Is Child Labor Inefficient? Evidence from Large Cash Transfers[*]

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Abstract: This study examines how child labor and education respond to a fully anticipated increase in household income. Baland and Robinson (2000) show that in the presence of liquidity constraints, child labor may be greater than is privately efficient. This study considers evidence on the presence of liquidity constraints by examining whether child labor supply and schooling are affected by the timing of fully-anticipated increases in income from a social pension program in South Africa. For the poor, black households considered in this study, pension eligibility is determined largely by age, and this study uses the age discontinuity in the pension benefit formula for identification. The data support the theory that liquidity constraints contribute to inefficiently high levels of child labor. When households become eligible for the social pension in South Africa, the resulting increase in household non-labor income is associated with a sizeable decline in child labor and increases in schooling attendance and attainment. This finding suggests that the current emphasis in development policy of addressing child labor by attacking labor demand may be misdirected.

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1. Introduction

Few issues in developing countries draw more public attention than child labor. Baland and Robinson (2000) frame the household's decision regarding sending a child to work and school in a model with implications analogous to a life cycle / permanent income model with consumption smoothing. Absent constraints on liquidity or bequests, the household allocates child time to equalize the marginal cost of reducing child time spent working to the present value of the marginal return to the child of not-working or attending school in the present. In this sense, child labor is privately efficient. With liquidity constraints, the household cannot borrow against the child's future return from not working, and thus the child works more in the present than is privately efficient for the household.[1]

This study tests for liquidity constraints by examining how child labor supply and education respond to a fully anticipated increase in household income. The role played by liquidity constraints in the pervasiveness of child labor in low income-countries is of critical policy importance. In recent years, child labor has drawn greater public attention than most other facets of life in low income countries. Governments in both rich and poor nations battle child labor in the developing world largely with policies aimed at mitigating the demand for child labor. This policy is predicated on the idea that child labor is an efficient household decision to be combated by lowering the relative return to child work. If, however, child labor is inefficiently high because of liquidity constraints, lowering the demand for child labor may only increase the household's need to send children to work. Moreover, increases in household income through economic growth and development may ameliorate child labor associated with inefficiencies. However, growth may raise the earnings opportunities open to children as well.

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[1] The concept of efficiency in Baland and Robinson (2000) is private for the household. Child labor could be privately efficient but socially inefficient. However, throughout this study, the concept of efficiency explored is that of private efficiency from the household decision-maker's perspective. Issues of social efficiency are neglected.

Thus understanding the role of private inefficiencies in child labor supply is critical to understanding how child labor will change with economic development. Despite the importance of the topic, to my knowledge, no other study examines empirical evidence on the private efficiency of child labor.

The anticipated income increase explored in this paper comes from a large social pension program in South Africa. As such, the methodology of this paper is similar to that of the literature examining the life-cycle consumption model through household responses to well-defined, predictable changes in income attributable to social security tax law changes (Parker 1999), income tax refunds (Souleles 1999), and income tax cuts (Souleles 2002). Testing for liquidity constraints in reaction to an anticipatable cash transfer offers two main advantages over research that relies on endogenous income variation. First, in general identifying the predictable component of income is difficult for the econometrician. With a well defined cash transfer program, the benefit formula dictates the predicted increase in income. For the poor black households in South Africa examined here, the recipient's age determines the amount of the cash transfer; there is little uncertainty about the benefit level (Alderman 1999). Second, even if a researcher can separate the predictable and unpredictable parts of household income, it is never clear if this separation corresponds to what the decision-maker perceives. In the present case, the South African social pensions are so large (for black households, the 1999 benefit of 520 Rand per month is greater than median per capita income) that they are well-known and highly anticipated by the recipient (Lund 1993). Hence, the anticipated income used to test for liquidity constraints in this study is likely to match the income anticipated by the households observed in the data.

The extension of the white social pension to blacks with the end of apartheid in South Africa is the source of the anticipated income increase used to examine whether liquidity constraints affect inefficiently high levels of child labor. The black population of South Africa is substantially poorer than the white population. Hence, when the relatively meager white Old Age Pension (OAP) program was extended to other South Africans at the end of apartheid, the social pension became a large cash transfer. There is a means test in the OAP, but it is at such a high level that, while it binds for most white households, it affects few black households (Case and Deaton 1998). Thus, the primary determinant of the cash transfer is the age of the beneficiary. Moreover, black South African households are typically multi-generational, so there is ample scope for this pension income to be shared with children. In fact, other studies of the OAP have documented sharing of the pension benefit with co-resident adults (Lund 1993, Bertrand and others 2000), across households (Jensen 1998), and with children (Duflo 2001).

This study examines the private efficiency of child labor by comparing child labor supply and schooling in households that are eligible for the OAP to households that are not eligible. Two main issues complicate identification. First, take-up of the pension is a household choice that may be jointly determined with the economic activities of the household. For example, Case and Deaton (1998) find that households receiving the pension are poorer on average. If children are more likely to work in poorer households, then child labor may be positively associated with pension take-up. Because of this problem of endogenous take-up, this paper focuses on pension eligibility rather than pension take-up. For black households, pension eligibility depends on the pensioner's age rather than any household decisions. Thus, all of the results in this paper could be interpreted as reduced form regressions of a structural model of the labor supply decision where income depends on the pensioner's age.

Second, the placement of pensioners is not random. Pensioners may move into households because of the activities of children. Or households with pensioners may differ in some systematic way from households without pensioners. The nonrandom placement of pensioners affects two aspects of the empirical approach. First, the sample is restricted to children in black-headed households who co-reside with a black person between the ages of 50 and 75. Thus, all children in this paper live with an older person who will become eligible for the pension in the relatively near future, and the test in this paper is then based on comparing the impact on child labor of actually receiving the cash today compared to receiving it in the near future. Second, a series expansion in the age of the oldest man and oldest woman in the household is included in each regression. This controls for general patterns of child labor that may be associated with having older individuals in the household. The effect of receipt of pension income is then identified by using the data on child labor in households without pensioners but with someone over 50 to learn about what the labor supply of children that co-reside with pensioners would be absent the pension, after controlling for patterns in child labor associated with the aging household.

This paper finds evidence of liquidity constraints that produce (privately) inefficient child labor. [2] Once households become age eligible for the pension income, child labor declines and schooling increases. Declines in child labor are largest in market work such as work for wages, work on the family farm, or work in the household business. School attendance increases with

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[2] In arguing that the observed household responses to anticipated income represent evidence of liquidity constraints, this study assumes away two alternative explanations. First, if the expected variance in consumption changes upon receipt of the income, then precautionary motives for savings, child labor, or education may create a link between the timing of receipt and child labor supply and schooling. Without liquidity constraints, it is hard to envision how the expected variance of consumption would be affected by the timing of the old age pension. Second, a boundedly rational household (as in Parker 1999) may allow child labor and schooling decisions to track income provided that this strategy does not make the household too much worse off than the fully rational strategy. Given the magnitude of the cash transfer stemming from the old-age pension, it is hard to imagine that this nearly rational rule of tracking child labor and schooling to income would not make the household much worse off.

pension eligibility, and school attainment is increasing in the time that the household has been eligible for the pension. The effect of pension income on child labor and schooling appears to vary with the gender of the recipient. In general, child labor decreases and schooling increases more when men receive pensions than when women receive pensions. Male pension eligibility is associated with an approximately 35 percent decline in hours worked per week, a rise in school attendance to almost 100 percent, and a 2 percentage point increase in the probability a child completes primary school for each schooling year that the household has received the pension. These findings imply that because of male pension eligibility 23,000 children are attending school who would otherwise not, an additional 6,000 children have completed primary school, and over 180 million fewer hours were worked by children in a 1999.

This finding of inefficiencies in the child labor decision supports the argument that the high levels of child labor in poor countries may reflect market imperfections associated with poverty rather than the efficient result of rational household decisions. As a result, existing child labor programs directed at curtailing labor demand may be misdirected, and punitive, income-reducing policies such as trade sanctions designed to punish counties with high levels of child labor have the potential to increase child labor.[3]

The next section of the paper outlines the test of inefficiencies in child labor based on the presence of liquidity constraints. Section 3 describes the old age pension and the identification strategy. Section 4 presents the results. It begins by considering whether liquidity constraints influence child labor supply as well as what type of child labor supply is affected. Schooling attendance and attainment are examined next. Section 4 concludes with a discussion of several

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[3] Basu and Van (1998) point out that if labor demand mechanisms were effective in eliminating child labor, there may be general equilibrium effects that raise adult wages enough to eliminate the household's desire to send children to work. Thus, the argument that attacking labor demand may only serve to increase child labor assumes that these labor demand oriented policies will not curtail child labor enough to induce these general equilibrium wage effects. Ranjan (2001) is a more formal development of this argument in the context of liquidity constraints.

factors that may influence the interpretation of the results. The findings of liquidity constraints appear to depend on who receives the pension in the household. Thus, throughout section 4, the role of the gender of the pension recipient is examined. Section 5 concludes. Appendix 1 describes the data in greater detail, and Appendix 2 presents detailed results for the discussion in section 4.3 about how shifts in household composition may relate to this paper's results.

