Grandmother's pension and its effect on youth sexual behavior:

Evidence from the Cape Area Panel Study

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I. Introduction

Vast amounts of time, money and resources have been devoted to studying the sexual behaviors of young adults in South Africa in recent years. Teen pregnancy rates are relatively high in South Africa compared to equally developed countries and the spread of HIV/AIDS is of grave concern (Panday et al 2009). Programs that reduce sexual risk taking by young adults are of great interest to policy makers and economists. While some recent literature focuses on non-monetary solutions[1] to the problems, the effects of income on risky behaviors deserve attention. Changes in income affect schooling attendance, leisure/labor allocations and expenditure patterns, all of which influence a young adult's risk profile. In South Africa, there exists a non-contributory state-run pension program meant to support the elderly. South Africa's State Old-Age Pension (SOAP) program provides sizable cash payments (about twice the median per capita income) to elderly, who often live in the same household as their grandchildren. Pension income from grandparents exogenously increases household income in South Africa. A question that naturally arises is whether there exists a connection between SOAP pensions and youth risk behaviors.

Recent literature[2] has discussed intra-household allocation decisions to discern if and how pension income is transferred between generations. These studies suggest that depending on how income is pooled within households, the effects of pension income may differ based on the gender of the recipient. This has important policy implications: any difference seen between genders should drive policy makers' decision on how to target pension funds more efficiently. Also, recent literature[3] looking at the pension program mainly considers cross-sectional data.

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[1] See Lam, Marteleto and Ranchhod (2009) and Grossman and Markowitz (2005)
[2] See Duflo (2000) and Maitra and Ray (2003)
[3] See Dulfo (2000), Maitra and Ray (2003) and Edmonds E., Mammen, K. and Miller, D. (2003)

But, when analyzing risk behaviors concerns arise due to omitted variable factors that are constant across individuals, time and location. For instance, young adults have inherent risk inclinations and sexual behaviors change throughout time depending on changes in cultural values, societal norms and peer effects. Controlling for these fixed effects will help alleviate concerns about omitted variable bias in analyses based on the pension program.

Using data from the Cape Area Panel Study (CAPS), I analyze the relationship between sexual risk taking and income. CAPS is a longitudinal study of youth (ages 14-22 in 2002) in Cape Town, South Africa's second most populated city. Using ordinary least squares (OLS) fixed effects modeling, I find that grandfathers' pensions have no effect on risky behavior while grandmothers' pensions directly impact risk-taking behaviors. The effects of grandmothers' pensions on sexual activity, condom use and teen pregnancy vary based on the race and gender of the young adult. But the pension measurements potentially suffer from measurement error and are endogenous. To address this issue, I use instrumental variables approach using age-eligibility dummies as instruments for pension recipients. I find that the pension indicators likely suffer from classical measurement error. I still find that grandfathers' pensions have no effect on sexual risk taking. On the other hand, grandmothers' pensions increase overall sexual activity by 0.3%, condom usage by 3.1%, and teen pregnancy by 5.6%. The effects differ by the gender and race of the young adult due to differences in initial income levels and the power structure within South African households.

The rest of the paper is organized as follows. Section II reviews the history of the pension program and related literature. Section III discusses the data used in the empirical work. Section IV outlines the empirical models used in the regression analysis, including the specification issue with pension indicators. Section V discusses empirical results and Section VI discusses policy

recommendations and suggests potential areas for future research.

II. Literature Review

i. History of South Africa Old Age Pensions

Started in 1928, the Old Age Pension system was historically racist, created to benefit whites. In 1944, it was expanded to cover blacks, but at a much lower threshold. At the end of apartheid in 1991, the government made a concerted effort to equalize the pension program by increasing payments to blacks and coloureds. "The new system is universal and non-contributory" (Duflo 2000). By 2002, the program had been in full operation for just under 10 years. "There are a number of restrictions on the national program: (1) age eligibility begins at 60 for women and 65 for men, (2) the pension is restricted to individuals with a South African identification document, and (3) there is a means-test, which excludes mostly elderly whites," (Schatz and Ogunmefun 2007). According to Case and Deaton (1998), roughly 80% of age-qualified blacks and coloureds receive a pension. This agrees with Samson et al (2004), who find that 90% of pensioners receive the maximum pension, which amounts to R7440 (1116 USD[4]) in 2002. The grant is roughly 3.5 times the poverty line[5], so it represents a significant source of income (Case and Deaton 1998).

The South African government has taken many steps to reduce program fraud, including measures like fingerprinting and issuing pension ID cards. Additionally, the government has taken steps to alleviate difficulties in accessing pension funds. To help the elderly receive their pensions, administrators drive vans, equipped with ATMs capable of reading fingerprints, to convenient locations throughout South Africa (Case and Deaton 1998).

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[4] USD amounts are reported in 2011 US dollars.
[5] Based on the World Bank poverty line of $1 a day for poor countries, such as South Africa

ii. Household Demographics

a. Living Arrangements and Pension Transfers

"Living arrangements in South Africa are such that grandparents often live in extended households, with their children and grandchildren" (Duflo 2000). From anthropologists' perspective, Sanger and Mtati (1999) find that there exists normative pressure within South African households to pool their income from pensions. Additionally, they find that since South African society does not value the older adults, pooling pension incomes provides a way for elderly South Africans to gain respect. Behrman (1997), analyzing theoretical models of the household and previous literature, suggest that older women are more likely to pool their income than older males. Exploring many models of intrahousehold decision making, Behrman (1997) shows that male income is often separated from the rest of the household.

Furthermore, income outlays from elderly pensions also differ along gender lines. Bobonis (2006) finds that women in rural Mexico spend more of their pension income on household public goods, including food, education, and healthcare. Duflo (2000) and Maitra and Ray (2003), both discussed more below, find similar patterns as Bobonis (2006).

b. Gender Bias

Deaton (2000), recounting notable household surveys, finds a strong gender bias in the allocation of resources within households and argues that younger men are able to capture more of the household income compared to women. Bolt and Bird (2003), analyzing case studies from around the developing world, find that younger males are able to take advantage of older women within households. Interviewing 20 older women, Bolt and Bird (2003) find that the respondents

note that younger males control the household income, including their own. Lundberg (2005) surveys psychology and economics literature and determines that there exists a "son" preference in the developing world: households with sons are more stable and male parents spend more time with their sons than daughters.

iii. Previous Outcomes of Pension Program

Case and Deaton (1998) find that the pension program transfers income to the predominately poor, closing the income gap. However, analyzing data from 1993, they find that pension income has a statistically similar effect on food expenditure as regular income: "a rand is a rand whatever its source." Since then, Maitra and Ray (2003) have challenged this theory using similar cross-sectional data as Case and Deaton (1998). They conclude that expenditure patterns are different in the presence of an increase in pension income compared to regular income. Using a three stage least squares approach, Maitra and Ray (2003) note that schooling increases in the presence of pension income, allowing more young adults to consistently attend school and complete more grades. Samson et al (2004), using cross-sectional data from South Africa's Income and Expenditure Survey and Labour Force Survey, also find that schooling outcomes increase in the presence of pensions. Edmonds (2006), using data from the Survey of the Activities of Youth, finds that pensions eliminate credit constraints, particularly for black households, allowing young adults to attend school more consistently. Barrientos (2002), by surveying previous literature, finds that the pensions protect the health status and financial security of elderly. Case (2004) addends this finding to include the condition that pension income must be pooled for its effects to be felt, using data from the Langeberg Survey. In

particular, Case (2004) finds that the presence of a pensioner decreases the likelihood that adults skipped meals by 25%.

Duflo (2000) evaluates cross-sectional data from the South African Labor and Development Research Unit to capture the effects of pensions on the nutritional status of children younger than 5 years old. She finds that the effects of the pensions differ by the sex of the recipient, and that empirical analyses using pension indicators likely suffer from both measurement error and endogeneity bias. Dulfo finds that female pensioners improved weight for height by 1.19 standard deviations, and height for age by 1.16 standard deviations for young women, while male pensioners had no effect: effects are felt from "grandmothers to granddaughters." Dulfo uses eligibility dummies[6] as instruments for the pension variables to correct for measurement error and endogeneity.

Ardington et al (2009), in a study that uses CAPS, find that grandparents care for their grandchildren when their own children die. Although grandparents also bear the financial burden of caring for the children, they receive large public and private transfers to offset the costs. However, the authors did not run fixed effects regressions: instead they ran OLS regressions on the fourth wave of the survey, and pulled in data from previous waves.

v. Risky Behaviors

Some surveys have used CAPS to analyze risky behaviors. Bezabih, Mannberg and Visser (2010) look at the relationship between sexual risk taking and expected welfare. Again the authors only analyze data from the third wave, choosing to pull in information from other waves

[6] Indicators noting whether an age-eligible individual, split by sex, lives in the household

when necessary. They construct a sexual risk profile (using questions[7] such as number of sexual partners and relationship to sexual partner) to test the effects of income and health status: they find that increases in income decrease sexual risk taking in Tobit models (coefficient of income is negative 0.07, statistically significant at 5%). Bezabih, Mannberg and Visser (2010) also find that condom usage decreases with increases in income (coefficient of income is negative 0.057, statistically significant at 5%), but the probit models have extremely low R-squares (less than 0.1).

Lam, Marteleto and Ranchhod (2009) study the role of peer effects on sexual behavior. The authors focus on the second and third waves of CAPS and limit their research to young adults between the ages of 14-17. Constructing a measure of cumulative exposure to classmates at least two years older than the student, Lam, Marteleto and Ranchhod (2009) find that an increasing exposure by one standard deviation increases the probability of sexual activity by 9.9 percentage points for young women. The estimated effect for young men is half the size and statistically insignificant. The authors control for race, but do not include interaction terms with the key variable independent variable of interest.

In addition, Panday et al (2009) survey the issue of teen pregnancy in South Africa. Based on 2001 census data, the overall teen pregnancy rate was 65 births per 1000 (comparable to Oceania and Latin America), with higher rates for blacks (71 births per 1000). The authors recommend increasing prevention education to reduce teen pregnancy rates and increased help to allow teen mothers to return to school. Kostova et al (2010) estimate the price elasticity of smoking participation at -0.63. The authors find that the likelihood of participation decreases with anti-smoking sentiment. Kostova et al (2010) also discuss the importance of quantity of

[7] I do not use these questions for my analyses because I find them to have poor response rates

cigarettes consumed: they find that the same anti-smoking sentiment does not reduce the number of cigarettes smoked.

Using US data, Markowitz, Kaestner and Grossman (2005) find that alcohol has little effect on the decision to have sex, but that alcohol use predicts lower condom usage. The authors instrument for alcohol (given the potential simultaneity) using taxation rates on beer and monetary price of marijuana, but find that IV results do not differ greatly from the OLS. Grossman and Markowitz (2005), using similar data and instruments, find that illicit drug use is correlated to alcohol usage. Additionally they find that illicit drug use increases unsafe sexual activity, teen pregnancy and reduces condom usage. Risky behaviors appear to complement each other: one begets another.

Section III: Data

i. The CAPS Survey

The data for this paper is taken from the Cape Area Panel Study, a longitudinal survey of youth from the city of South Africa. Surveys of young adults and their households were conducted between 2002 and 2006 in 4 waves. This paper uses data from waves 1 (conducted in 2002), wave 3 (conducted in 2005) and wave 4 (conducted in 2006). Wave 2 did not focus on the same topics as the other waves and suffers from data consistency issues as it was gathered during a longer period of time[8]. For each household containing young adults, both the young adults and the head of the household were interviewed. The researchers who gathered the data took great

[8] Wave 2 data was collected over a two-year period, instead of a 6-9 month period like the other waves. Additionally the focus of the surveys in Wave 2 changed part way through, focusing more on unemployment and psychological stigma surrounding AIDS. This created data inconsistencies across waves.

care in establishing samples for the survey.[9] Sampling proportions, however, do not reflect the population of Cape Town as the researchers over sampled black and coloured young adults.[10]

The CAPS survey asked young adults an extensive list of questions regarding different economic, health and behavioral issues. The survey puts a strong emphasis on providing data capable of answering questions related to educational outcomes, sexual relationships and intra-family interactions. For the purposes of this research, I used demographic and educational data as well as information on household membership, employment and income. Most of the variables come directly from the survey, including the key independent variable of interest regarding the old age pension. Most variables were available for all waves, with one exception. Income information was not collected in wave 4. I imputed the value of income using the data from wave 3 and multiplying by the growth rate of income between the two periods.[11] While this does not provide an exact measurement of income, it likely provides a good approximation given the relatively short period between waves 3 and 4. For the top wage earners in a family, their income will likely not fluctuate greatly from year to year. No recessions or other major unemployment shocks occurred in Cape Town during this period.

I have also created another measure of welfare, called a wealth index, to capture long-term wellbeing. Using both income and a wealth index provides an indicator of both transient and permanent welfare, capturing a fuller effect of wealth on behavior. Based on work by Filmer and Pritchett (2001), I developed a wealth index using a series of household characteristics and

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[9] The researchers took precautions to randomly sample young adults. They randomly chose clusters of households to examine within Cape Town and then random chose homes to sample within those clusters.