2. Testing the efficiency of child labor - theory

The basic model of Baland and Robinson (2000) has a single household decision-maker (a parent) who makes child labor and schooling decisions after making other household income decisions. The parent lives two periods. In the first period, the parent chooses savings s and the fraction of child time spent working, h. m_1 is the household's income each period from sources other than child labor. Wages from working are normalized to 1. Thus, consumption in the first period is: $c_1 = m_1 + h - s$. In the second period, in addition to the parent's income m_2, the parent receives the savings income and gives a bequest b to the child: $c_2 = m_2 + s - b$.[4] Parental utility depends on consumption in period 1 and 2 as well as the well being of the child: $U_p\left(c_1, c_2, U_c\left(w_c\right)\right)$. Child well-being depends on the return to the time spent not working, $z(1-h)$, and income from bequests: $w_c = z(1-h) + b$.

Baland and Robinson show that if savings and bequests are not zero, then household chooses child labor so that marginal cost in terms of foregone consumption today due to decreased child labor exactly equals the additional return to the child of foregoing child labor:

$$(1) \qquad z'(1-h) = 1.$$

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[4] Adding an interest rate, discount rate, and (later) altruism parameter to the model does not affect the basic intuition of the test in this paper. Hence, they have been omitted from this presentation for simplicity.

Thus, child labor is privately efficient. (1) is referred to as "the efficiency hypothesis" throughout this paper. If income is higher in the second period than in the first, child labor supply is unaffected. The household merely adjust savings.

However, with liquidity constraints, the household cannot move resources between periods. Hence, child labor supply in period one depends on the household's marginal utility of consumption in period one, and the resulting educational investments will be lower than in the equilibrium without liquidity constraints: $z'(1-h) > 1$. Child labor is inefficiently high from the household's perspective.[5]

In Baland and Robinson's model, identifying an income elasticity of child labor supply is indicative of a constraint on liquidity or bequests. However, the fact that child labor is income elastic is not sufficient for testing the efficiency of child labor in a more general model of child labor. First, leisure or education may be a normal good in parental preferences. Higher income thereby may lead to increases in leisure and education. Thus, to test for liquidity constraints in child labor, identification needs to be based on the timing of income.[6] Second, the source of variation in the timing of income must not arise from the same household decision-making process that determines child labor supply. For example, Jacoby and Skoufias (1997) show that child labor supply and household income both vary with agricultural seasons. This could generate misleading results in identifying liquidity constraints, because changes in the value of child time outside of schooling coincide with changes in income, independent of any effect of expected seasonal variation in income on child labor. Third, the variation in the timing of income must be foreseeable to both the econometrician and the household. For the test of

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[5] Baland and Robinson (2000) show that these results for savings and bequests also hold under reciprocal altruism when children value the well-being of their parents.
[6] There may still be a slight income effect associated with the timing of income because of the household's present value calculation. For example, if a million dollars today has a slightly higher present value than a million dollars tomorrow. The assumption in this paper is that the magnitude of this income effect based on timing is small.

liquidity constraints posited here, the variation in the timing of income must reflect the variation perceived by the household decision-maker. A mismatch between the econometrician's understanding of predictable variation in the timing of income and the household's may yield false evidence of liquidity constraints if the income that appears anticipated to the econometrician is unanticipated by the household.

The discussion so far has ignored bequests. As with liquidity constraints, if bequests are constrained, the return to not-working can exceed the cost to the household of foregoing child work, and child labor is inefficiently high. Without bequests, children cannot compensate parents for the foregone consumption that comes from decreasing child labor. Thus, either the presence of liquidity constraints or constraints on bequests can generate inefficiencies. Hence, a failure to observe child labor responses to the timing of income does not necessarily imply that child labor is privately efficient, because the timing of income should have no effect on bequest constraints. Similarly, the observed levels of child labor after the relaxation of liquidity constraints are not necessarily privately efficient. Thus, examining whether child labor responds to the timing of income only identifies private inefficiencies associated with liquidity constraints.

The timing of income influences child labor supply with liquidity constraints, because the household's inability to move resource between periods causes educational investments (and child leisure consumption) to depend on the household's marginal utility of consumption. Thus, inefficiencies are generated because of income's effect on child labor supply. However, in a more general model, there are a number of other ways in which liquidity constraints may cause inefficient levels of child labor. Consider a couple of examples. First, liquidity constraints may force households to under-invest in child nutrition, lowering the child's productivity in school. Improved nutrition as a result of receipt of the cash transfer (e.g. Duflo 2001) may then increase

the return to schooling and lower child labor. Second, liquidity constraints may limit the (in or out) migration of household members. Changes in household structure as a result of the anticipated receipt of income (e.g. Edmonds and others 2002) may then lower the demand for child labor within the household. One can imagine several other mechanisms through which liquidity constraints affect child labor supply other than through the direct effect of income on child labor. The possibility of these other mechanisms means that the results of this study cannot be interpreted as reflecting the direct effect of income itself. Nevertheless, to the extent that liquidity constraints cause these other factors to respond to the timing of income, these other factors are merely the mechanisms through which liquidity constraints generate inefficient child labor. In this way, the model of Baland and Robinson and the results of the test in this paper can be interpreted as reduced form evidence on inefficiencies in child labor owing to liquidity constraints rather than as an identification of the mechanism through which liquidity constraints influence child labor supply.

3. Testing the efficiency of child labor – an application

3.1 The Old Age Pension Program (OAP)

The OAP in South Africa provides an ideal setting to explore whether the economic activities of children depend on the timing of increases in household income. The collapse of the apartheid system in the early 1990's brought many changes to the lives of South Africans. One substantive change was the extension of the white pension program to elderly blacks. This caused a dramatic increase in the pension receipts of almost all elderly blacks. Historically, blacks received only a fraction of the state pension that whites received, but by 1993 most blacks and whites eligible for the pension were receiving comparable amounts. The maximum benefit

in 1993 was 370 Rand per month (about $3 a day), twice the median per capita monthly household income of blacks (Case and Deaton 1998). By 1999, the maximum benefit increased to 520 Rand per month.

The OAP has three important attributes that make it ideal for this study. First, there has been a means test to the pension, but it is set as such a high level that it does not apply to most black South Africans (Alderman 1999).[7] Hence, the pension rules themselves do not coerce households to change their economic activities. Second, absent the means test, the age of co-resident household members determines whether the household is eligible for the pension. A woman is pension eligible if she is age 60 or older. A man is pension eligible at age 65 or older. Thereby, the timing of the income receipt and the magnitude of the cash transfer is easily identified for both the econometrician and the household. Third, it is not unusual for a pension eligible grandparent to reside with a grandchild in black South African households. Hence, there is ample scope for the sharing of pension income with co-resident children and their parents, and evidence of this sharing permeates the academic literature on the OAP (Lund 1993, Case and Deaton 1998, Bertrand and others 2001, Duflo 2001).

3.2 Empirical methodology

The presence of inefficiencies in child labor supply is tested by comparing the labor supply of children in households with a pensioner to children in households with an elder that is not yet pension eligible. The influence of the gender of the pensioner on the link between the timing of pension income and child labor is also examined.

Since pensioners are not randomly distributed among households, the comparison of child labor in households with pensioners to child labor in households where the elder is not yet

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[7] The means test, if applied, does not take in to account income of other family members (Case and Deaton 1998), so there is no incentive to change the activities of children in order to be eligible for the pension.

pension eligible raises two concerns. First, take-up of the pension may be an endogenous household decision. For example, Case and Deaton (1998) find that households receiving the pension are poorer on average. If children are more likely to work in poorer households, then child labor may be positively associated with pension take-up. This endogenous pension take-up problem is addressed by focusing on pension eligibility rather than actual take-up. For black households, pension eligibility depends on the pensioner's age rather than any household decisions. Women become eligible for the OAP at age 60. Men become eligible at age 65. Hence, the test of the efficiency of child labor supply comes from comparing child labor supply in households with a man at or above age 65 or woman at or above 60 to child labor supply in households with a younger elder.