[10] Results later in the paper have been weighted to reflect Cape Town's population

[11] According to Murphy and Topel (2002), this will affect the standard errors in my regression models. The standard errors will be understated compared to their true value. I run regressions that include and exclude the income related variables and I find the standard errors to insignificantly change; therefore I assume any bias introduced is small.

principle components analysis. Principle component analysis orthogonalizes the independent variables into a set of uncorrelated variables. Taking the first principle component produces an index that captures the most variance between all the variables. Filmer and Pritchet (2001) show that the index is "a proxy for something unobserved: a household's long-run economic status." The correlation between the wealth index and income is 0.36, indicating that the two measures are related, but represent different aspects of welfare. Summary statistics of all independent variables are found in Table 1.

I analyze three dependent variables that directly relate to risky behaviors in young adults. In the survey, youth were directly asked whether they are sexually active, used condoms the last time they had sex, or were a part of a pregnancy event (either being pregnant or making someone pregnant). These serve as the dependent variables in the regression analysis. Summary statistics for dependent variables and other risky behaviors are provided in Table 2.

If I consider the full sample for sexual activity and pregnancy, I will pick up non-risky behaviors. Sexual activity and having children past a certain age does not indicate risky behavior. To try and measure the existence of risky sexual encounters and pregnancies, I consider a sample of near teens, defined as an individual who was under the age of 22 in the final wave. This sample provides a crude measure and may not capture the full scope of risky sex or pregnancies, but will target risky behaviors better than the full sample.[12] Summary statistics, based on this "teen" sample, are found in Table 3.

Previous research in Samson et al (2004) indicates that over 90 percent of pensioners receive the full pension amount, with the remaining receiving small deviations from a full

[12] To mitigate some of the omitted potential, I consider another sample of near teens, defined as individuals who were younger than 18 in the first wave. Regression analysis did not yield significant differences between the two samples. For the rest of the paper, the first teen sample (defined as all individuals younger than 22 in the fourth wave) is used.

pension. Based on this conclusion, I assume that all pensioners receive the full amounts for this research. Full pension amounts were for Wave 1, R7440 (1116 USD[13]); Wave 3, R7918[14] (1188 USD); Wave 4, R8059[14] (1209 USD). This translates to 18% of average income in wave 1, 16% of average income in wave 3, and 16% of average income in wave 4. For households receiving pensions, this translates into 33% of average income in wave 1, 46% of average income in wave 3, and 43% of average income in wave 4.

ii. Potential Issues with the Data

As with other panel studies, attrition across waves affected CAPS. The researchers took great care to analyze the cause of attrition and suggest any potential biases it may introduce. The most common cause of attrition was that young adults moved out of Cape Town. To test for potential systematic attrition, the researchers include regressions in their guidelines testing the significance of certain household factors on attrition rates. Gender had no statistical effect nor did income quintiles. Being connected to electricity in the first wave lowers the likelihood of attrition. This suggests that slightly wealthier households are more likely to remain the sample. This, however, implies that households with pensioners are less likely to drop out of the sample, reducing any potential bias.[15] Other than electricity, attrition appears to occur arbitrarily, so the remaining sample is still a valid random sample (Lam et al 2008).

For the purposes of my analysis, I took additional steps in order to produce a balanced panel dataset. When merging the waves together, I dropped respondents who did not appear in all three waves of interest. As Table 4 shows, the remaining sample in each wave and those

[13] USD amounts are reported in 2011 US dollars.
[14] These values are adjusted for inflation and are reported in 2002 (Wave 1) rands.
[15] Since I am looking at teenagers, they are also more likely to remain in the sample, as they are less likely to move than older counterparts.

dropped in this process are statistically similar across all variables and time, consistent with the researchers finding that attrition minimally affects results.[16] Upon further inspection, it appears that the young adults in the dropped sample are a little older, slightly more likely to be sexually active and less likely to experience a pregnancy event. Condom usage is not different between the samples. Excluding this sample could lead to upward, selection bias for effects on the sexually active, condom use and pregnancy indicators, since the sample considered may over-represent risky sexual behaviors. But since the differences between the means are statistically insignificant, selection bias is likely to be small or nonexistent. Additionally, about 30 respondents appeared more than once in the survey as they lived in multiple households, either as the result of a divorce or the surveyor not being able to correctly identify the proper household.[17] Many families live in communal housing in Cape Town, where multiple families share a common courtyard and sometimes bathing facilities. In these cases, the respondents were included, but their household information was averaged together. An indicator was included in regressions to mark this process, but I find it to be insignificant in all specifications.

Since the dependent variables related to sexual behaviors are self-reported, there may be some other biases present in the data. This might be the case particularly for teenagers, who may be less inclined to speak about their drug or alcohol usage due to age restrictions or social pressures of admitting sexual behaviors. To account for this possibility, I included an indicator for whether others were within hearing range during the interview. In regressions for both the sexual activity and the condom use variables, I find this indicator to be insignificant in all cases. For pregnancy events, the indicator is either insignificant or slightly positive, the opposite

[16] Hypothesis tests failed to reject the null hypothesis that the means are the same between the two samples at the 10% level.
[17] When dropping this sample from the analysis, the regression results do not change. The sample is included to achieve more precise estimates.

direction I would expect if measurement error, due to intentional misreporting, were present. In all cases, the tests agree with a hypothesis of little to no measurement error.

To the extent that measurement error still exists, I would expect the dependent variables to be underreported; young adults are less likely to report deviant behavior than to falsely admit to it. In this case, point-estimation is not a concern. The presence of classical measurement error in dependent variables will lead to "OLS estimators that are unbiased and consistent," (Woolridge 319) given that the cause of measurement error is unrelated to any of the independent variables. For the purposes of this research, I assume that measurement error does not occur systematically.[18] Given this assumption, the only problem with estimates will be larger standard errors, which can only be corrected with better data collection. This should be considered when interpreting results.

Another potential issue with the data is the fact that, although I control for households receiving other types of government pensions (including childcare or disability pensions)[19], I am not able to distinguish the other type of grant that the households receive. As a result, I cannot control for relative differences in income from these alternative transfers.

Finally, most of the dependent and independent variables considered in the analysis are binary. While this does provide a measure of risk taking by young adults, it does not allow for important quantity discussions that should accompany risk-taking behavior. For alcohol and cigarettes, it is important to know how often they are being used, as well as if they are being consumed at all. Without considering both participation and quantity, the effects of a policy may

[18] Measurement error is most likely dependent on the interplay between different household members. Although these relationships may depend on income, education or other demographic factors, by using fixed effects I control for most of these factors. It is important to note that it is not likely, but measurement error could occur systematically.

[19] For additional information on the different types of pensions in South Africa, see Samson et al (2004)

be overstated. For example, Kostova et al (2010) find that anti-smoking campaigns may be successful in reducing number of participants, but not the number of cigarettes smoked. Considering only participation data would yield a different conclusion than including both pieces. The data in CAPS do not provide quantity measurements of risky behaviors, however, limiting the potential scope of this line of research.

iii. Discussion of summary statistics

The summary statistics, discussed briefly below, are presented in tables 1, 2 and 3.

Sexually Active: Women and men reported statistically similar sexual activity across all waves, with 42.3% of young adults being sexually active in the first wave, 73.2% in the third wave and 82.5% in the fourth wave.[20] In the sample of teens, the proportion of sexually active young adults is smaller than the full sample (26.5% in the first wave, 64.8% in the third wave, and 76.7% in the fourth wave). Teen males are slightly more likely to be sexually active although the difference is statistically insignificant at the 10% level. Teen males report, on average, a likelihood that is 3.1 percentage points higher than females.

Condom Usage: The data reported in table 3 for condom usage only consider the sample of individuals that are sexually active. In the first and third wave, men reported slightly higher condom usage rates than women (66.3% of young men use condoms the last time they had sex compared to 60.9% for young women in the first wave, and 65.2% compared to 62.0% in the third wave). Two explanations exist for this phenomenon. First, men control condom usage and therefore may be more likely to use one. Along the same lines, since men control condom usage, they may be more aware that a condom is being used. If an inexperienced young woman has no

[20] The first wave proportion is much smaller than the other two, likely due to the age differences between Waves 1 and 3.

exposure to condoms prior to sex, she may not know what a condom is, causing a slightly underreported percentage. Also in wave 4, there is a decrease in overall condom use percentage, likely driven by the increased age of the sample. Older individuals are more likely to have unprotected sex in order to conceive children.

Pregnancy: Across all waves, women reported a higher level of pregnancy events compared to men (17.1% young women involved in a pregnancy event compared to 5.7% for men in wave 1; 35.9% compared to 15.4% in wave 3; and 42.7% compared to 21.0% for wave 4). Measurement error may be present in the young men sample as it is not always possible to determine if a particular man is responsible for a pregnancy. Women, on average, have relations with older male partners. Since the average age of partners is higher for women then men, I expect that a woman's chance to experience a pregnancy event is higher than a man's at a given age. Since men and women have the same average age in the sample, I would expect a higher frequency of normal pregnancy events for women. Looking at the teen sample, the same difference between genders is observed across waves. But, as expected, the overall rates of pregnancy events in the teen sample are lower for both sexes by an average of 48% for men and 56% for women.

Consume Alcohol and Smoke Cigarettes: Men report higher cigarette and tobacco usage across waves: males appear to be greater risk takers. Young men report an 81% higher likelihood of smoking, on average, than women. This could be a result of stronger social pressure on men to behave in a particular manner. Young men could use smoking, long associated with machismo, as a symbol of strength or social standing ("Is Female Smoking Female Machismo" 1974). Men use alcohol at a higher rate than young women, on average by 76%. Similar to smoking, drinking may signal status to males' peers leading to higher usage. Alcohol and cigarette usage are also

positively correlated with sexual activity and pregnancy. The Pearson correlation coefficient between alcohol and sexual activity is 0.205 and between smoking and sexual activity is 0.139. The correlations between smoking, drinking and pregnancy events are lower; they are 0.059 between alcohol and pregnancy and 0.090 between smoking and pregnancy is 0.090. This is not surprising given that some portion of the sexual activity is risky. Furthermore, women change their behaviors if they become pregnant, unlike the fathers who have fewer incentives to change. If pregnant women quit smoking and drinking (a reasonable behavior change), this would contribute to the differences between genders.

Pension Variables: Female pensioners are more present, on average by 188% more than male pensioners. This holds across all waves, sexes, ages and races. This is to be expected for a few reasons. Women live longer than men, increasing the chances that they make it to eligibility age. Also the pension eligibility age for females is lower than for men (60 years versus 65 years). Young men and women are equally likely to live in a household with a pensioner(s). Of households that have a pensioner, 14% contain two pensioners and no households contain more than two.

Education: Young women have acquired more education in the sample than young men. A higher proportion graduated all levels of education and young women have studied for 0.28 more school years, despite a higher pregnancy rate. There may be an ability difference between young men and women that allow women to attain higher levels of education at the same age.

Household Demographics: Young women are more likely to be married than young men across all waves. This can be explained along the same lines as pregnancy: since women hit puberty earlier, they sexually and emotionally mature earlier. This makes it more likely for them to marry at a younger age than men and on average men tend to marry women younger than

themselves around the world. Interestingly, a male's parents are more likely to be married than a female's, a finding consistent across all waves. This result is consistent with Lundberg (2005) who finds that parents have a strong preference for sons, especially in developing countries. Since males control most household decisions (Bolt and Bird 2003) and are found to spend more time with sons, they will be more likely to marry given a son (Lundberg 2005). Young women also live in slightly larger households than men, a finding consistent with the pregnancy variable. If more women have been a part of pregnancy, they will have larger households due to extra births.[21]

Welfare: Young men live in slightly richer households on average, but have the same level of permanent wealth as women. The difference in income is not statistically significant, so it appears that both genders have the same levels of welfare. No systematic bias seems to affect income or wealth. This finding is consistent with multi-generation living. Typically single mothers would be poorer than married couples with children, but extended households in South Africa compensate for income differences.

Teen Sample: The teen sample I studied differed from the overall sample in a few ways. As stated earlier, sexuality activity is lower across waves for the teen. The teen sample also contains lower pregnancy events (in first wave, overall event proportion is 11.8% while in the teen sample it is 4.1%), education, and marriage. The teen sample interestingly appeared to be slightly richer than the overall sample with a higher average wealth index (the teen wealth index is calculated as negative 0.086 in the first wave compared to an overall negative 0.254; 0.372 in the third wave compared to 0.230; 0.182 in the fourth wave compared to 0.024). There is a higher likelihood that young adults live with their parents if they are younger, so they would

[21] This assumes that women do not leave their current household after giving birth. This is a safe assumption given the research that indicates South African live in multi-generational households.

have higher wealth by association.[22]

Race: Nearly all Cape Town residents are black, coloured or white with the highest percentage of city identifying themselves as coloureds (48.1% based on census data from 2001). The three races statistically differ, especially in terms of human capital, income and household demographics. For the purposes of the research, I exclude the white sample. Whites comprise a very small portion of the population, but are major outliers in terms of participation in risky behaviors, income, education and family demographics in my sample. These findings are consistent with the literature. Policy implications of this research will have little effect on the whites, due to their higher observed income. Results in the paper still adjust to accurately report coefficients that reflect sizes of the black and coloured population in Cape Town.

Compared to coloureds, blacks are poorer in the sample, regardless which measure of poverty is used. On average, the black households have 54% less income than coloureds and the wealth index for blacks is 1.17 standard deviations smaller than for coloureds. Blacks have a lower amount of education in the first wave (8.8 years compared to 9.3 years for coloured), despite being the oldest age group at the start of the survey. Blacks' parents are statistically less likely to be married than coloureds' (on average, coloured parents are married 70% more often than black parents). The coloureds are slightly more likely to live with a pensioner, both male (5% more likely) and female (24% more likely). Additionally, coloureds have slightly smaller households than blacks (by an average of 0.2 individuals). Given more adverse socio-economic factors, I expect an income shock from pensions may be felt more by blacks than coloureds.

[22] The alternative sample of teens (young adults younger than 18 in the first wave) is closely related to the teen sample considered (there is a 91% cross over). Summary statistics for this sample are presented in Table 3, third column.

iv. Pension Samples

Differences in effects between male and female pensioners can arise from two sources. Either pension recipients pool and distribute pension income differently, or the gender of the pensioner indicates differences in sample composition. I will discuss the first possibility more in Sections V and VI. To check the second possibility, I looked at the sample split by gender of pension recipient. Summary statistics are provided in Table 5. The pension samples are small relative to the overall samples. Despite the small sample size, the samples are statistically similar to the overall sample. There are small differences in income for households containing pensioners (R2602 for households with a male pensioner and R3479 for households with a female pensioner), but this difference is statistically insignificant. From this, I can assume the effects of the pensions come from how income is pooled and shared within households instead of differences in samples.

Additionally if the majority of households contained both a male and female pensioner, it would nearly impossible to discern differences based on the pensioner's gender. On average across waves, however, 16% of households that report a pensioner also had a second pensioner. No households report more than 2 pensioners. Considering the low percentage of crossover, the analysis can safely be split along the sex of the pension recipient.

Section IV: Empirical Approach

i. General OLS Model

Risk behaviors theoretically depend on both nature and nurture (Bezahib, Mannberg and Visser 2010). A young adult's surroundings, upbringing, friends and family will all influence their decisions along with an inherent risk aversion or desire-seeking behavior. A fixed effect

model is justified in this case as many of these influences will not likely change over time. The general fixed effects model controls for both time and individual fixed effects. Young adults that live close together attend similar schools and interact with the same group of peers throughout the sample. To control for immeasurable effects seen by this phenomena, I control for both peer and neighborhood fixed effects. In addition, individuals have different risk profiles and natural proclivities towards social interaction, calling for the use of personal fixed effects as well. Given that my dependent variables are binary, I use a linear, fixed-effects probability model. As discussed in Section II, previous research[23] indicates that different effects may be seen depending on the gender of the pensioner, so I separate the pension indicator based on the sex of the recipient to check for differences. So, the basic OLS, fixed-effect model I use is:

$$Y_{itn} = \beta_0 + \beta_1 MaleSOAP_{itn} + \beta_2 FemaleSOAP_{itn} + \beta_3' X_{itn} + \alpha_i + \lambda_t + \gamma_n + \varepsilon_{itn} \qquad \text{(Eq 1)}$$

where i indexes individual young adults, t refers to three time periods and n refers to ten neighborhoods[24] respectively. In this specification, MenSOAP refers to the presence of a male pensioner, WomenSOAP refers to the presence of a female pensioner, X is a rich set of individual/family level variables including young adult age, marital status, years of education, educational attainment, parental marital status, household welfare and demographic makeup. Y represents outcomes including risky sexual behavior, pregnancy and condom use. Also λ_t represents time fixed effects, γ_n represents neighborhood fixed effects, α_i represents individual fixed effects and ε_{itn} is a independent, identically distributed error term with mean zero.

[23] See Duflo (2000), Bolt and Bird (2003) and Bobonis (2006), among others.
[24] The data were captured in three waves, one in 2002, 2005 and 2006. There are 10 different magisterial districts represented in the sample

Controlling for the three different fixed effects separates this analysis from previous cross-sectional analyses in South Africa[25] and other analyses using the CAPS data[26]. Also, as indicated in previous research, the effects of pensions likely differ based on the gender and race of the young adult. To capture potential differences, I include interaction terms between the pension, sex and race indicators. My fully interacted model is therefore:

$$Y_{itn} = \beta_0 + \beta_1 MSPI_{itn} + \beta_2 FSPI_{itn} + \beta_3' \mathrm{X}_{\mathrm{itn}} + \alpha_i + \lambda_t + \gamma_n + \varepsilon_{itn}$$
$$MSPI = \{\text{MaleSOAP x Int}\}$$
$$FSPI = \{\text{FemaleSOAP x Int}\} \qquad \text{(Eq 2)}$$
$$\text{Int} = \{1, \text{Female}, \text{Coloured}, \text{Coloured x Female}\}$$

where "Int" is the set of interaction terms. In this specification, β_1, β_2, β_3 are vectors.

ii. Identification

In this OLS specification, the effect of pensions on risky behaviors is identified by variables that capture the presence of a pensioner in the household. These values are reported by the heads of households in interviews that happen concurrently with youth surveys. All pension recipients in the sample are the young adults' grandparents, who are only the heads of households in about 3% of cases. Since the head of the household reports pension presence and they may not be fully aware of the financial status of older members of the household, the pension indicators may suffer from measurement error, introducing bias to results. Assuming classical measurement error, the OLS estimates are going to be downwardly biased. In addition, despite controlling for fixed effects across individuals, time and neighborhoods, possible

[25] See Duflo (2000), Mantra and Ray (2003) and Schatz and Ogunmefun (2007)
[26] See Case and Deaton (2008), Lam, Marteleto and Ranchhod (2009) and Ardington et al (2009)

endogeneity concerns exist. For example, receiving a pension indicates access to and knowledge of government services, which could affect youth behavior.

Using an instrumental variables approach could address these issues. I use the presence of an eligible household member as an instrument for the pension variable.[27] Government data indicates that 80% of eligible adults receive the pension, while age is exogenously determined (Samson et al 2004).[28] For these reasons, age eligibility dummies are valid instruments. The age eligibility dummies also do not suffer the same measurement error as the pension variables. Heads of households likely know the age of older members better than their financial situation, as age is commonly shared within a household and because the heads of households are not old (average age is 47 years).[29]

In practice this is accomplished by using fixed effects, two stage least squares model, where in the first stage, the pension variables are regressed on the instruments and other exogenous variables in the main model.

First Stage

$$SPI_{itn} = \alpha_0 + \alpha_1 EMI_{itn} + \alpha_2 EFI_{itn} + \alpha_3' \mathrm{X}_{\mathrm{itn}} + \mu_{itn} \qquad \text{(Eq 3)}$$

Second Stage

[27] I use two indicators, male eligible for a pension and female eligible for a pension, as instruments for male pensioners and female pensioners, respectively.
[28] In my sample, 81.7% of eligible females receive a pension while 66.8% of eligible male receive a pension.
[29] Literacy and age clustering also potentially affect measurement error. Age clustering does not appear to affect CAPS though as even proportions of ages are reported for adults greater than 55 despite its presence in many developing countries data surveys.

$$Y_{itn} = \beta_0 + \beta_1 MSPI_{itn} + \beta_2 FSPI_{itn} + \beta_3' \mathrm{X}_{\mathrm{itn}} + \alpha_i + \lambda_t + \gamma_n + \varepsilon_{itn}$$

$$SPI = \{\mathrm{MSPI}, \mathrm{FSPI}\} \qquad \text{(Eq 4)}$$
$$EMI = \{\mathrm{MaleEligible\ x\ Int}\}$$
$$EFI = \{\mathrm{FemaleEligible\ x\ Int}\}$$

where α_0, α_1, α_2 are vectors and everything else is as in equation 2.

Section V: Results

i. Prelude: Alcohol and Tobacco

The variables related to smoking and drinking in the data set are binary indicators of whether or not the young adult participates in the activity. Both behaviors can be considered risky: smoking increases the likelihood of cancer, heart disease and other health ailments, and excessive drinking can lead to liver damage and other medical complications. But the interest in smoking and drinking involves two elements: participation and quantity. Participation alone does not constitute a risky behavior: it needs to be accompanied by a risky quantity of participation. Consider the example of teenage drinking. A teenager drinking does not necessarily constitute a risky behavior, but a teenager drinking 10 beers at a time does. Because I am not able to measure quantity of these behaviors, I use the indicators as independent variables. Both variables provide a good proxy for risk seeking behaviors: previous literature cites the effects of risky behaviors, such as alcohol consumption and drug use, on condom use and sexual activity (Grossman and Markowitz 2005). Potential simultaneity and endogeneity issues[30] exist when considering smoking and drinking as independent variables. Markowitz, Kaestner and Grossman (2005)

[30] Multicollinearity may also be an issue. I ran regressions using the binary indicators for smoking and drinking as the dependent variables. The R-squares for the regressions were extremely low (less than 0.10 on average), indicating little to no collinearity.

suggest that including indicators about risky behavior yields similar results to instrumental variables strategy that control for simultaneity and endogeneity issues. I include two indicators (one for smoking and another for drinking) to control for their effects on sexual behaviors.

ii. Independent Variables

All specifications include indicators for males and females receiving pensions and interactions with a young adult gender identifier to capture differences in effects between sexes. The other sets of variables are welfare[31], education[32], young adult[33], parent,[34] and household[35] demographics. All specifications regarding sexuality activity include the smoking and drinking indicators as a proxy for risk tolerance. In addition, for condom usage, I include a lag indicating whether the condoms were used in the previous wave. Reported standard errors are robust standard errors, clustered on magisterial district to allow for heteroskedacity and arbitrary correlation within distribution. The proceeding sections present results from regression analysis based on models discussed in Section IV.

iii. Sexually active: "Grandmothers and Granddaughters"

a. Fixed Effect OLS

[31] Log income to allow for decreasing marginal effects of additional income, log income squared to capture additional non-linearity provided by changes in income, wealth index and indicators for various levels of the wealth index to allow for decreasing marginal effects of additional wealth.
[32] Log of years of education to allow for decreasing marginal effects of additional education, indicators for graduating general education, high school and attaining an advanced degree, omitting a variable indicating that no formal school attainment had been reached
[33] Age, age squared, indicator for married
[34] Indicators for parents living, parents married
[35] Indicators for who is head of household, number of old present (age > 50), adults present (age between 27-50), peer present (age between 14-27) and very young child present (age < 4)

The OLS results for sexual activity are found in Table 6. Since I am most interested in potentially risky sexual behaviors, most of my analysis focuses on the teen sample discussed earlier. Based off the OLS regression, it appears a few independent variables (outside the pensions) have a significant effect on sexually activity. Welfare measures have no significant effect, while graduating high school had a small, positive effect (0.03 standard deviations) and attaining an advanced degree has a negative effect of 0.10 standard deviations, significant only at the 10% level. Interestingly, having a living father decreases the likelihood of sexually activity by 0.20 standard deviations, significant at the 1% level. The presence of a father likely frightens young adults from being sexually active. But this may be endogenously decided, so the true size of the effect is unclear. Cigarette use and alcohol consumption[36] were both positive at the 1% level (0.10 standard deviations and 0.12 standard deviations with an interaction term of negative 0.06 standard deviations, respectively). As expected from Grossman and Markowitz (2005), risky behaviors are positively related. These results indicate that if a young female were to both smoke and drink, the effect of those behaviors would offset the benefit from female pensioners.

In the first regression, I only included the pension indicators with an interaction term with young woman. I find that male pensioners have no effect on either young men or women. Additionally, female pensioners have an insignificant effect on young men, but a significant, negative effect of 0.17[37] standard deviations for young women. When controlling for welfare, education, demographics, and alcohol and tobacco usage, similar results hold: male pensioners have no significant effect on young men or women while female pensioners only have a

[36] I also considered an indicator term considering whether the individual both smoked and consumed alcohol.

[37] An F-test was significant at the 5% level testing whether the indicator for female pensioner and its interaction term where jointly significant. Therefore, the total effect of female pensioners is found by adding the coefficient of the indicator to the coefficient of the interaction term.

significant and sizable negative effect on granddaughters (negative 0.20 standard deviations). Directionally, this result agrees with Dulfo (2000): it appears that the only effect felt in a family is between a grandmother and her granddaughters. The magnitude of the coefficient is smaller than Duflo's finding on the effect of pension on weight-to-age ratio (0.60 standard deviations) and height-to-age ratio (0.71 standard deviations). Interestingly, both my results and Duflo's suggest that female pensioners cause movement away from risky outcomes for young women.

b. Race

In contrast with Duflo, the data enable me to control for race. Since the sample includes blacks and coloureds, I added interaction terms[38] to the previous model to capture differences in pension effects between races. The results from running a partial interacted regression are presented in the sixth column of Table 6. I also include all independent variables found in column 5 of Table 6. The base case in the regression models is black males.

When controlling for race, the male pensioners still have no effect on young adults regardless of gender and race (all coefficients are insignificant at the 10% level). Female pensioners have a statistical effect only on young, coloured women (F-test of all relevant interaction variables significant at the 1% level), while no effect is seen for young black men, black women, or coloured men. The magnitude of the effect for young, coloured women is a little larger than the overall sample (negative 0.25 standard deviations compared to overall of 0.20 standard deviations).

These results are interesting. I initially predicted that the effects of the pensions would be

[38] Included interactions are between pensioner and indicator for coloured as well as a second order interaction term between pensioner and female and indicator for coloured to capture second order differences.

felt more for blacks than coloureds. Blacks have lower initial income, education along all measures and adverse household demographics (large households, lower parental marriage rates), so the marginal effect of new income should be felt more. However, it appears that since coloureds are richer than blacks, the pension income is more disposable, allowing for increased leisure and education. Blacks, on the other hand, likely use the income to meet basic needs like food, education, and healthcare (Samson et al 2004). By contrast, for coloureds, the combination of additional family interaction (increased leisure means grandparents are more likely to be at home, adversely affecting sexual behavior) and more sexual education exposure (since total education increases) leads to the observed relationship between coloured grandmothers[39] and granddaughters.