By focusing on eligibility rather than pension take-up, the results of this paper can be interpreted as reduced form regressions for a model where pension income is instrumented by eligibility. The income data associated with the child labor data used in this study are poor; estimating the structural model is infeasible.[8] Moreover as discussed in section 2, there is no reason in examining liquidity constraints to restrict the timing of income to influence child labor through the direct effect of income on child labor alone. Indirect effects can still identify liquidity constraints. Nevertheless, there needs to be a link between pension eligibility and household income in order to interpret the results of this study in terms of liquidity constraints. Several studies using other datasets document a link between pension eligibility and household income in black South African households.[9] The link between household income and pension

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[8] The questionnaire collects income by asking for total household income in the last year. Rather than recording an income amount, the survey asks the respondent to select one of several broad categories (60 percent of the population falls in one of five categories), and 5 percent of the sample used in this study does not respond to the income question.

[9] See Edmonds and others (2002) for the 1996 South African census and Case and Deaton (1998) for evidence from a 1993 household survey.

eligibility in the data used in this study is discussed in detail in Appendix 1. The probability that the household reports receiving pension income increases by 600 percent with pension eligibility, and the probability that a household reports an income above the pension amount of 520 Rands per month rises by 12 percentage points if at least one co-resident elder is pension eligible (t-statistic 8.167). Henceforth, when considering the effect of pension eligibility on child labor, pension eligibility will be treated as reflecting additional household income.

The second main concern raised by the non-randomness of pension income is that households with pensioners may differ systematically from non-pension households. In particular, households with pensioners are likely to be older on average than are households without a pensioner and are more apt to contain multiple generations. Comparing children who co-reside with an elderly person to those who do not is problematic, because the presence of an elderly individual may influence the allocation of a child's time other than through income. For example, an elder may need care, bringing additional household obligations to children. Alternatively, an older person may take over some of the duties performed by children.

These problems influence the empirical work in two ways. First, the sample is limited to children that co-reside with an elder. In particular, the sample is restricted to children that co-reside with a person between the ages of 50 and 75. Restricting the sample in this manner means that the effect of a pensioner of a given gender is identified by comparing the effect of a person who is near but below pension age to a person who is of pension age (e.g. the effect of having a 64 year old man relative to a 66 year old man). This type of identification is used in Bertrand and others (2001) and Case (2001).

An obvious concern in this approach is that the pension indicator may capture age trends in addition to the effect of pension income on child labor.[10] Thus, this study allows for differences in child labor with the age of the elder by including a series expansion in the ages of the oldest male and female in the household in each regression. The basic regression approach is thus:

$$(2) \qquad H_{ij} = \beta_0 + \beta_1 PEF_i + \beta_2 PEM_i + \beta_3 PEF_i * PEM_i + \pi \left(AOM_i, AOF_i \right) + \varepsilon_{ij}$$

where H is the labor supply of child j in household i, PEF indicates the presence in the household of a female who is at or above age 60 (and thus pension eligible), PEM indicates the presence in the household of a male who is age 65 or older (pension eligible), $PEF*PEM$ allows for an interaction of these two, and $\pi \left(AOM_i, AOF_i \right)$ is a third order polynomial expansion in the age of the oldest man and age of the oldest woman and all of their interactions.[11] With the series expansion to control for age trends, the coefficient on the indicator for pension eligibility can be interpreted as the change in child labor associated with changing a person of gender g from ineligible to pension eligible after controlling for the changes in child labor associated with the presence of generally older people.

4. Testing the efficiency of child labor - results

4.1 Child labor results

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[10] Consider three examples. First, pensioners are older than the aged who are not pension eligible. Thus, the pension indicator may capture that older people will have older grandchildren and great-grandchildren who are more likely to work and not attend school. Second, because the child and grandchildren of pensioners should be relatively older, there may be larger household sizes around pensioners. There are a number of ways in which household size may increase or decrease child labor supply. Third, surviving to pension age may indicate that elders (especially elder males) are in relatively rich households. Wealthier households may be less likely to have children work or may have greater employment opportunities open to children.

[11] Every regression in this paper has been re-estimated allowing the effects of pension income to vary by child gender. In every case, the data do not reject the hypothesis that the gender interactions are insignificant. Thus, gender interactions are not included in estimating (2) in the reported results.

This study tests the efficiency of child labor decisions by examining how child labor in black households in South Africa responds to the fully anticipated changes in non-labor income that comes from the OAP. Without liquidity constraints, increases in income may change savings, but child labor is determined by setting the return to not working equal to the opportunity cost of not-working. However, without savings, child labor supply in the first period depends on the household's marginal utility of consumption in the first period. Thus, the timing of household income can affect the labor supply of children in addition to savings and bequests. The test of the efficiency of child labor in this paper is to examine whether child labor supply changes when households move from anticipating the OAP income to actually being eligible to receive the income.

This study's empirical analysis is based on the 1999 Survey of the Activities of Youth in South Africa (SAYP) described in detail in Appendix 1. The SAYP collects data on the activities of children over a 12-month reference period. The activities of children are grouped into household and market economic activities. Household economic activities include housekeeping and caretaking activities within the child's household or school. Market activities include running any kind of business, big or small, for the child him/herself; working unpaid in a family business; working in farming activities on the family plot, food garden, cattle post or kraal; catching or gathering any fish, prawns, shellfish, wild animals or any other food, for sale or for family consumption; doing any work for a wage, salary or any payment in kind; collecting wood for fuel or water; and begging for money or food in public. Total hours worked are the sum of hours in household and market economic activities.[12]

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[12] Many studies of child labor ignore time in household work. However, this can produce very misleading results. For example, consider a household where a mother moves away from home to locations that better reward her skills. Children, then, pick up the household duties performed by the mother and exit the types of market work that they performed when their mother was present. This might look like a decline in child labor if household activities are

Table 1 contains the summary statistics for the children in black-headed households interviewed in phase 2 of the SAYP (see appendix 1). This study focuses on the 2,752 children ages 10-17 in columns 3 and 4 of table 1 that co-reside with a person between the ages of 50 and 75. Comparing children 10-17 that reside with an elder who is not pension eligible (column 3) to children that reside with a pension eligible person (column 4) suggests that pension eligibility is associated with a decline in total hours worked for children. The decline is larger in market work than in household work. Treating column 3 as the reference group, pension eligibility is associated with approximately a 10 percent decline in hours worked in market work.

Of course, this comparison in table 1 may confound age trends with the pension. Hence, age patterns in child labor are controlled for with the framework of (2). Table 2A begins by considering total hours worked in both market and household work. In column 1, after controlling for differences associated with the age of the oldest household members, hours worked declines by 2 hours when a female becomes pension eligible if there is no eligible male in the household and by 6 hours when a male is pension eligible if there is no eligible female. The combined effect of having both a male and a female pension eligible in the households is less than the sum of each individual's effect. Having both a co-resident male and female pensioner is associated with a decline in hours worked of approximately 5 hours.[13]

Figure 1 presents the raw data and the results from column 1 of table 2A. The raw sample means illustrate the basic finding that child labor declines with pension eligibility.

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ignored. However, if the child moves from attending to school and working 2 hours a week helping out on the farm to no school and 40 hours a week filling in for a parent, it would not be correct to claim that the child works less.

[13] Out of 2,752 children between ages of 10 and 17 that co-reside with a person age 50 or greater, only 172 report 0 hours of work. Hence, the left censoring of the hours worked distribution is not a substantive problem in table 3. However, column 6 contains Tobit results. They match the corresponding OLS results closely.