To give a better sense of the magnitude of these coefficients, if the pensions were extended to individuals older than 55, an additional 10.1% of households would live with a female pensioner. This directly translates into a 10.1% increase in the cost of the pension program assuming no additional costs are incurred servicing the new population and that all eligible adults receive the pension. Since coloured women experience changes in sexually activity due to pensions, 8.7%[40] of young, coloured women experience a risk change of 0.25 standard deviations. When averaging back together with all other races and sexes, this comes out as a total effect of 0.01 standard deviations, or 0.3%, change in sexual activity.

Given that these results are in line with Duflo (2000), it appears that male pension income is less likely to be pooled with the rest of the household income. Older males keep the income for themselves and spend it on their wants and needs. Maitra and Ray (2003) find that

[39] There is a possibility that grandmothers of coloured youth are not coloured themselves. This data do not allow me to test this possibility, but it could explain the observed effect.
[40] The additional proportion of coloured women living with a female pensioner if this program change were implemented

expenditures on tobacco, alcohol, fuel, and food increase when males receive a pension, consistent with the notion that male do not pool their income. On the other hand, female pension income is more likely to be pooled, so it trickles down to grandchildren. Duflo (2000) finds female pension income is pooled, resulting in increased expenditures on young women's education, nutrition and healthcare.

The effects of the pensions, though, could be different depending on the relative size of the pension income compared to household income. Based on this conjecture, I ran regressions on samples split at the median[41] household income. At the median household income level, a full pension represents 27% of household income, sizable even for richer households. Results are presented in Exhibit 1. Despite the apparent size of coefficients for male pensioners (the point estimate for the effect on young, black women is 0.52 standard deviations), all effects are insignificant at the 10% level. Male pensioners have no statistically significant effect regardless of income level, sex or race. From female pensioners, the effects on poorer households are significantly negative compared to richer households, with the exception of coloured men (but these values are statistically insignificant). For coloured women, the effect of a female pensioner does not statistically differ from zero for richer households, but is negative 0.56 standard deviations for poorer households.

Since income is not the entire story, research by Lam, Marteleto and Ranchhod (2009) hints at an explanation. The researchers find that differences in exposure to older peers drives differences in sexual debut between black and coloured females. While the analysis is not truly

[41] I considered the possibility of splitting into more samples, but sample size constraints became an issue.

longitudinal[42], it does hint at why negative pension effects are being captured. If the research is considered from the perspective of a student forced to repeat a grade, the young adult will more likely sexually debut because they are exposed to younger classmates. Dulfo (2000) finds that female pensions allow young women to stay in school, allowing them to complete grades quicker and have less exposure to peers of different ages. Similarly, Edmonds (2005) finds that the reduction in liquidity constraints due to pension income allows students to attend school without interruption, consistent with Lam, Marteleto and Ranchhod's findings. Since more coloured households receive pensions and have more initial wealth, the liquidity constraints are lower for coloureds, leading to the difference in the size of the effects seen between blacks and coloureds (Edmonds 2006).

iv. Condom Usage

a. Fixed Effect OLS

I follow a very similar framework to the OLS regressions found in the sexual activity section. A few changes are made. First I consider a different sample, consisting of individuals who report having sex by the fourth wave. Two potential issues arise from considering this sample. Individuals in the sample may report not being sexually active in earlier waves (so they have no condom usage), skewing the results downward. In order to control for this, I include the sexually activity indicator in the regressions. Additionally, since I consider the full sample of individuals who are sexually active, some instances of sex may purposely not involve a condom, i.e. in order to get pregnant. While this is a concern, the direction of the bias is fairly obvious: it will cause the coefficients to understate their true effect.

[42] The data they use to measure this effect is only available in one wave. Therefore I cannot include it in the panel regressions.

Condom usage is autocorrelated, as suggested by many economic and healthcare researchers[43]. To control for this, I include a lag of the condom usage. Autocorrelation does not bias coefficient estimates, but it does cause misstatement of standard errors. However, I find condom usage to be negatively autocorrelated, which implies that my standard errors with be overstated (Wooldridge 353). To capture knowledge of HIV (which is likely to affect condom usage) I include an indicator as to whether or not the young adult knows someone infected with HIV/AIDS.

The results from the OLS regressions can be found in Table 7. Looking at the fifth column in Table 7 (the OLS regression including the most controls), no significant effect is found for either pensioner on either sex. In fact, very few independent variables had any significant effect on condom usage. Having a wealth index above the 75% level reduces the chance that a young adult will use condoms (significant at the 1% level) as does having a living father (significant at the 10% level). A handful of independent variables appear to increase the likelihood of condom usage: having a living mother (significant at the 10% level), drinking, smoking and knowing someone with HIV (significant at the 5% level). Based on work by Markowitz, Kaestner and Grossman (2005), I predicted alcohol consumption to have a negative effect on condom usage. The results, however, suggests that risky behaviors may be substitutes as individuals may compensate risk taking in one arena by being risk averse in other areas. But, most likely this finding results from spurious correlation. A positive coefficient could result from capturing young adults infected with HIV/AIDS or other sexually transmitted disease. Grossman and Markowitz (2005) find alcohol usage to be positively correlated to STDs and the presence of disease theoretically leads to increases in condom usage.

[43] For further detail, see Stacy, Stein and Longshore (1999) and Yim, Russo and La Croix (1994)

b. Race

Results for condom usage split by race are found in the sixth column of Table 7. No statistical effect is found from the male pensioners. Considering female pensioners, statistically significant effects are found for all but coloured women. An increase of 0.30 standard deviations is seen for black men; 0.02 standard deviations for black women; negative 0.35 standard deviations for coloured men. If the pensions had been extended to individuals older than 55 in the sample, an additional 13.6%[44] of households would live with a female pensioner, directly translating into a 13.6% increase in the cost of the pension program, assuming all newly eligible individuals receive a full pension. Expanding the pension changes overall condom usage by 0.02 standard deviations, from 49.7% to 50.8%. Expanding access to pensions increases condom usage 2.2% at a 13.6% cost increase.

Previous literature suggests that female pensioners positively affect healthcare and education of young adults, which in turn I predict would cause more young adults to use condoms. The results from the sexual activity section also indicate that female pensioners cause fewer young women to engage in risky sex. Given the reduction in one risky behavior, I would expect the same to occur in another. Additionally, Markowitz and Grossman (2005) find that income has little to no effect on the decision to use condoms. Using cross-sectional data from the Youth Risk Behavior Surveys, they find that condom usage depends more on education and substance abuse. But their results do not separate based on race and my results provide a more complete picture. Black men in particular experience large positive effects from female pensioners, while coloured men experience small, negative effects. Across the entire sample, the

[44] Breaking this number down by race, 11.6% of black men, 12.0% of black women, and 12.0% of coloured men would live with a female pensioner if this program were implemented.

pensions positively affect condom usage (increasing pension access increases condom usage), leading to an overall reduction in risky sex.

To try to explain the differences between genders and races, I then did a similar analysis as in the sexual activity section.[45] Results are presented in Exhibit 2. For high income, the only statistically significant effects are those of male pensioners on black and coloured women (negative 0.34 standard deviations and negative 0.18 standard deviations, respectively). On the other hand, for low income, male pensioners have no statistical effect, while female pensioners have a statistical, albeit in some cases small, effect across all sexes and races. Although the effects of female pensioners on young women are statistically significant, they are small (0.004 standard deviations for blacks and 0.02 standard deviations for coloureds). Female pensioners affect young men more: an increase of 0.328 standard deviations for black men and a decrease of 0.368 standard deviations for coloured men.

The difference seen before between black and coloured men still persists when splitting the sample based on income. At low levels of income, the biggest difference is observed between black and coloured men: black men experience a large positive effect while coloured men experience an effect in the opposite direction. Based on Bolt and Bird (2003) and Lei (2006), men have more control within households, so they are more able to take advantage of their grandmothers and directly capture more pension income. This leads to the larger magnitudes seen for black and coloured men, but does not explain the differences in direction. Despite splitting the sample along the overall median[46], the black, low-income sample is poorer than the

[45] I split the sample based on median income. Since I was considering a different sample, the median income changed from a SOAP representing 27% of household income to 30% of household income.

[46] Ideally I would like to consider a sample where the average income is the same between blacks and coloureds to test for inherent differences between the two races. Sample size

coloured, low-income sample (a SOAP pension, on average, represents 169% of household income for blacks compared to 55% for coloureds). Black men use their SOAP income towards necessities that they may not already be receiving: nutrition, education and healthcare (Samson et al 2004). Comparatively richer coloured men have more disposable income from SOAP, allowing them to partake in drugs, alcohol and other illicit drugs. This difference appears in the sample: poor, black men report alcohol and cigarette use of 32.7% and 30.9% while poor, coloured men report alcohol and cigarette use of 49.9% and 49.2%, respectively. Markowitz, Kaestner and Grossman (2005) find a strong relationship between alcohol use and illicit drug use that, in turn, negatively affects condom usage.

v. Pregnancy

The next section focuses on young adult pregnancy rates (being pregnant for women and impregnating someone for men). Pregnancy involves the combination of sexual activity and condom usage: it is an outcome of risky sexual behavior instead of an input. Additionally, teen pregnancy has been an issue of importance in South Africa. According to Panday et al (2009), the overall teen pregnancy rate was 65 births per 1000 with higher rates for blacks (71 births per 1000), poor rates in comparison to equally developed countries in Latin America and Africa. Finding policies effective at reducing teen pregnancy will greatly benefit the country.

a. Fixed Effect OLS

The OLS results for pregnancy based on the teen sample are found in Table 8. Since I am most interested in risky pregnancy, I will focus on the teen sample. Some independent variables

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constraints unfortunately do not allow for this possibility since not enough poor coloureds were interviewed.

(outside of pensions) appear to affect pregnancy rates. Young adult marital status (at the 1% level), log of income (at 10% level), size of the household (at the 1% level) and the presence of a very young child (at the 5% level) positively affect likelihoods, while indicators for the number of adults and older persons (at the 5% level) in the household negatively change rates. The age variable is significant, and modeled to be decreasing and convex. As expected, marital status and household size also predict pregnancy: an individual is more likely to be involved in a pregnancy in marriage and if a pregnancy has occurred, household size is going to increase by at least 1 member. A positive effect from income suggests that as an individual gains more income, the marginal cost of having a child decreases, leading to increases in pregnancy rates. With additional older adults present, fewer sexual opportunities exist for young adults, leading to lower pregnancy event rates.

When I control for welfare, education, and demographics (column 5 of Table 8), male pensioners have statistically insignificant effects on both young men and women. Female pensioners, on the other hand, have a 0.25 standard deviations effect on young men and a 0.01 standard deviations effect on young women. Given that the F-test for young women is only significant at the 10% level and that the magnitude of the effect is so small, the effect of female pensioners on young women is practically zero. By contrast, the effect of a female pensioner on young men is sizable.. These results would at first appear to be different compared to those in Duflo (2000): pensions from grandmothers do not appear to have a special effect on young women. However, pregnancy, like condom usage, is more dependent on other factors such as drugs, education and peer effects, so additional income will only affect outcomes in so much as it

affects these other factors[47] (Panday 2009).

b. Race

To see if these findings hold when splitting the sample by race, I ran an interacted model like in the previous sections. Results are reported in the sixth column of Table 8. The effects from male pensioners are statistically insignificant at the 10% level: male pensioners have no effect when controlling for race, education, income, demographics, neighborhood, time and individual fixed effects. Female pensioners, contrastingly, increase the likelihood of pregnancy by 0.38 standard deviations for black women; 0.41 standard deviations for coloured men; and reduce the likelihood by 0.10 standard deviations for coloured women. Increasing access to pension for everybody older than 55[48] the overall pregnancy likelihood would decrease 0.01 standard deviations from 15.8% to 15.3%: a 3.4% decrease compared to a 10.1% pension cost increase.

Again, I tested to see if these differences could be explained by differences in income levels.[49] Results are reported in Exhibit 3. Male pensioners have opposite, statistically significant effects for high and low income young adults: positive 0.21 (high income) and negative 0.15 (low income) standard deviations for black men, negative 0.28 and positive 0.25 standard deviations for black women, negative 0.27 and positive 0.69 standard deviations for coloured men, and negative 0.05 and 0.0 standard deviations for coloured women. On the other hand,

[47] For example, additional income could lead to increased drug use, which Grossman and Markowitz (2005) find reduces condom usage

[48] As before, if the pensions had been extended to individuals older than 55, an additional 10.1% of households would live with a female pensioner, directly translating into a 10.1% increase in the cost of the pension program, assuming all newly eligible individuals receive a full pension.

[49] I split the sample into two, just like for sexual activity and condom usage. I use the same median as the sexually activity analysis. In this case, a SOAP pension represents 27% of the median household income.

there is no clear direction between high and low-income effects based on female pensioners. Effects for high and low income young adults are negative 0.30 and positive 0.11 standard deviations for black men, 0.51 and 0.28 standard deviations for black women, 0.38 and 0.28 standard deviations for coloured men, and negative 0.06 and negative 0.11 standard deviations for coloured women.