Figure 1: Total Hours Worked and Pension Eligibility
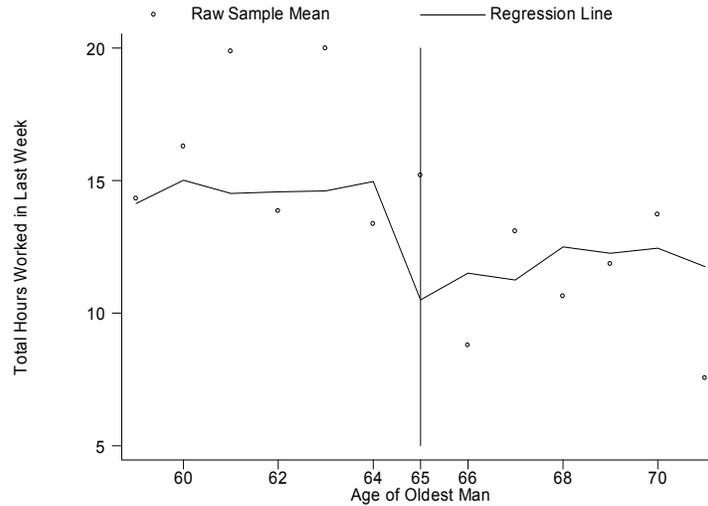
In households where the oldest man ranges between 59 and 64, average hours worked for children vary between 13.4 and 20 hours. However, between ages 66 and 71, average hours worked for children range between 7.5 and 13.7. [14] The regression line in figure 1 is computed by calculating the mean for all of the regression variables conditional on the age of oldest man and plotting the regression line at each age of the oldest man with all of the corresponding means. [15] The general age trend controlled for in (2) is evident in figure 1 as well. Both before and after age 65, child labor is increasing slightly in the age of the oldest man. The observed pension effect comes from the dramatic decrease in child labor that shifts the post 65 mean downward.

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[14] An obvious question in figure 1 is why child labor does not decline until after age 65. One possibility is that there is significant delay in when the pension goes into effect. More likely, the picture reflects considerable measurement error in age. For example, the survey estimates the number of men age 65 to be 35 percent greater than the number of men age 64. Edmonds and others (2002) find even greater age-heaping in the South African census. One solution to this problem is to re-estimate the regressions in this paper, dropping all men age 65. Reproducing column 1 of table 2A for this nonrandom sub-sample suggests that male pension eligibility is associated with 6.5 fewer hours worked (t-statistic=3.04).

[15] Upon observing a child co-resident with a male pensioner, the probability that the child also co-resides with a pension eligible female is .57. Thus, the decline with pension eligibility evident in figure 1 corresponds to the 5 hours decline that accounts for the fact that men cohabite with women who may be pension eligible. If the sample is restricted to households where the only pension eligible individual is male, male pension eligibility is associated with 7.3 fewer hours worked per week (t-statistic=3.63).

An elasticity calculation might help to interpret the result that hours worked declines by 6 hours per week with male pension eligibility. The mean hours worked for children that co-reside with an elder who is not pension eligible is 17 hours. If this is treated as a baseline for children that reside with a pension eligible male, the 6 fewer hours worked by a child who lives with a pension eligible male implies a 35 percent reduction in child labor. For a household with a pension eligible male receiving the pension, the benefit corresponds to a 122 percent increase in household income.[16] The 35 percent reduction in child labor then implies an income elasticity of child labor supply of approximately 0.3.

A way to interpret the magnitude of these findings is to estimate the total reduction in child labor affected amongst black South African households as a result of the eligibility of men for the social pension program. The SAYP estimates that there are approximately 531,771 black, pension eligible men in South Africa in 1999. On average, these men live with 1.1 children between the ages of 10 and 17. If the average reduction associated with the pension eligibility of men is 6 hours per week, then over 180 million fewer hours were worked in 1999 as a result of the pension eligibility of men.

The main identifying assumption in this approach is that the series expansion in elder ages controls for differences between households that vary in whether their elders are pensioners. That is, if a child in a pension eligible house is switched to an ineligible house, the labor supply for that pension eligible household child now in the pension ineligible house will be the same as

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[16] In order to predict income absent the pension for a household with a pension eligible man, the household's income category is regressed against the age of oldest man and woman polynomial for households with elder males that are not pension eligible. The results from this regression are used to predict household income (without the pension) for pension eligible males. Annual household income for a household with a pension eligible male would be between 4201 and 6000 Rand per year without the pension. Treating the midpoint of this range as the average household income for a household with a male pensioner implies that average income for this group is 425 Rand per month. Thus, the pension of 520 Rand per month corresponds to a 122 percent increase in household income.

a child living in a pension ineligible house. Specifically, for identifying the effect of male

pension eligibility, the assumption is:

$$(3) \qquad E_{PEM=1}\left(H \mid AOF, AOM, PEF, PEM = 0\right) = E_{PEM=0}\left(H \mid AOF, AOM, PEF, PEM = 0\right).$$

The subscript on the expectations operator indicates whether the child is observed in a pension

eligible house or not. The other conditioning variables then define the child labor supply that a

child would experience absent the pension eligible male. The remainder of table 2A and table

2B examine the SAYP data for evidence against this identification assumption.

There are two testable implications of (3). First, (3) implies that the inclusion of other

regression controls should not substantively alter estimates of the effect of pension eligibility on

child labor. To explore this, columns 2 – 5 of table 2A include various other controls in the basic

regression (2). Column 2 of table 2A includes controls for each child's age. Column 3 adds

province and urban fixed effects. Column 4 contains child age controls, province and urban

fixed effects, and housing controls.[17] Column 5 adds household composition controls to the

covariates in column 4.[18] All four control strategies lead to estimates of pension effects that

cannot be distinguished statistically from the results in column 1 that just condition on the

expansion in age of oldest man and woman.[19] Thus, the data does not present evidence to reject

the identification assumption in (3).

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[17] The survey collects detailed data on house characteristics, but little other household asset information. Hence, housing characteristics are the best available way to control for differences in household wealth, although they may also depend on pension income (and could also depend on available child labor). Ex ante, one would expect conditioning on house characteristics to attenuate the observed pension effects, because pension income may lead to improvements in household characteristics. This may lead to less work for children.

[18] Household composition controls are a vector of dummies for the presence of a mother, a father, a grandparent, grandparents and parents, the number of household members 0-5, 6-9, 10-13, 14-17, 18-22, 22-49, 50-75, and 76 plus.

[19] The remainder of this paper conditions on child age, gender, and province and urban fixed effects in addition to the polynomial in age of oldest man and age of oldest woman. Housing characteristics and household composition controls are not included because of concerns that they are jointly determined with child labor.

A second implication of (3) is that if artificial pension variables (e.g. assign pension eligibility to different ages) are created, there should not be any observed treatment effect. Table 2B contains these results. Column 1 pretends that pension eligibility occurs at age 55 for women and 60 for men. Column 2 pretends that pension eligibility occurs at age 65 for women, and 70 for men. Column 3 pretends that pension eligibility is at age 65 for women and 60 for men. In every case, there is no evidence of the large changes in child labor observed with the actual pension ages. Thus, the data do not reveal any evidence to suggest that the empirical method is providing false rejections of the efficiency hypothesis.

Throughout this study, the sample is restricted to households with persons age 50 to 75. The purpose of this restriction is to make the households with and without pensioners relatively comparable so that the variation for which the age of oldest man / woman polynomial controls for minor. As a third robustness check, columns 4 and 5 of table 2B limit the source of variation used to identify the mean differences in child labor associated with pension eligibility. Column 4 includes dummy variables for the presence of a woman age 55 and man age 60. Hence the interpretation of each of the pension indicators is the effect of having a pension eligible person relative to having a person of the same sex who is just below pension age. For this narrowed group, the data continue to suggest the table 2A results: 6 fewer hours of work associated with male eligibility and 2 fewer hours of work associated with female eligibility. Column 5 adds indicators for the presence of women above 65 and men above 70. Thus, the pension indicators compare households where elders are within 5 years below pension eligibility to within 5 years above pension eligibility after controlling for age patterns. With this narrower source of variation, the magnitudes of pension effects change from table 2A, albeit not in a statistically

significant way. Male pension eligibility is associated with 7 fewer hours of work and female pension eligibility is associated with 1 hour less of work.

In sum, all of the findings suggest that there are relatively large changes in the time a child spends working associated with the timing of pension income. The effects of pension income are largest when the pension recipient is a male. Under the efficiency hypothesis, when the sample is restricted to households that expect to receive the pension income in the near future, whether or not the household has yet to receive the income should not affect the allocation of child time. Thus, the child labor results in this section are consistent with liquidity constraints leading to higher levels of child labor than is privately inefficient.

The finding that pension income to a male is associated with greater reductions in child labor than is pension income to a female seems inconsistent with the existing literature on intrahousehold allocation with the OAP. Duflo (2001) finds pension effects on child anthropometrics only when women receive pensions. Bertrand and others (2001) find greater adult labor supply effects when women receive pensions as well. These studies consider income effects and not liquidity constraints. If older women have longer life expectancies, the present value of the social pension is larger for women than for men, and therefore there should be larger income effects when women become eligible for the social pension. With regards to liquidity constraints, if both men and women face liquidity constraints, the magnitude of the importance to the household of actually receiving the pension may dwarf the differences in present value of the male and female pensions. This argument suggests that male and female pension eligibility should be associated with similar effects on child labor. In general, the data do not reject the hypothesis that male and female pension eligibility affects the same reduction in child labor even though the magnitude of the male coefficients is larger and statistically different from zero.

However, if these male-female eligibility differences are real, life expectancy differences may still play a role. It is possible that because women have a higher life expectancy, they face a weaker liquidity constraint than men. That is, because men have a higher mortality risk, they are unable to borrow against expected pension income.

Moreover, the finding of larger reductions in child labor with male pension eligibility may be reconcilable with other studies of the OAP in a very simple model of intra-household allocation where men and women have different spheres of control. Becker (1973) and Lundberg and Pollak (1993) develop models of the household where men and women specialize into separate spheres of control within the household. While a person's sphere of influence in the household may depend in part on the resources at that person's command (e.g. Lundberg and others 1997; Thomas and others 1999), it is conceivable that the effect of cash transfers on the person's spheres of influence may be of second order relative to the ability of a person to affect behavior within their existing sphere. In Becker's model, women specialize within the household and men outside of the household. In this world, then, cash transfers to women might have greater effects on within household decisions about children and cash transfers to men might have larger effects on how children interact with the outside world and in traditionally male dominated spheres. Moreover, if household production activities (which may fall in female spheres of influence) are less income elastic, then the data should reveal larger declines in child labor with male pension eligibility. This can be examined by looking at child labor supply in different types of work.

In fact, the data suggests the largest reductions in child labor are in market work (work for wages, work for a household business, work on a farm, etc.). Table 2C breaks hours worked into hours in household activities and hours in market work. Girls work more in the household

and less in market work, although the difference in market work hours is not statistically

significant. In columns 1 and 2 (column 2 contains Tobit results), the data do not reject the

hypothesis that neither the pension eligibility of men or women has any effect on child labor

supply to household activities. Most of the reduction in hours worked with pension eligibility

appears in market work (columns 3 and 4). In fact, out of the 6 hours less work per week

experienced by children living with a pension eligible male, 5 of those hours appear to be in

market work. Thus, the fact that the statistically significant results in the data reject the

efficiency hypothesis only when men receive pension income appears easily reconcilable with an

extension to the basic model of intrahousehold decision-making.

4.2 Schooling

The test of the efficiency hypothesis implies that anticipated income should not affect

child labor nor should it affect schooling. Most studies of the link between schooling and child

labor find a negative correlation between the two but are careful to point out that some levels and

types of work are compatible with schooling. Moreover, measures of schooling are typically

crude so that variation in schooling may be difficult to observe. Thus, the observation in the

previous section that pension eligibility (especially for males) is associated with declines in child

labor does not necessarily imply that the data should reveal increases in schooling with pension

eligibility. As a result, it is informative to examine the effect of pension income on schooling

directly in a regression framework similar to (2).

These schooling results are in table 3A. In column 1, the dependent variable is an

indicator for whether a child currently attends school. Male pension eligibility is associated with

increases in the probability that a child attends school. Curiously, declines in school attendance

are observed when both male and female pensioners are present, but when all of the partials are

added together in column 1, the data cannot reject the hypothesis that there is no effect of pension eligibility of both men and women on schooling. Nevertheless, school attendance increases when men become pension eligible. Thus, the data suggest an effect of pension eligibility on schooling, contrary to the efficiency hypothesis.

Attendance is a crude measure of schooling, because it does not capture time spent in schooling nor does it capture time spent learning school work. Both of these factors may be the more important mechanism through which child labor trades off with schooling. While the dataset does not collect any information on time spent in school or on schoolwork, the questionnaire asks children that attend school if they have experienced financial problems with school in the last year and if work has forced them to miss school. Thus, columns 2 and 3 of table 3A are limited the sample that attends school. In column 2, the dependent variable indicates, conditional on attending school currently, whether a student is having problems with the cost of school. The incidence of schooling cost problems declines with both male and female pension eligibility, although the magnitude of the effect of male pension eligibility is almost three times that of female pension eligibility. Column 3 considers whether children that have missed school in the last 12 months have missed school for work. The probability that a child misses school for work declines with male pension eligibility.

These increases in school attendance may also be reflected in schooling attainment. Namely, if living with a pensioner increases a child's probability of attending school, then the longer the child lives with the pensioner, the more schooling the child should complete. Thus, table 3B considers the relationship between primary school completion and schooling years of exposure to a pension eligible individual. Schooling years of exposure to the pension is calculated by first identifying the number of years that the child has been eligible for school (age

minus 6). The child's exposure to the pension depends on the age of the oldest pension eligible individual in the household. If the pensioner has been eligible for the pension for more years than the child has been eligible for school, the child's schooling years of exposure to the pension is the number of years in which the child has been eligible for school. If the pensioner has been eligible for the pension for fewer years than the child has been eligible for school, the child's schooling years of exposure to the pension is the number of years in which the pensioner has been eligible for the pension.

Primary school in South Africa concludes with the standard five. If children have maintained their schooling continuously and entered at the typical ages, a child who has not fallen behind will complete primary school by age 13. Schooling information is available in the phase 1 sample. So the sample in table 3B is restricted to the 4,896 children 13-17 that co-reside with an elder. An indicator for if a child has completed primary school is regressed against years of exposure to a pension eligible person while controlling for the child's gender, age, residential location, and the series in the ages of oldest man and woman in the household.

At the sample mean, an additional year of exposure to a pension eligible person increases the probability that a child completes primary school by approximately 2 percentage points. Column 1 of table 3B includes years of exposure to any pensioner. Column 2 includes years of exposure to a female pensioner. Column 3 includes years of exposure to a male pensioner, and column 4 includes years of exposure to male, female, and both male and female pensioner. The data reveal that the effect of an additional year exposed to a female pensioner has approximately the same statistically significant effect as exposure to a male pensioner, although the magnitude of the coefficient is slightly larger for the male pensioner. An additional year of exposure to both

male and female pensioners in column 4 increases primary school completion rates by slightly more than male or female alone, but less than the sum of male and female effects.

Thus, the schooling and child labor data provide a consistent story. Receipt of anticipated large cash transfers is associated with increases in school attendance as well as primary school completion and declines in child labor. The pension eligibility of men is associated with over 180 million fewer hours worked by children in South Africa in 1999. The educational results are similarly significant. Male pension eligibility is associated with more than 23,000 children ages 10-17 attending school who otherwise would not (column 1 of table 3A), and more than 6,000 children ages 13-17 completing primary school (table 3B column 4).

These findings are not consistent with the efficiency of child labor hypothesis. If the decision to send a child to work is efficient from the household's perspective, then receiving additional cash income now (as opposed to receiving it in the near future) may affect savings decisions, but it should not affect schooling and the labor supply of children. In both school attendance and child labor, the data reveal larger changes with increased pension income to men. This finding can be reconciled with other studies that find increased nutritional investments in children when women receive the OAP if men and women have separate spheres of influence in the household, and market work decisions (that need to be more income elastic than household work) are in the male sphere.

4.3 Identification and Interpretation

4.3.1 Attenuating factors

The above results (aside from schooling attainment) are based on comparing households that currently receive the pension to households that will receive the pension in the near future.

This section highlights two factors that suggest the results above might understate the effect of pension eligibility on child labor and schooling.

First, households may respond to the pension either before or after actual eligibility even in the presence of liquidity constraints. For example, a household may keep children in school in anticipation of the pension income. This is particularly likely to be a problem if there are large "diploma" effects in the rewards to education. Consider a household with a seven year old girl. She can go to school now or she can work. If a parent knows that in two years time, the girl will be needed to work and hence she will not complete primary school, a parent may choose to keep the child at home now (if the large payoff to schooling is past the point of the girls expected termination of schooling). However, if the household anticipates receipt of the pension income in two years, then it knows that the girl can continue schooling in two years. Hence, the household continues schooling today. With the approach of comparing households with a pensioner to households without a pensioner but near to a pensioner, this "lag or lead" problem will attenuate any observed effects of the timing of income.

Second, measurement error in age in the survey maybe a problem, because black South Africans have only recently begun to systematically register births. This has created an administrative problem in implementing the South African OAP, because elder blacks without an official documentation of their births have incentives to try and persuade government officials that they are of pension eligible age. It is conceivable that survey respondents may believe that inflating ages in completing the data used below may help them receive pension income. Moreover, there may be targeting errors in the pension program such that some persons receive the pension other than at ages of eligibility. Hence, there are likely to be several households

defined as pension eligible that are not eligible and some households classified as ineligible that receive the pension.