These results do not appear to fit with earlier explanations for either condom usage or sexually activity: on average, a positive effect is seen at lower levels of income, suggesting female pensioners increase pregnancy rates. According to Panday et al (2009), however, pregnancy rates depend more on intrapersonal factors such as sexual frequency, peer effects and knowledge of contraception. Female pension income allows young adults to spend more time in school, increasing exposure to peers and leisure time (Lam, Marteleto and Ranchhod 2009). More leisure correlates with more sexual exposures, leading to higher pregnancy likelihoods.

vi. Instrumental Variables Analysis

a. Introduction

OLS results indicate that female pensioners effectively reduce potential risky sexual activity while increasing condom usage and pregnancy rates. However, as discussed earlier, the pension indicators may suffer from measurement error and endogeneity. As a potential fix, I ran instrumental variables using the presence of an age eligible older adult as an instrument. As mentioned earlier, most adults receive the pension, so the two are highly correlated. In my sample, male pensioners and male age-eligible adults have a Pearson's correlation coefficient of 0.67 and female pensioners and female age-eligible adults have a correlation coefficient of 0.82. Additionally, the age criteria likely do not suffer from the same measurement error as pension

variables: age is more widely known by heads of households and not as sensitive to discuss as finances. Age is also exogenously assigned, and therefore uncorrelated with the error term. In all the regressions presented in this section, I ran Kleibergen-Paap statistics for under identification and for weak identification. In all cases, the statistics were insignificant at the 10% level, indicating a strongly identified model. I have also included the first stage regression results in Table 12. Differences in total effects between OLS and IV can be seen in Exhibit 4.

A problem arises if I run a fixed effect, two staged least squares Staged Least Squares. Trying to instrument for the pension indicators while including all independent variables leads to a covariance matrix with a large amount of zeroes since I have more variables than neighborhood clusters.[50] This does not allow me to accurately predict coefficients or calculate standard errors. As a fix, I partial out all independent variables except for the pension indicators. Based on the Frisch, Waugh and Lovell theorem, taking a partial regression will result in the same coefficients and standard errors as in the original non-partial model.

b. Sexual Activity

The results for the IV regression based on sexual activity are reported in column 7 of Table 6. Previously, the only statistical effect was felt from grandmother's pensions on young coloured women (0.25 standard deviations). When considering the IV regressions, male pensioners are again found to have no statistically significant effect. The coefficients do move away from zero compared to the OLS, but the standard errors increase in magnitude. For female pensioners, a statistical effect is felt for both coloured men and women (0.18 and negative 0.19 standard deviations, respectively). Again, all coefficients move away from zero based on the

[50] Many of my independent variables are binary, contributing to the issue

initial OLS regression, but the total effects change compared to OLS.

c. Condom Use

The results for the IV regression are reported in column 7 of Table 7. None of the effects related to the male pensioners are found to be significant, similar to the OLS regressions. The standard errors on the coefficients increase in magnitude, but no consistent directional shifts occur (some coefficients move away from zero, others switch signs). A statistically significant (at the 5% level) effect from female pensioners is seen across all races and sexes. The magnitude of the IV effects (compared to those in the OLS regression) are 0.75 standard deviations (compared to 0.30) for black men; 0.21 standard deviations (compared to 0.02) for black women; 0.09 standard deviations (compared to negative 0.35) for coloured men; 0.06 standard deviations (compared to 0.00) for coloured women. Again, the individual coefficients move away from zero.

d. Pregnancy

The results for the IV regression are reported in column 7 of Table 8. In the IV regressions, again no statistically significant effects are reported from male pensioners, regardless of race or sex. Considering female pensioners, statistically significant effects are seen across all races and sexes, except for young, black men. The effect (relative to OLS) is 0.85 standard deviations (compared to 0.38 standard deviations from OLS) for black women; 0.41 standard deviations (compared to 0.41) for coloured men; and 0.15 standard deviations (compared to negative 0.10) for coloured women. Each coefficient moves further away from

zero[51] and standard errors increase.

e. Summary

The results from the instrumental variable regressions are consistent with classical measurement error. All coefficients move further away from zero and with larger standard errors. Instrumental variable method succeeds in correcting for measurement error. To look further at corrections to endogeneity, I need to consider the total effects seen in the instrumental variables specifications. For sexual activity, OLS suggests that female pensioners only affect young, coloured women while instrumental variables finds an additional statistical effect for young, coloured men. While the same argument applies for young, coloured women (see Section iiib), the effect on coloured men is positive. Bolt and Bird (2003) find that young men are able to capture more income from older females. Since young, coloured men control more of the income themselves, they spend less of it on education and more on discretionary items, including drugs and alcohol.[52] Consistent with Lam, Marteleto and Ranchhod (2009), reduction in schooling outcomes from less educational expenditure might lead to class repetition and thus lead to more exposure to older peers, causing earlier sexual debut.

For condom usage, OLS understates the effects of female pensioners across all races and sexes. All effects are found to be positive in the IV regressions, whereas before negative effects were found for both coloured men and women. This is more consistent with the story in Mantra and Ray (2003) that female pension income is spent on "public goods" within the households,

[51] Except for the coefficients related to black men. These values, however, are extremely close to zero so the overall story does not change.
[52] In the sample, this is seen by the differences in alcohol use (30.0% for coloured men and 23.1% for coloured women) and cigarette use (49.5% for coloured men and 34.2% for coloured women), conditional on receiving a pension.

like healthcare and education, leading to more knowledge of condoms and access to them. The stronger effects seen for blacks compared to coloureds are due to the differences in initial income: poorer households will experience a greater relative income effect. The IV results also highlight the intra-household differences between young men and women. Young men, relative to women, are able to capture more income from their grandmothers and therefore see a larger effect from an income shock (Behrman 1997). Black and coloured men experience a larger effect at their given levels of income relative to black and coloured women, consistent with the IV results.

Similar to condom usage, OLS understates the effects of female pensioners across all races and sexes for pregnancy likelihoods. In the IV regressions, all effects become positive and greater than in OLS, indicating that female pensioners promote teen pregnancy. This contradicts my original hypothesis that female pensioners reduce the likelihood of risky events occurring. However, my data might not be capturing the full story. As discussed before, pregnancy likelihood depends on increases in sexual frequency and peer effects, factors which should be both positively affected by pension income (Panday et al 2009). The strongest effect is observed for black women, then for coloured men, and, finally, for coloured women. At lowest levels of income, pensions have the greatest marginal effect on leisure and peer exposures, similar to the story for condom usage. The zero effect of female pensions on black men presents a conundrum. As seen in the condom usage analysis, though, black men are more likely to use condoms, given the presence of a female pensioner. This decreases the likelihood of being involved in a pregnancy given that condoms are properly used.

To give a better sense of size of the IV estimates, I consider the hypothetical situation that pensions are extended to all females older than 55. Overall in this scenario, sexual activity

would increase 0.3% (same as OLS estimate); condom usage would increase 3.1% (compared to OLS estimated increase of 2.2%), from 49.8% to 51.4%; and pregnancy would increase 5.6% (compared to OLS estimated decrease of 3.4%) from 15.8% to 16.7% at an overall program cost increase of between 10.1% and 13.6%. Increasing female pensions would significantly increase condom usage while unfortunately increasing pregnancy rates. I will discuss that pregnancy rates are related to other factors in the next section.

Section VI: Discussion

Using a fixed effects approach, I find that only female pensioners affect the behavior of young adults in Cape Town: male pensioners have no effect regardless of which controls are included. This is consistent with Duflo's (2000) findings and theories of intra-household allocations from Behrman (1997) and Bird and Bolt (2003). Grandmothers appear to pool their income with the rest of the household while grandfathers keep it to themselves. OLS estimates suggest that the effect of female pensioners differs depending on initial level of income. Coloureds have higher levels of initial income, so they gain more disposable income from the presence of pensions. This leads to more risk taking on the part of coloureds (particularly men) due to increases in alcohol and drug use.

Additionally, instrumental variable results suggest the presence of attenuation bias in OLS estimates, resulting from classical measurement error. Using pensions as a tool to reduce risky behaviors amongst young adults is met with mixed results. Pension income does not change the likelihood of an individual being sexually active, in agreement with findings from Markowitz, Kaestner and Grossman (2005). Increasing pension access leads to increases in condom usage, but ironically increases in teen pregnancy rates. This calls to attention a limitation

of this research: I am not able to capture changes in frequency of sexual activity. Pregnancy rates depend both on having sex and the frequency with which a young adult has sex. The relationship between pregnancy and pensions is likely to be spurious: pension income increases leisure time and interaction to peers allowing young adults to have more sexual encounters, leading to higher rates of pregnancy. Future research should look for ways to control for the frequency of sexual activity to capture true income effects.

The results and previous literature suggest that pension income increasingly allows students to attend school and enjoy nutritional gains. Dulfo (2000) finds increases in nutritional measurements around 1.15 standard deviations. By contrast, I find increases in condom usage of at most 0.75 standard deviations, with the weighted, average effect of 0.276 standard deviations. The different magnitudes highlight the importance of non-monetary interventions for risky behaviors. Any consideration of expanding the pension program ought to be met with further evaluations in non-monetary solutions such as sexual education and added services in and support in community health centers. Increases in pregnancy in light of increases of condom usage also suggest poor information dissemination about the efficacy and proper techniques to condom use. Also, pensions seem to increase available leisure of time of students. Instead of allowing young adults free reign, schools should make concerted efforts to increase alternative after-school programming.

Pensions are only effective in so far if they are received by grandmothers. In terms of a policy evaluation, the uneven effects felt by different races and genders make me look elsewhere for effective policies to reduce risky sexual behaviors. Lam, Marteleto and Ranchhod (2009) suggest that decreasing exposure to older peers leads to reductions in sexual activity. This could be accomplished by setting up educational systems that separates older students repeating grades

from younger students. Instead of increasing investment in SOAP, investing in structural changes to the education system may yield more effective outcomes with respect to risky sexual behaviors. Based on Grossman and Markowitz (2005), reducing binge drinking and marijuana consumption leads to more condom usage (reducing the number of days binge[53] drinking by 1 leads to an increase of condom usage of between 0.20 and 0.26 standard deviations). Increasing alcohol taxation and increasing extracurricular opportunities at school would help reduce risky sexual behaviors. While increasing access to pensions would appear to increase condom usage, other policies and programs could have a broader and larger reach.

The results reported in this paper have been weighted to reflect population proportions of blacks and coloureds in Cape Town, South Africa. Coloureds make up a significantly larger portion of residents in Cape Town than in the rest of South Africa: 48.1% in Cape Town compared to just 8.8% in overall South Africa. Since the sample size for blacks is sizable on its own (roughly 750 individuals), the results for blacks likely extend to other urban areas of South Africa. Two concerns exist when extending the findings outside of Cape Town: racial dynamics and the effects of urbanization. Cape Town has a unique demographic profile, given the large portion of coloureds, which may affect the relationship between pensioners and their grandchildren. Also, the effect of pensions may differ when considering urban environments compared to rural areas: the concerns and needs of a rural family are different than those of an urban household.

Great potential exists for future research in the field of sexual risk taking. The CAPS study is continually re-interviewing young adults and adding waves to the dataset (an additional wave is due out this year.) More research is needed to quantify the relationship between pensions

[53] Five or more drinks in a day

and peer effects seen from increased schooling. Capturing quantity measures of sexual activity, smoking and drinking will allow for more thorough analysis of risky behaviors: without it, a piece of the story is missing. What is really driving the positive relationship between pensions and pregnancy? Is it a direct income effect or spurious correlation?