4.3.2 Confounding factors

There is a large literature on the effects of the OAP on various household decisions. This section considers whether the finding of liquidity constraints could reflect other aspects of the effects of the OAP.

Households are fluid in South Africa, and Edmonds and others (2002) find that some households respond to the pension by re-arranging. Thus, the observed effects of the pension on child labor may actually just reflect changes in household composition rather than a change in child labor supply. In Edmonds and others (2002) male pension eligibility is associated with a 7 percent increase in children in the age group studied here. Under the hypothesis that children do not change their labor supply with the pension but rather that children who do not work move in, the 7 percent increase in these non-working children implies that male pension eligibility would be associated with 1.2 fewer hours of child labor. Hence, the results of this study are too large to be explained purely by children who do not work moving in. In fact, there would need to be a 33 percent increase in children (none of whom work) to generate the observed reductions in child labor with the pension.

The data used in this study also permit an exploration of the link between household composition shifts and child labor. Appendix 2 details these results. First, the appendix explores whether the number of co-resident children increases with pension eligibility. The data do not reject the hypothesis that there is no growth in children 10-17 associated with male pension eligibility. However, the data are also consistent with the 7 percent increase observed in Edmonds and others (2002). Second, the data can be restricted to children who have not moved

recently (the dataset asks about the last two years). The basic results do not change with this restriction. Third, it is possible to control for variation in child labor associated with household composition differences. Column 5 of table 2A includes controls for both the presence of family (mother, father, grandparents) and the number of household members in various demographic groups. Estimates of the observed effects on child labor of male pension eligibility are even larger with these household composition controls. Appendix 2 explores an alternative way to control for the link between household composition and child labor. It generates a new variable that is the residual from the regression of child labor on all the household composition variables and relates this household composition adjusted child labor to pension eligibility. As with simply conditioning on household composition, the basic findings of declines in child labor and increases in schooling with pension eligibility of men are not altered.

In addition to household composition changes, the literature on the South African OAP has indicated pension income effects on adult labor supply (Bertrand and others 2001) and child nutrition (Duflo 2001). These studies are concerned with identifying income effects rather than liquidity constraints, but to the extent that there are liquidity constraints, the timing of income may affect child nutrition or adult labor supply. However, both Duflo and Bertrand and others only observe pension effects for women, not men. Thus, the pension effects from male pension eligibility observed in this paper are not likely to be from Duflo or Bertrand and others type effects. Regardless, if the timing of pension income affects child labor through nutrition or changes in adult labor supply, this still reflects liquidity constraints that influence the child labor decision. The only issue raised by these confounding factors is whether the observed effects of the timing of income on child labor represent direct or indirect effects of the pension.

4.3.3 Omitted factors

Because the results in this paper come from changes in child labor associated with people reaching the age of pension eligibility, it is possible that the pension variables may capture other factors associated with age. This section considers three types of omitted variable problems.

First, retirement, absent the pension program, may complicate the interpretation of this study's findings. If women stop working at 60 and men at 65 without the pension program, the effect of retirement is intertwined with my estimates of the effect of the pension program. Note, the problem is not that the pension may induce individuals to retire and thereby influence child labor and schooling. If liquidity constraints prevent individuals from retiring and this thereby influences child labor supply, the results of this paper capture an indirect effect of the timing of income on child labor. Rather, a problem arises if retirement *absent* the pension occurs at ages 60 for women and 65 for men.

This is impossible to test in the data, but there are several reasons why this problem may not substantively alter the discussion. First, most black South Africans are not engaged in formal employment that would have a fixed retirement age (Edmonds and others 2002). Second, most black South Africans are sufficiently poor that they do not have the luxury of terminating employment at a specified age (in the absence of the pension). Typically, poor health and other problems associated with aging force the elderly out of employment. Third, in a more general model of child labor than in section 2 where the value of child time inside the household is affected by the activities of other members, retirement could affect child labor supply within the household even when child labor decisions are efficient. However, the largest effects observed above are in market work where the value of child time is more plausibly exogenous. Hence, retirement is unlikely to be an important omitted variable in the results above.

A second class of omitted variable problems could come from age-specific programs aimed at children. The probability that a child lives with a pensioner increases in the age of a child. In a world without discontinuous fluctuations in household composition, this would be expected, because older children are more apt to have an older grandparent who is thereby more apt to be pension eligible. Thus, there could be some government program or targeted intervention that is age-specific which thereby is associated with pension eligibility.

This is somewhat unlikely to be a problem in estimation for several reasons. First, child age and elder age are not perfectly correlated. The data contain both 12 year olds that live with pensioners and 12 year olds that do not. Thus, the inclusion of the polynomial in child age should control for age-specific factors. When table 2A controls for differences in child age (column 2), estimates of the effects of pension eligibility do not vary outside of the hundredths position from the estimates without age controls (column 1). Second, gross primary and secondary school enrollment rates have been increasing in South Africa throughout the 1990s (World Bank 2001). If older children are more likely to be in pension households and less likely to have attended schooling, the bias from these omitted education trends would be away from finding an effect of pension income on schooling.

Third, omitted anti-child labor policies are unlikely to be behind this paper's findings. International legislation is unlikely differentially effect the 10-17 year olds considered in this paper in ways that the pension indicators will capture. South Africa has been a signatory on the UN Convention on the Rights of the child since 1989 and just signed the UN Convention on the Elimination of the Worst Forms of Child Labor in 1999. Domestic legislation has been minimal and likely to be more strongly associated with younger children. The Basic Conditions Employment Act of 1997 prohibits the employment of children younger than 15 and regulates

the employment of children over 15. Thus, if this legislation has any effect, it would be to decrease the activities of younger children (thus biasing away from finding pension effects).[20] The 1996 constitution assigns every child a right to "be protected from exploitative labor practices . . .", but there do appear to be any concrete policies that have followed from this other than the Basic Conditions Employment Act.

5. Conclusion

This study finds that anticipated large cash transfer to the elderly in South Africa appear to be associated with increases in schooling and large declines in child labor. The average South African child living with an elder that is not yet pension eligible spends 17 hours a week working. In the data, pension income to an elder male is associated with 6 hours less work. Most of this decline in child labor is in market work which includes work in agriculture, work for pay, or work in a household business. Schooling attendance in South Africa is relatively high, so the effects of pension income on schooling are necessarily much smaller. 96 percent of children that co-reside with an elder who is not pension eligible attend school. The data suggest that pension income paid to an elder male is associated with school attendance rates that are close to 100 percent. Moreover, the cumulative effect of receipt of pension income is to increase schooling attainment so that each additional year that a child lives with a pensioner increases the probability that the child completes primary school by 2 percentage points. These findings are robust to several specification checks, and they imply a large overall effect of the pension program. For example, the results for male pension eligibility imply that 23,000 children are

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[20] If the Act has been effective, there should be discontinuous changes in child labor supply or in the probability that a child works for pay at age 15. However the SAYP does not reject the hypothesis that the labor supply of 15 year olds is the same as that of 14 and 16 year olds.

attending school who would otherwise not, an additional 6,000 children have completed primary school, and a total of over 180 million fewer hours were worked in a 1999.

The main focus of this study has been to test whether child labor supply is influenced by liquidity constraints. Baland and Robinson (2000) show that if a household faces liquidity constraints, then child labor is inefficiently high (from the household's perspective), because child labor supply is determined by the marginal utility of consumption rather than the return to educational investments. This study tests the efficiency of child labor decisions by examining how black households in South Africa respond to the fully anticipated, permanent changes in non-labor income that comes from the OAP. If households are saving, the increased income may affect savings, but child labor decisions should be unaffected if they are already at an efficient level (where the private return to education equals its private opportunity cost). However, the findings of this paper suggest that some households with working children would rather their children not work, but because of some sort of market imperfection that creates liquidity constraints, households are forced to send their children to work. The results of this paper are consistent with a story where an inability to borrow against a child's future return to education forces households to under-invest in education. Receiving large cash transfers weaken this cash constraint, and hence children work less and attend school more.