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Table 1: Key Independent Variables

Variable	Wave	All	Males	Females	Blacks	Coloured
Male Receives Pension	1	0.038	0.043	0.033	0.035	0.044
		(0.190)	(0.204)	(0.177)	(0.185)	(0.205)
	3	0.057	0.060	0.055	0.055	0.063
		(0.232)	(0.237)	(0.227)	(0.227)	(0.242)
	4	0.050	0.057	0.044	0.049	0.057
		(0.218)	(0.232)	(0.204)	(0.216)	(0.232)
Female Receives Pension	1	0.117	0.121	0.113	0.111	0.137
		(0.321)	(0.326)	(0.317)	(0.314)	(0.344)
	3	0.152	0.151	0.154	0.137	0.178
		(0.359)	(0.358)	(0.361)	(0.344)	(0.383)
	4	0.150	0.150	0.149	0.135	0.176
		(0.357)	(0.357)	(0.357)	(0.341)	(0.381)
Years of Education: YA	1	9.095	8.920	9.247	8.803	9.261
		(2.080)	(2.123)	(2.031)	(2.134)	(1.998)
	3	10.533	10.382	10.664	10.349	10.509
		(1.870)	(1.908)	(1.828)	(1.909)	(1.814)
	4	10.700	10.582	10.802	10.466	10.683
		(1.747)	(1.796)	(1.697)	(1.669)	(1.761)
Complete General Education	1	0.584	0.549	0.614	0.543	0.610
		(0.493)	(0.498)	(0.487)	(0.498)	(0.488)
	3	0.871	0.843	0.895	0.853	0.869
		(0.335)	(0.364)	(0.307)	(0.355)	(0.337)
	4	0.885	0.876	0.895	0.881	0.872
		(0.319)	(0.330)	(0.307)	(0.324)	(0.334)
Graduate High School	1	0.165	0.152	0.176	0.121	0.192
		(0.371)	(0.359)	(0.381)	(0.326)	(0.394)
	3	0.382	0.363	0.398	0.334	0.388
		(0.486)	(0.481)	(0.490)	(0.472)	(0.488)
	4	0.432	0.405	0.455	0.348	0.451
		(0.495)	(0.491)	(4.603)	(0.477)	(0.498)
Attain Advanced Degree	1	0.048	0.042	0.053	0.042	0.050
		(0.213)	(0.200)	(0.223)	(0.200)	(0.217)
	3	0.059	0.055	0.063	0.043	0.055
		(0.236)	(0.227)	(0.243)	(0.202)	(0.229)
	4	0.058	0.061	0.055	0.023	0.059
		(0.233)	(0.239)	(4.603)	(0.149)	(0.236)

Table 1 Continued

Demographics						
Young Adult Age	1	17.566	17.544	17.585	17.852	17.447
		(2.452)	(2.459)	(2.447)	(2.514)	(2.398)
	3	20.491	20.456	20.522	20.864	20.314
		(2.513)	(2.510)	(2.516)	(2.579)	(2.443)
	4	21.386	21.363	21.405	21.671	21.260
		(2.546)	(2.576)	(2.521)	(2.669)	(2.461)
Young Adult Married	1	0.019	0.005	0.032	0.018	0.023
		(0.138)	(0.071)	(0.176)	(0.134)	(0.150)
	3	0.042	0.021	0.061	0.029	0.056
		(0.201)	(0.144)	(0.239)	(0.168)	(0.235)
	4	0.060	0.032	0.084	0.041	0.083
		(0.238)	(0.177)	(0.278)	(0.198)	(0.275)
Parent's Married	1	0.505	0.543	0.472	0.355	0.603
		(0.500)	(0.498)	(0.499)	(0.479)	(0.489)
	3	0.439	0.475	0.408	0.311	0.521
		(0.496)	(0.500)	(0.492)	(0.463)	(0.500)
	4	0.423	0.457	0.393	0.287	0.505
		(0.494)	(0.498)	(0.489)	(0.453)	(0.500)
Household Size	1	5.652	5.537	5.752	5.875	5.697
		(2.457)	(2.383)	(2.515)	(2.739)	(2.235)
	3	5.909	5.739	6.057	6.029	6.075
		(2.811)	(2.727)	(2.874)	(2.968)	(2.739)
	4	6.029	5.783	6.241	6.435	5.981
		(2.973)	(2.884)	(3.033)	(3.313)	(2.692)
Log Income	1	10.318	10.364	10.278	9.686	10.657
		(1.067)	(1.055)	(1.076)	(0.897)	(0.831)
	3	10.486	10.541	10.439	9.905	10.780
		(1.070)	(1.024)	(1.106)	(0.988)	(0.809)
	4	10.501	10.540	10.468	9.963	10.763
		(1.077)	(1.038)	(1.108)	(1.043)	(0.818)
Wealth Index	1	-0.254	-0.156	-0.338	-2.217	1.091
		(2.700)	(2.624)	(2.706)	(2.536)	(1.566)
	3	0.230	0.348	0.127	-1.411	1.322
		(2.349)	(2.269)	(2.412)	(2.330)	(1.432)
	4	0.024	0.097	-0.040	-1.511	1.055
		(2.275)	(2.187)	(2.346)	(2.413)	(1.180)
Number of Observations		2350	1087	1263	1098	1252

Table 2: Risky Behaviors

Variable	Wave	All	Males	Females	Blacks	Coloured
Dependent Variables						
Sexually Active	1	0.423	0.428	0.419	0.584	0.317
		(0.494)	(0.495)	(0.494)	(0.493)	(0.465)
	3	0.732	0.738	0.727	0.882	0.630
		(0.443)	(0.440)	(0.445)	(0.322)	(0.483)
	4	0.825	0.840	0.812	0.945	0.740
		(0.380)	(0.367)	(0.391)	(0.228)	(0.439)
Condom Usage[54]	1	0.635	0.663	0.609	0.681	0.559
		(0.482)	(0.473)	(0.488)	(0.466)	(0.497)
	3	0.635	0.652	0.620	0.731	0.518
		(0.482)	(0.476)	(0.486)	(0.444)	(0.500)
	4	0.591	0.589	0.592	0.721	0.445
		(0.492)	(0.492)	(0.492)	(0.449)	(0.497)
Pregnancy Event	1	0.118	0.057	0.171	0.115	0.137
		(0.323)	(0.232)	(0.377)	(0.320)	(0.344)
	3	0.264	0.154	0.359	0.281	0.285
		(0.441)	(0.361)	(0.480)	(0.450)	(0.452)
	4	0.326	0.210	0.427	0.349	0.351
		(0.469)	(0.407)	(0.495)	(0.477)	(0.477)
Smoke Cigarettes	1	0.264	0.344	0.194	0.105	0.409
		(0.441)	(0.475)	(0.396)	(0.307)	(0.492)
	3	0.358	0.464	0.266	0.170	0.523
		(0.480)	(0.499)	(0.442)	(0.376)	(0.500)
	4	0.366	0.491	0.256	0.188	0.535
		(0.482)	(0.500)	(0.437)	(0.391)	(0.499)
Consume Alcohol	1	0.203	0.251	0.161	0.104	0.251
		(0.402)	(0.434)	(0.368)	(0.305)	(0.434)
	3	0.370	0.489	0.266	0.278	0.401
		(0.483)	(0.500)	(0.442)	(0.448)	(0.490)
	4	0.326	0.427	0.238	0.258	0.346
		(0.469)	(0.495)	(0.426)	(0.438)	(0.476)
Number of Observations		2350	1087	1263	1098	1252

[54] Sample sizes for condom usage are different as they only consider individuals that have had sex. The rates reported are condom usage given that the young adult is sexually active.

Table 3: Teen Sample

Variable	Wave	Full Sample	All Teens	Alt Teen	Teen Males	Teen Fem
Sexually Active	1	0.423	0.265	0.255	0.284	0.249
		(0.494)	(0.442)	(0.436)	(0.451)	(0.433)
	3	0.732	0.648	0.644	0.659	0.638
		(0.443)	(0.478)	(0.479)	(0.474)	(0.481)
	4	0.825	0.767	0.764	0.787	0.750
		(0.380)	(0.423)	(0.425)	(0.409)	(0.433)
Pregnancy Event	1	0.118	0.041	0.037	0.020	0.058
		(0.323)	(0.197)	(0.189)	(0.139)	(0.235)
	3	0.264	0.159	0.153	0.078	0.228
		(0.441)	(0.366)	(0.360)	(0.268)	(0.420)
	4	0.326	0.221	0.216	0.125	0.303
		(0.469)	(0.415)	(0.411)	(0.331)	(0.460)
Male Receives Pension	1	0.038	0.039	0.038	0.042	0.037
		(0.190)	(0.195)	(0.190)	(0.201)	(0.189)
	3	0.057	0.062	0.060	0.067	0.057
		(0.232)	(0.241)	(0.237)	(0.250)	(0.233)
	4	0.050	0.053	0.051	0.062	0.045
		(0.218)	(0.224)	(0.221)	(0.241)	(0.207)
Female Receives Pension	1	0.117	0.120	0.117	0.124	0.117
		(0.321)	(0.325)	(0.322)	(0.329)	(0.321)
	3	0.152	0.162	0.157	0.161	0.163
		(0.359)	(0.368)	(0.364)	(0.367)	(0.370)
	4	0.150	0.154	0.151	0.157	0.152
		(0.357)	(0.361)	(0.358)	(0.364)	(0.359)
Years of Education: YA	1	9.095	8.415	8.381	8.188	8.609
		(2.080)	(1.788)	(1.754)	(1.796)	(1.760)
	3	10.533	10.336	10.525	10.137	10.506
		(1.870)	(1.778)	(1.051)	(1.812)	(1.731)
	4	10.700	10.586	10.589	10.429	10.719
		(1.747)	(1.698)	(1.681)	(1.772)	(1.623)
Age: YA	1	17.566	16.118	16.014	16.080	16.149
		(2.452)	(1.502)	(1.389)	(1.519)	(1.487)
	3	20.491	19.011	18.933	18.966	19.049
		(2.513)	(1.543)	(1.473)	(1.548)	(1.539)
	4	21.386	19.856	19.839	19.786	19.916
		(2.546)	(1.513)	(1.581)	(1.500)	(1.522)
Wealth Index	1	-0.254	-0.086	-0.095	-0.006	-0.155

		(2.700)	(2.607)	(2.630)	(2.596)	(2.615)
	3	0.230	0.372	0.386	0.493	0.268
		(2.349)	(2.257)	(2.249)	(2.191)	(2.307)
	4	0.024	0.182	0.194	0.277	0.102
		(2.275)	(2.181)	(2.187)	(2.099)	(2.247)
Number of Observations		2526	1650	1619	760	890

Table 4: Studied Sample versus Dropped Sample

Variable	Wave	Studied Sample[55]	Dropped Sample[56]	T-Statistic[57]
Sexually Active	1	0.423	0.426	-0.013
		(0.494)	(0.495)	
	3	0.732	0.762	-0.016
		(0.443)	(0.421)	
	4	0.825	0.843	0.105
		(0.380)	(0.362)	
Condom Usage	1	0.203	0.266	-0.105
		(0.402)	(0.442)	
	3	0.370	0.415	-0.065
		(0.483)	(0.493)	
	4	0.326	0.317	0.014
		(0.469)	(0.466)	
Pregnancy Event	1	0.118	0.118	0.000
		(0.323)	(0.323)	
	3	0.264	0.202	0.104
		(0.441)	(0.401)	
	4	0.326	0.261	0.101
		(0.469)	(0.439)	
Male Receives Pension	1	0.038	0.026	0.048
		(0.190)	(0.159)	
	3	0.057	0.046	0.035
		(0.232)	(0.210)	
	4	0.050	0.066	-0.048
		(0.218)	(0.249)	
Female Receives Pension	1	0.117	0.089	0.065
		(0.321)	(0.284)	
	3	0.152	0.138	0.028
		(0.359)	(0.345)	
	4	0.150	0.181	-0.059
		(0.357)	(0.385)	
Years of Education: YA	1	9.095	9.585	-0.152
		(2.080)	(2.459)	
	3	10.533	10.688	-0.056

[55] Values reported are overall sample averages
[56] Sample sizes are not reported as they vary by wave. Proper sample sizes were considered when calculating t-statistics
[57] All t-statistics are insignificant at the 10% confidence level

	(1.870)	(2.033)	
4	10.700	10.640	0.017
	(1.747)	(3.089)	

Table 5: Comparison of Summary Statistics
Based on Sex of Pension Recipient

Variable	Wave	Full Sample	Male Pensioners	Female Pensioners
Sexually Active	1	0.423	0.442	0.397
		(0.494)	(0.499)	(0.490)
	3	0.732	0.736	0.696
		(0.443)	(0.443)	(0.461)
	4	0.825	0.762	0.791
		(0.380)	(0.428)	(0.407)
Pregnancy Event	1	0.118	0.147	0.112
		(0.323)	(0.356)	(0.316)
	3	0.264	0.313	0.239
		(0.441)	(0.465)	(0.427)
	4	0.326	0.333	0.307
		(0.469)	(0.473)	(0.462)
Smoke Cigarettes	1	0.264	0.326	0.258
		(0.441)	(0.471)	(0.438)
	3	0.358	0.396	0.369
		(0.480)	(0.491)	(0.483)
	4	0.366	0.460	0.362
		(0.482)	(0.500)	(0.481)
Consume Alcohol	1	0.203	0.263	0.208
		(0.402)	(0.443)	(0.407)
	3	0.370	0.389	0.387
		(0.483)	(0.489)	(0.488)
	4	0.326	0.325	0.283
		(0.469)	(0.470)	(0.451)
Years of Education: YA	1	9.095	9.211	9.203
		(2.080)	(1.983)	(2.002)
	3	10.533	10.371	10.627
		(1.870)	(1.626)	(1.694)
	4	10.700	10.525	10.711
		(1.747)	(1.702)	(1.626)
Complete General Education	1	0.584	0.579	0.614
		(0.493)	(0.493)	(0.488)
	3	0.871	0.854	0.896
		(0.335)	(0.354)	(0.306)
	4	0.885	0.833	0.870
		(0.319)	(0.374)	(0.336)

Table 5 Continued

Graduate High School	1	0.165	0.168	0.153
		(0.371)	(0.376)	(0.360)
	3	0.382	0.333	0.403
		(0.486)	(0.473)	(0.491)
	4	0.432	0.381	0.423
		(0.495)	(0.488)	(0.495)
Attain Advanced Degree	1	0.048	0.032	0.051
		(0.213)	(0.176)	(0.220)
	3	0.059	0.021	0.047
		(0.236)	(0.143)	(0.211)
	4	0.058	0.032	0.042
		(0.233)	(0.176)	(0.202)
Demographics				
Young Adult Age	1	17.566	17.726	17.519
		(2.452)	(2.430)	(2.501)
	3	20.491	20.458	20.332
		(2.513)	(2.458)	(2.507)
	4	21.386	21.333	21.304
		(2.546)	(2.492)	(2.555)
Young Adult Married	1	0.019	0.053	0.017
		(0.138)	(0.224)	(0.129)
	3	0.042	0.069	0.047
		(0.201)	(0.255)	(0.211)
	4	0.060	0.048	0.074
		(0.238)	(0.214)	(0.262)
Log Income	1	10.318	10.498	10.406
		(1.067)	(0.793)	(0.818)
	3	10.486	10.507	10.604
		(1.070)	(0.940)	(0.898)
	4	10.501	10.521	10.587
		(1.077)	(0.810)	(0.922)
Wealth Index	1	-0.254	0.876	0.589
		(2.700)	(1.512)	(1.773)
	3	0.230	0.639	0.706
		(2.349)	(1.694)	(1.756)
	4	0.024	0.202	0.491
		(2.275)	(1.605)	(1.573)
Number of Observations	1	2526	95	295
	3	2526	144	385

4	2526	126	378

Table 6: Teen Sample OLS Regressions for Sexual Activity

	Dependent Variable: Sexually Active Indicator						
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) IV
Male Pension	0.016	0.012	0.014	0.021	0.020	-0.005	0.208
	(0.075)	(0.079)	(0.080)	(0.072)	(0.079)	(0.016)	(0.195)
Women x Male Pension	0.002	0.011	0.007	0.003	0.013	0.087	0.105
	(0.049)	(0.056)	(0.052)	(0.048)	(0.059)	(0.098)	(0.209)
Female Pension	0.054	0.052	0.058	0.042	0.044	-0.015	-0.087
	(0.074)	(0.074)	(0.071)	(0.073)	(0.071)	(0.046)	(0.160)
Women x Female Pension	-0.139**	-0.141**	-0.146**	-0.132**	-0.145**	-0.001	0.157
	(0.051)	(0.045)	(0.047)	(0.054)	(0.046)	(0.068)	(0.184)
Coloured x Male Pension						0.039	0.211
						(0.105)	(0.180)
Coloured x Women x MalePen						-0.103	-0.122
						(0.090)	(0.095)
Coloured x Female Pension						0.077	0.237**
						(0.070)	(0.095)
Coloured x Women x FemPen						-0.187*	-0.401**
						(0.090)	(0.192)
Controls							
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Welfare	No	Yes	No	No	Yes	Yes	Yes
Education	No	Yes	No	No	Yes	Yes	Yes
Young Adult Demographics	No	No	Yes	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes	Yes	Yes
R2/Adjusted R2	0.405	0.407	0.408	0.410	0.418	0.418	0.315
Number of Young Adults	1,512	1,512	1,512	1,512	1,512	1,512	1,512

Note: Standard errors (robust to heteroskedacity and arbitrary correlation) reported above
*-significant at 10%; **-significant at 5%; ***-significant at 1%
Sexually Active Indicator: Whether or not individual has had sex in last 30 days
Male Pension: Whether young adult lives with a male pensioner
Female Pension: Whether young adult lives with a female pensioner
Fixed Effects: Individual, Time and Neighborhood
Welfare: Log income, log income squared, wealth index and indicators for wealth index quartiles
Education: Log of years of education, indicators for graduating general education, high school and advanced degree
Young Adult Demographics: Age, age squared, indicator for married
Household Demographics: Indicators for parents living, parents married, head of household, number of old present (age > 50), adults present (age between 27-50), peer present (age between 14-27) and young child present (age < 4)
The instruments in column 7 are male eligible and female eligible (first stage in Table 9)

Table 7: OLS Regressions for Condom Usage

	Dependent Variable: Condom Usage						
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) IV
Male Pension	0.053	0.053	0.050	0.050	0.045	-0.042	0.187
	(0.080)	(0.081)	(0.082)	(0.084)	(0.087)	(0.111)	(0.293)
Women x Male Pension	-0.113	-0.111	-0.111	-0.113	-0.105	0.022	0.027
	(0.087)	(0.086)	(0.087)	(0.086)	(0.086)	(0.123)	(0.394)
Female Pension	0.012	0.012	0.014	0.008	0.011	0.129	-0.032
	(0.054)	(0.051)	(0.054)	(0.054)	(0.052)	(0.098)	(0.354)
Women x Female Pension	-0.043	-0.045	-0.040	-0.047	-0.041	-0.191	-0.092
	(0.071)	(0.067)	(0.072)	(0.069)	(0.066)	(0.153)	(0.385)
Coloured x Male Pension						0.135**	0.365***
						(0.057)	(0.124)
Coloured x Women x MalePen						-0.129**	-0.262***
						(0.051)	(0.062)
Coloured x Female Pension						-0.180**	-0.320***
						(0.069)	(0.111)
Coloured x Women x FemPen						0.123	0.247*
						(0.097)	(0.148)
Controls							
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Welfare	No	Yes	No	No	Yes	Yes	Yes
Education	No	Yes	No	No	Yes	Yes	Yes
Young Adult Demographics	No	No	Yes	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes	Yes	Yes
R2/Adjusted R2	0.306	0.308	0.308	0.309	0.317	0.318	0.381
Number of Young Adults	1,964	1,964	1,964	1,964	1,964	1,964	1,964

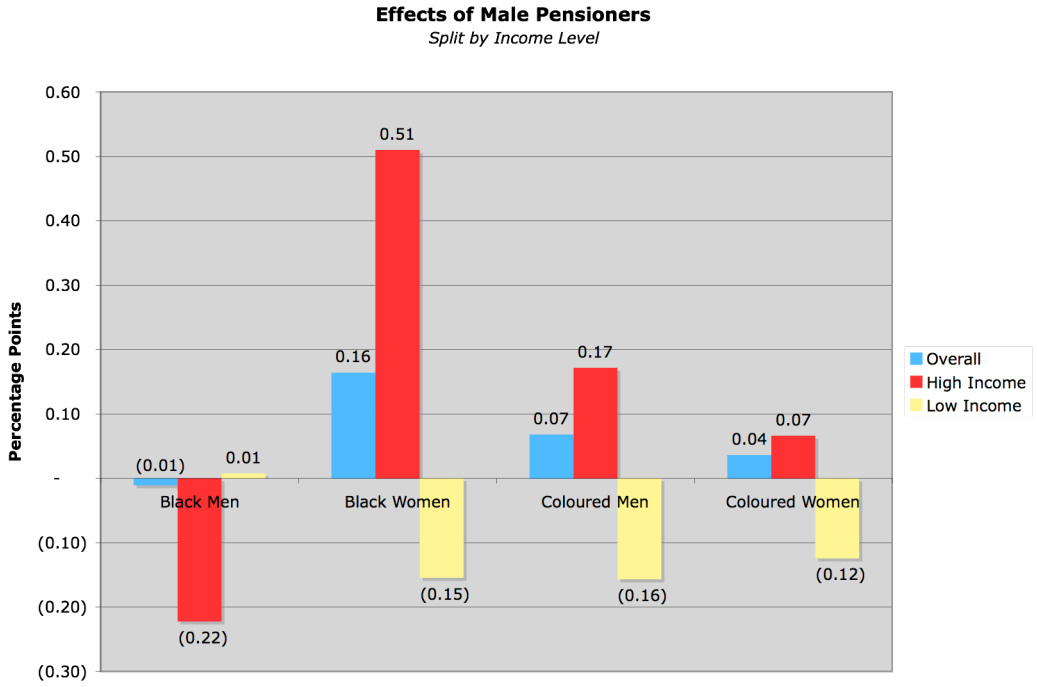
Note: Standard errors (robust to heteroskedacity and arbitrary correlation) reported above
*-significant at 10%; **-significant at 5%; ***-significant at 1%
Condom Usage: Used a condom last time had sex
Male Pension: Whether young adult lives with a male pensioner
Female Pension: Whether young adult lives with a female pensioner
Fixed Effects: Individual, Time and Neighborhood
Welfare: Log income, log income squared, wealth index and indicators for wealth index quartiles
Education: Log of years of education, indicators for graduating general education, high school and advanced degree
Young Adult Demographics: Age, age squared, indicator for married
Household Demographics: Indicators for parents living, parents married, head of household, number of old present (age > 50), adults present (age between 27-50), peer present (age between 14-27) and young child present (age < 4)
The instruments in column 7 are male eligible and female eligible (first stage in Table 9)

Table 8: OLS Regressions for Pregnancy

	Dependent Variable: Pregnancy Events						
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) IV
Male Pension	-0.044*	-0.043	-0.041	-0.034	-0.030	-0.042	0.187
	(0.023)	(0.028)	(0.025)	(0.030)	(0.031)	(0.111)	(0.293)
Women x Male Pension	0.019	0.011	0.020	0.029	0.022	0.022	0.027
	(0.088)	(0.094)	(0.098)	(0.096)	(0.103)	(0.123)	(0.394)
Female Pension	0.064**	0.061**	0.056*	0.076*	0.068*	0.129	-0.032
	(0.027)	(0.027)	(0.028)	(0.035)	(0.034)	(0.098)	(0.354)
Women x Female Pension	-0.074	-0.066	-0.069	-0.072	-0.063	-0.191	-0.092
	(0.072)	(0.064)	(0.073)	(0.077)	(0.070)	(0.153)	(0.385)
Coloured x Male Pension						0.135**	0.365***
						(0.057)	(0.124)
Coloured x Women x MalePen						-0.129**	-0.262***
						(0.051)	(0.062)
Coloured x Female Pension						-0.180**	-0.320***
						(0.069)	(0.111)
Coloured x Women x FemPen						0.123	0.247*
						(0.097)	(0.148)
Controls							
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Welfare	No	Yes	No	No	Yes	Yes	Yes
Education	No	Yes	No	No	Yes	Yes	Yes
Young Adult Demographics	No	No	Yes	No	Yes	Yes	Yes
Household Demographics	No	No	No	Yes	Yes	Yes	Yes
R2/Adjusted R2	0.306	0.308	0.308	0.309	0.317	0.318	0.236
Number of Young Adults	1,512	1,512	1,512	1,512	1,512	1,512	1,512

Note: Standard errors (robust to heteroskedacity and arbitrary correlation) reported above
*-significant at 10%; **-significant at 5%; ***-significant at 1%
Pregnancy Event: Whether individual has been pregnant or impregnated someone
Male Pension: Whether young adult lives with a male pensioner
Female Pension: Whether young adult lives with a female pensioner
Fixed Effects: Individual, Time and Neighborhood
Welfare: Log income, log income squared, wealth index and indicators for wealth index quartiles
Education: Log of years of education, indicators for graduating general education, high school and advanced degree
Young Adult Demographics: Age, age squared, indicator for married
Household Demographics: Indicators for parents living, parents married, head of household, number of old present (age > 50), adults present (age between 27-50), peer present (age between 14-27) and young child present (age < 4)
The instruments in column 7 are male eligible and female eligible (first stage in Table 9)

Exhibit 1: Total Effects of Pensions
Split by Income Levels for Sexual Activity



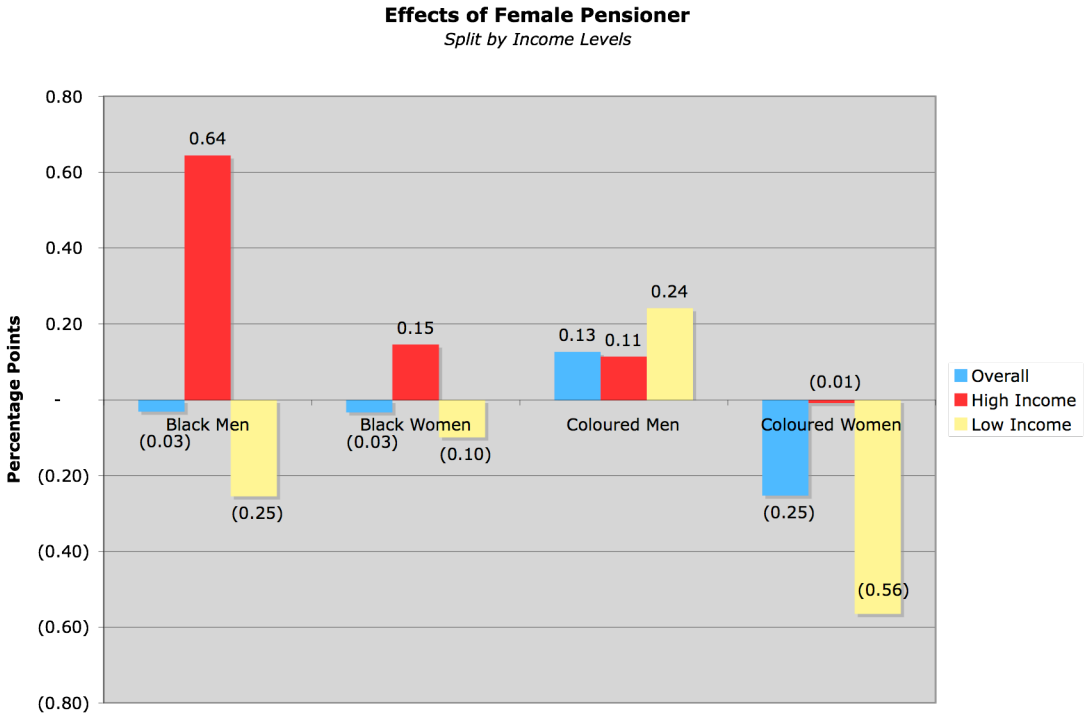
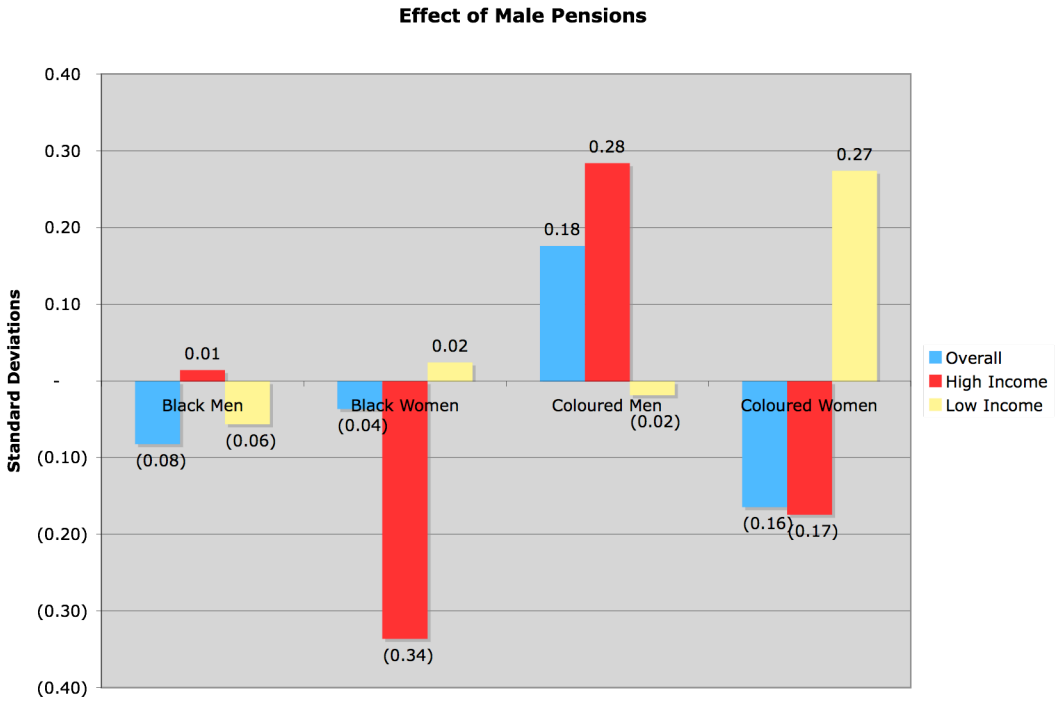