As with much of the literature on the South African pension program, the child labor data reveal different effects when men receive pensions than when women receive pensions. In particular, the effects of income on child labor and schooling are larger and have greater statistical significance when men receive the pension than when women receive the pension. It might be possible to interpret this as a rejection of the unitary household model, but the puzzle is why pension effects appear larger for men. Most of the intrahousehold literature finds larger

benefits to children when women receive pension income. One possible explanation is that men and women have different spheres of control within the household. Thus, income to women affects food and nutrition decisions whereas income to men affects the labor supply of children. Of course, although the magnitudes and statistical significance of the effects of income to men are larger, in general, the data do not reject the hypothesis that income to men and women have equal effects on most forms of child labor and in schooling. Thus, the data do not support a strong intra-household interpretation of these results.

The policy implications of the finding of inefficient child labor are substantial. A great deal of the literature on the determinants of child labor, going back as far as Marx, argues that parents send their children to work, because the return to working is greater than the return to not-working. This view then suggests that, if ending child labor is a policy priority, countries should focus on interventions directly related to child labor. For example, countries should use coercion to forcibly lower the return to child labor or increase returns to schooling. However, the results of this study suggest that, for some households, child labor stems more from market imperfections than from high returns to child labor or low returns to education. Hence, in these households where child labor is inefficient, attacking child labor may best be accomplished by attacking poverty, developing markets, and building financial intermediaries. With substantive liquidity constraints, actions design to prohibit child labor directly (such as trade sanctions) may impose costs on the poorest parents rather than the most callous and could, in the end, serve to worsen child labor (Ranjan 2001).

Appendix 1: The Survey of the Activities of Young People, 1999

The 1999 Survey of the Activities of Young People or SAYP (conducted by Statistics South Africa with the help of the International Labor Organization) is the first nationally representative survey in South Africa to collect detailed data about the allocation of child time. The survey also collects basic information about all of the members of a child's household including age eligibility and participation in the OAP.

The SAYP was conducted in two phases (Statistics South Africa 2000). The first phase employed a brief questionnaire designed to identify whether or not a household had children and, if so, if any children participated in any economic activities. In the SAYP, a household consists of a single person or a group of people who live together for at least four nights a week, who eat together, and who share resources. A household may occupy more than one structure. People that occupy the same dwelling unit but do not share food or other essentials are regarded as separate households. A domestic worker living in separate domestic workers quarters or who is paid a cash wage by the main household (even if she or he has most of her or his meals with the household) is regarded as a separate household. In this way, this study misses domestic workers that live within their employer's household in separate quarters.

Of the 10,480 sampled black households with children in phase 1, 74 percent had at least one child participating in an economic activity. In phase 2, a sample was drawn out of the sub-population with any working children. The definition of working for this re-sampling was broad: it included both household duties as well as work outside of the household. In this second phase, detailed questions about the allocation of child time were administered. Both phase 1 and phase 2 are studied in the empirical work in the text, but the detailed schooling and child labor data come from the phase 2 sample. Hence, these results are only representative to the population of households where at least one child works an hour or more in household or market production.

The aim of this paper to use the data on child labor in households without pensioners but with someone over 50 to learn about what the labor supply of children that co-reside with pensioners would be absent the pension, after controlling for general age trends. If the effect of the pension income is to move households from having children working to no children working, then the group in the data that are both pension eligible and qualify for the second round of the SAYP might be special and incomparable to the group of households without a pensioner but with a child labor. To evaluate this problem, an indicator for whether a household is selected into phase 2 is regressed on pension eligibility. Having a co-resident female pensioner decreases the probability of being selected by 1.5 percentage points and having a co-resident male pensioner increases the probability of being selected by less than a tenth of a percent (for a baseline, 22 percent of black phase 1 households with a person over the age of 50 are re-interviewed in the second phase). Both coefficients have t-statistics that are less than 1. This finding that sample selection is not associated with pension eligibility is consistent with the results in the text: the reductions in child labor are in the hours of work and not in participation rates.

This study focuses on children ages 10-17 in households with a black head. All of these children were born before the end of apartheid. Hence, their parents are unlikely to have anticipated pension income at the time of conception. Table A1 presents summary statistics for households with black household heads in the full SAYP sample and for the various restricted

samples that are used in this study. All descriptive statistics in table A1, including the phase 2 sample, are weighted to be nationally representative.

Households in the Phase 1 and Phase 2 samples look similar. This reflects the fact that three-fourths of the phase 1 sample (column 1) is eligible for phase 2. Hence, the phase 2 sample in column 2 is a random sample of most of the households in column 1.

Table A1 also illustrates that there is ample scope for the direct, within household sharing of income between the elderly and younger generations. Households with a pensioner and a working child 10-17 (column 5) have on average 1.9 children between the ages of 10 and 17. In the full, phase 1 sample (column 1), 26 percent of black households with children 10-17 also have a resident, pension eligible person and 26 percent report receiving pension income. Thus a substantial portion of households with children are directly affected by the OAP.

Four interesting characteristics about pension income, relevant to this study, are in table A1. First, 79 percent of households with a pension eligible person report receiving pension income. Pension take-up appears to not be universal (Case and Deaton 1998 find this as well), but a large portion of the eligible population receives it. Second, there is some leakage in the pension program (this is known to occur) or measurement error in reported ages. 13 percent of households without a person that is pension eligible report receiving pension income. In column 2, 7 percent of households without a person age 50 to 75 report pension incomes, but these households can include pension eligible persons above the age of 75. Third, the average number of pensioners per household is 1.2. Thus, some households may receive pension income from multiple individuals. Fourth, co-residency of children with pension eligible women is more common than is co-residency of children with pension eligible men. However, the difference in co-residency rates is approximately the same as the presence of pension eligible men and women in the general population (author's calculation from the full SAYP sample).

The raw data are also consistent with an increase in household income associated with the pension. In columns 4 and 5 of table A1, the sample is restricted to households with a person between the age of 50 and 75. When the household elder is pension eligible, the probability that the household reports receiving pension income increases by 600 percent. Moreover, in this same sub-sample, the probability that a household reports an income above the pension amount of 520 Rands per month rises by 12 percentage points if at least one of the persons above 50 is pension eligible (t-statistic 8.167). Hence, there is evidence within the SAYP that pension eligibility is associated with increased income.

Appendix 2: Household Composition, Child Labor, and the Old Age Pension (OAP)

A2.0 Overview

Pension income may induce children or other household members to move. This observation has two possible implications for this study. First, part of the mechanism through which pension income affects child labor is via changes in household composition. This relates to the question of whether the observed effects are direct or indirect effects of liquidity constraints on child labor. Second, if household composition shifts systematically with pension eligibility, the age of oldest male and female polynomial cannot fully capture all of the differences between child labor in pension eligible and ineligible households in the absence of

pension income. Thus, it is impossible to construct the counterfactual of what child labor would look like in the absence of pension income in pension eligible households.

The data permit four ways to assess the importance of shifts in household composition in this paper's findings. First, is there any evidence of changes in household composition with pension eligibility? Edmonds and others (2002) look in the South African census and find relatively small changes in household composition. Based on their findings, it is unlikely that household composition shifts can generate all of the results in the text, but this appendix considers evidence of movements in household composition in the SAYP. Second, the SAYP collects migration information on children. Restricting the sample to children who have not moved recently only addresses one type of change in household composition with pension income, but this is the only movement information in the dataset. Third, after partialing out all of the differences in child labor association with household composition, is there any evidence of a link between child labor and pension eligibility. This approach limits the variation with which to identify pension income effects on child labor if there is any association between pension income and household composition. Fourth, is there any observed pension effect after controlling for household composition rather than redefining the dependent variable as household composition adjusted child labor. This has already been discussed in the text and is not further explored here. None of these approaches suggest large changes in the basic findings of this paper.

A2.1 Co-residency of pensioners with children

In phase 1 of the SAYP data, there are 4,372 households with a person between the age of 50 and 75. For these households, the number of children who appear in the household (children age 10 to 17) is regressed against pension eligibility with and without controlling for the age of oldest man and woman. These results are in appendix table A2. Without controlling for general age trends, there is a positive association between a single pension eligible female or a single pension eligible male and the residency of children although the coefficient on male pension eligibility is not statistically significant. The magnitude of the association between single male pension eligibility and number of children increases upon controlling for general age trends, but the data do not reject the hypothesis that there is no association between pension eligibility and the number of co-resident children. In the phase 2 sample used throughout the paper, there is no statistically significant evidence of any association between pension eligibility and the co-residency of children. Moreover, the estimated magnitudes of the association between children and pension eligibility are very close to zero. This difference between phase 1 and phase 2 findings may be attributable to the sample selection issues discussed in the previous appendix.