Exhibit 2: Total Effects of Pensions
Split by Income Levels for Condom Usage



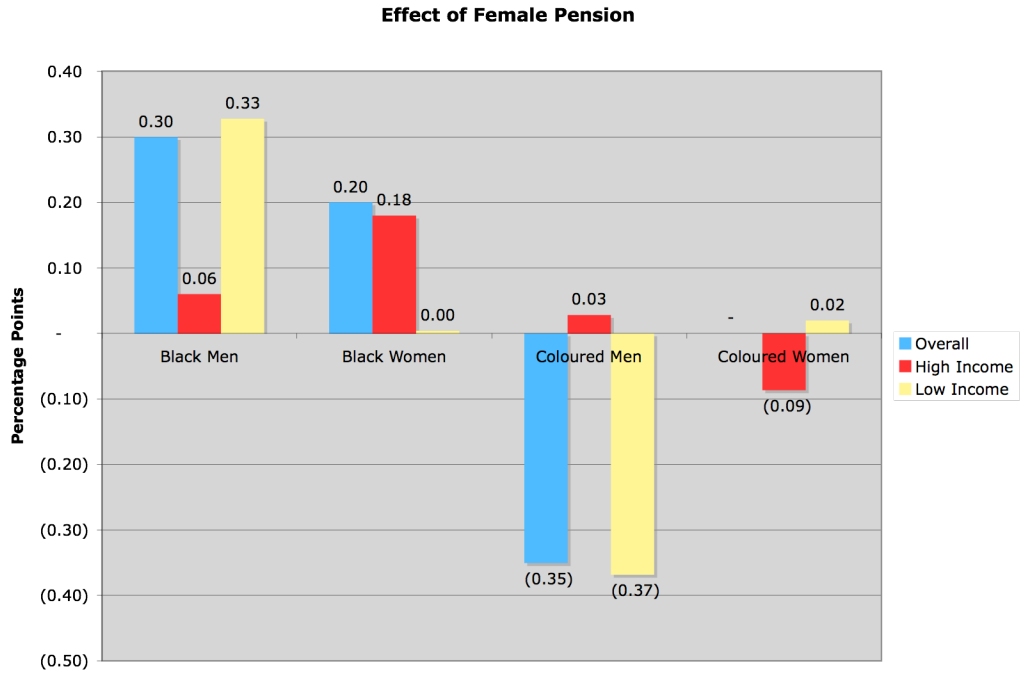
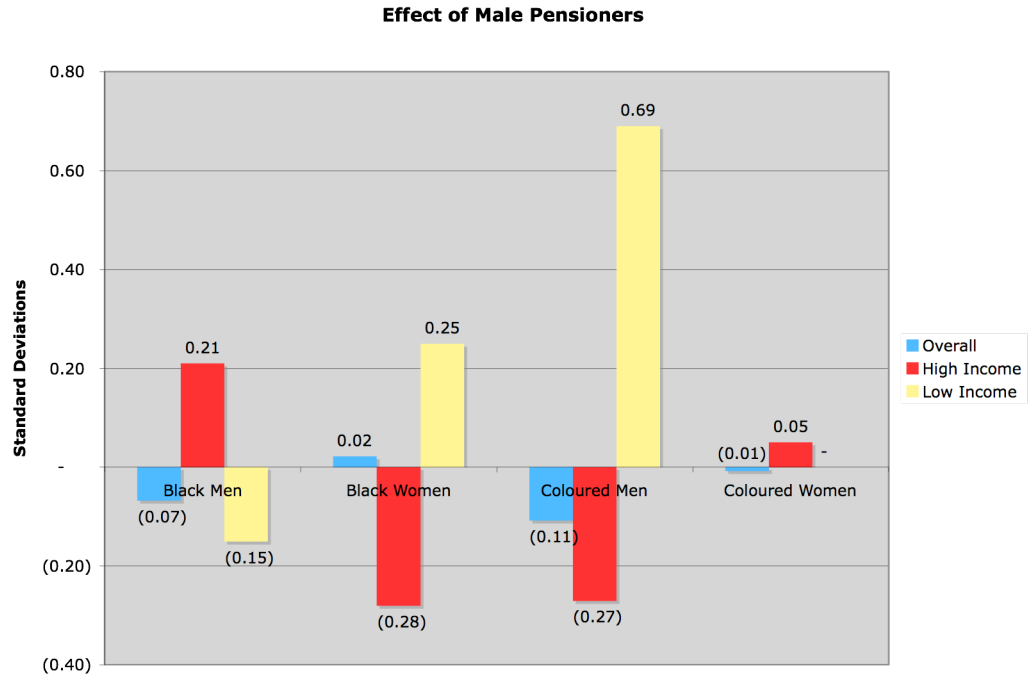


Exhibit 3: Total Effects of Pensions
Split by Income Levels for Pregnancy



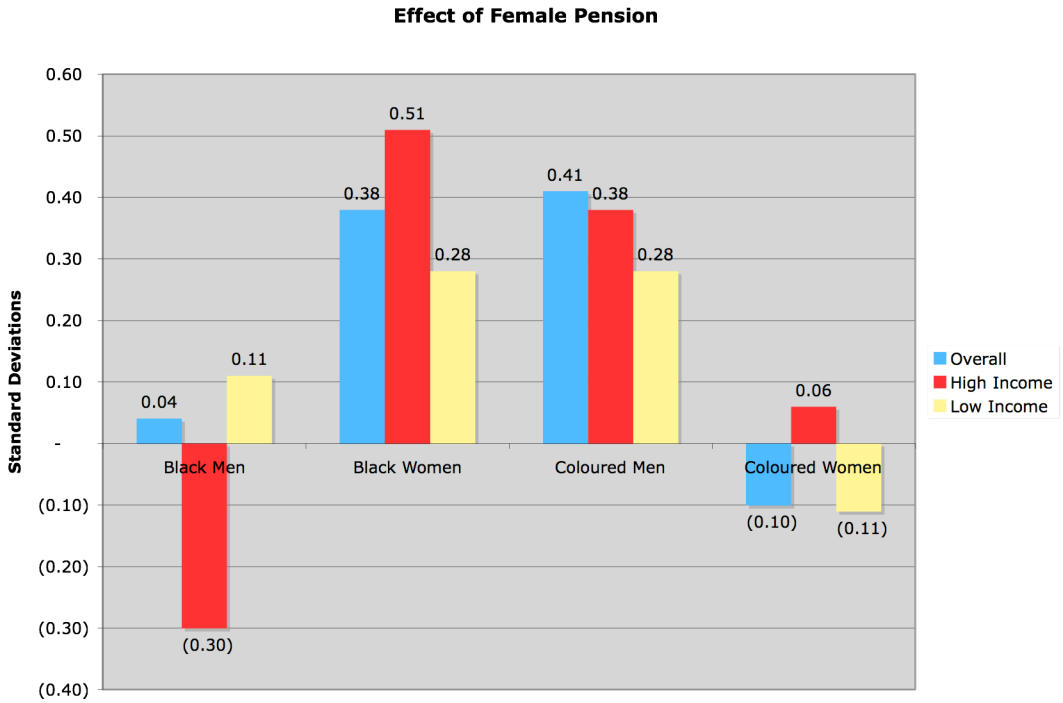
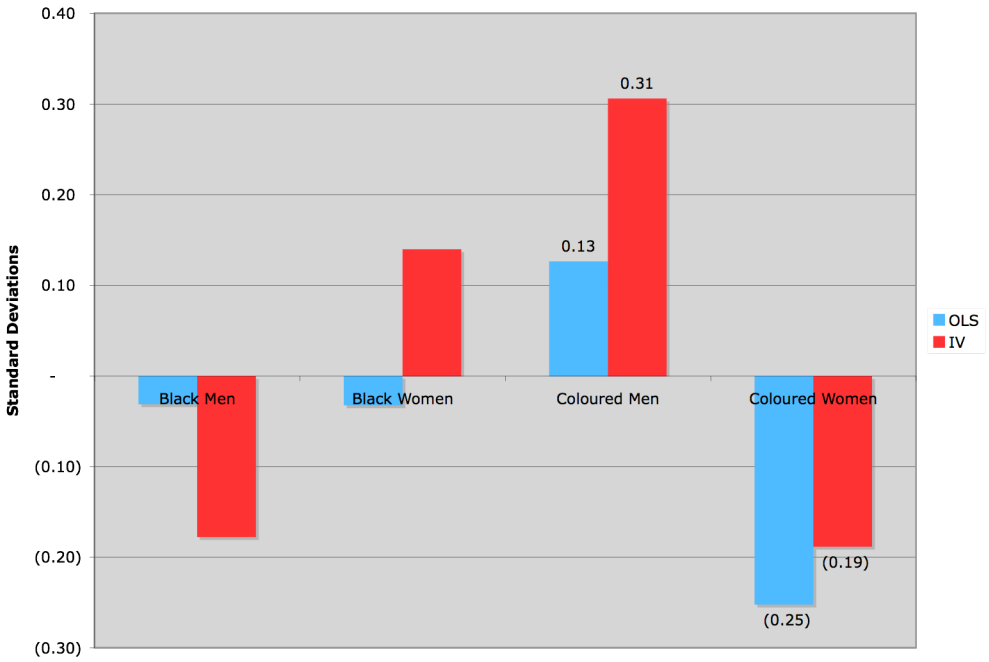


Exhibit 4: IV Total Effects Compared to OLS
Female Pensions Only

Sexual Activity



Condom Usage

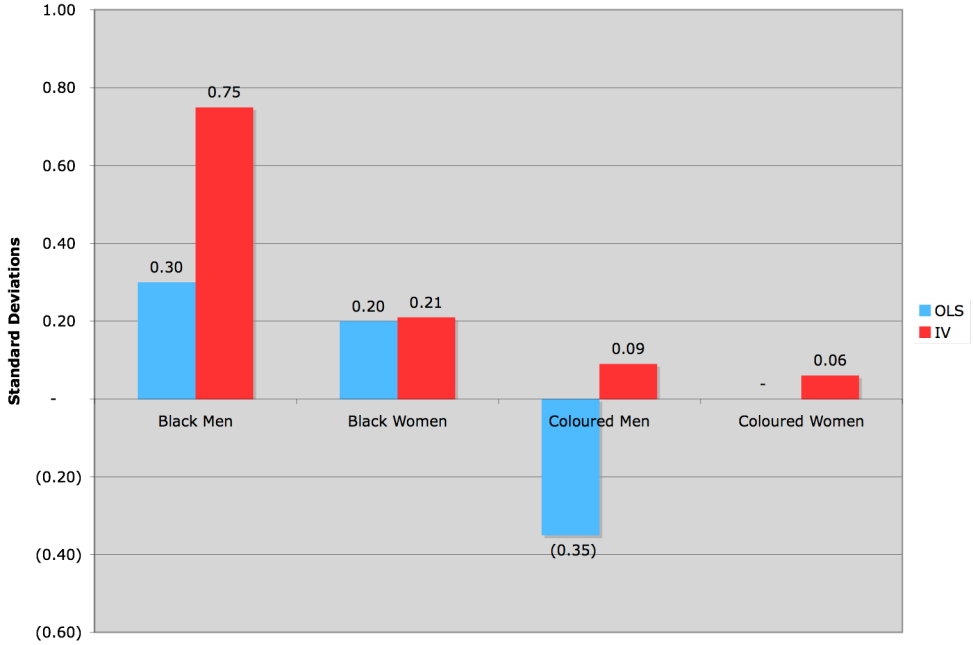


Exhibit 4: Continued

Pregnancy