A2.2 Child migration and pension eligibility

While the data used in most of the paper do not suggest substantive increases in the presence of children around the elderly with the pension program, there could be important marginal changes that provide much of the variation used in earlier sections. The only information in the SAYP about changes in household composition comes from asking children 10-17 if they have moved in the last two years. Appendix table A3 replicates most of the key regressions of the paper, restricting the sample to children who have not moved (this obviously does not control for movement by other household members). Only 162 children between 10 and 17 that co-reside with a person above the age of 50 have moved in the last two years. This

group does not appear to be particularly important in the previous sections' findings, because all of the results in the sample restricted to children that do not move are well within standard confidence intervals of the full sample results.

A2.3 Controlling for household composition effects

Another approach to the household composition problem is to first control for all of the variation in child labor associated with variation in household composition and then to relate the remaining variation in child labor to pension eligibility. This can be accomplished in two steps. First, regress labor supply of child i in household j on various measures of household composition:

(4) $\qquad H_{ij} = \alpha_0 + \alpha_1 G_j + \alpha_1 P_i + u_{ij}$

where G is a vector of counts of the number of co-resident persons in ages 0-5, 6-9, 10-13, 14-17, 18-22, 22-49, 50-75, and 76 plus in child i's household j and P is a vector of indicators for the presence of child i's mother, father, grandmother, grandfather, and both grandparents and parents. Second, regress the residuals from (4) on the pension indicators and age of oldest man and woman series as in (2):

(5) $\qquad u_{ij} = \beta_0 + \beta_1 PEF_i + \beta_2 PEM_i + \beta_3 PEF_i * PEM_i + \pi \left(AOM_i, AOF_i \right) + \varepsilon_{ij}.$

The advantage of this approach is that it conditions out all of the differences in child labor associated with the household's population. It comes with three costs. First, this decomposability property is only a property of OLS, so the schooling results need to be re-estimated with linear probability models. Second, to the extent that there is any variation in household composition associated with pension income, the household composition controls capture these pension effects, limiting the variation available to identify pension effects in (5). Third, the dependent variable in these regressions is different from the regressions in the text. Hence, the comparability of this exercise to the results above is questionable.

The results from this exercise are in appendix table A4. For each pension indicator (male, female, pem*pef), the percentage change in the regression coefficient is reported after controlling for household composition differences. The estimates of β_i (i=1,2,3) in the basic model (2) are treated as baselines for the purpose of calculating percentage changes. The p-value for the null hypothesis that there is no change in β_i between models (2) and (5) is also reported. Finally, the p-value for the null hypothesis that β_i is zero in (5) is reported.

A few results stand out in appendix table A4. First, the data never reject the hypothesis that there is no change in estimates of β_i between models (2) and (5). Thus, as in the previous appendix tables, there is no statistically significant evidence of biased inference from household composition shifts. Second, after conditioning out household composition variation, the hypothesis that the effects of pensions for women or for having both women and men are actually zero cannot be rejected. However, the key effects for men persist even after partialing out household composition. There are statistically significant declines in total hours worked that appear to primarily be in hours in market work. Moreover, there is a statistically significant increase in schooling for children between the ages of 10 and 17. In missing school for work, there are large changes in estimates of the effects of pension eligibility, but these coefficients are highly variable to begin with, so it is not clear how to interpret these changes. Overall, the data

do not reveal any evidence to suggest that shifts in household composition drive the results in the text.

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Table 1: Means of Child (Ages 10 - 17) Characteristics

	Full Sample	No Person with 50<=Age<=75	Person Age 50<=Age<=75 But Not of Pension Age	Person of Pension Age
	1	2	3	4
Sample Size	6,482	3,503	1,456	1,296
Population	5,327,912	2,593,989	1,217,059	1,300,116
Age	13.441	13.458	13.408	13.426
Sex	0.521	0.525	0.508	0.523
Residency Attributes				
Father Co-Resident	0.347	0.412	0.419	0.183
Mother Co-Resident	0.628	0.775	0.632	0.382
Grandfather Co-Resident	0.099	0.006	0.106	0.249
Grandmother Co-Resident	0.289	0.018	0.278	0.780
Child has not moved in last 2 years	0.943	0.931	0.943	0.962
Hours in Child Labor in last 7 days				
Total Hours	15.586	14.856	17.074	15.790
Household Economic Activities	7.023	6.890	7.386	7.030
Market Economic Activities	8.563	7.965	9.689	8.760
Schooling in last 12 months				
Currently Attend School	0.961	0.960	0.957	0.961
Miss School for Work	0.022	0.023	0.021	0.017

All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

Other than sample size, each cell contains the mean weighted to be representative of the South African population.

Primary school completion is only for children ages 13 and older

Having problems with cost of school and missing school for work is conditional on being currently in school

Table 2A: Child Labor and Pension Eligibility

Dependent Variable: Total Hours Economically Active

	1 OLS		2 OLS		3 OLS		4 OLS		5 OLS		6 Tobit	
Pension Eligible Female (PEF)	-2.241 (1.837)		-2.191 (1.848)		-1.656 (1.769)		-1.975 (1.737)		-1.784 (1.713)		-1.916 (1.242)	
Pension Eligible Male (PEM)	-5.724 (2.080)	**	-5.844 (2.050)	**	-5.873 (2.156)	**	-5.961 (2.078)	**	-7.195 (2.257)	**	-6.016 (1.837)	**
PEF * PEM	3.021 (2.965)		3.109 (2.979)		3.510 (2.839)		3.593 (2.720)		3.948 (2.813)		3.662 (2.372)	
Female			0.592 (0.686)		0.759 (0.678)		0.897 (0.682)		0.923 (0.678)		1.062 (0.634)	*
Series in Age of Oldest Man and Age of Oldest Woman	yes		yes		yes		yes		yes		yes	
Polynomial in Child Age	no		yes		yes		yes		yes		yes	
Province and Urban Fixed Effects	no		no		yes		yes		yes		yes	
Housing Controls	no		no		no		yes		yes		no	
Household Composition	no		no		no		no		yes		no	
Adj R2	0.019		0.030		0.099		0.122		0.154		0.013	
N	2752		2752		2752		2752		2752		2752	

* significant at 10%. ** Significant at 5%. Standard errors (in parenthesis) corrected for clustering at the psu level and arbitrary heteroskedasticity.

All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

All regressions also include a constant.

Series expansion is a third order series expansion in the age of the oldest male, the age of the oldest female, and all of their interactions.

The polynomial in child age is a third order polynomial.

Housing controls include indicators for the following: the dwelling is a house, hut, flat, or shack (other omitted) ; the dwelling has 1 room or 2 to 4 rooms (5 or more rooms omitted); the dwelling has electricity; the household cooks with wood; the household cooks with parafin; the household heats with wood; the household heats with parafin; the household gets water from a within dwelling tap; the household gets water from an on-site tap; the household gets water from a public tap; and the household cultivates land.

Household composition controls are a vector of dummies for the presence of a mother, a father, a grandparent, grandparents and parents, the number of household members 0-5, 6-9, 10-13, 14-17, 18-22, 22-49, 50-75, and 76 plus.

Urban fixed effects include formal urban, informal urban, and commercial farms (other rural) is the omitted group

Columns 1-5 are OLS. Column 6 is a tobit. R2 in column 6 is a pseudo-R2.

Table 2B: Child Labor and Pension Eligibility with Artificial Treatment Variables
Dependent Variable: Total Hours Economically Active

	1	2	3	4	5
Pension Eligible Female (PEF)				-1.745 (1.865)	-1.382 (1.890)
Pension Eligible Male (PEM)				-6.298 (2.405) **	-7.014 (2.469) **
PEF * PEM				3.033 (2.989)	4.363 (3.113)
Woman Age 55 or greater (WA5)	-0.484 (1.772)			-0.119 (1.876)	-0.765 (1.850)
Man Age 60 or greater (MA6)	-0.024 (2.082)			1.239 (2.280)	1.370 (2.303)
WA5*MA6	2.195 (2.511)			1.805 (2.625)	1.292 (2.636)
Woman Age 65 or greater (WA6)		-0.547 (2.451)			2.247 (2.472)
Man Age 70 or greater (MA7)		-2.621 (1.728)			-2.089 (1.725)
WA6*MA7		-4.431 (3.580)			-6.092 (3.717)
Woman Age 65 or greater (WA6)			-2.344 (1.863)		
Man Age 60 or greater (MA6)			0.987 (1.669)		
WA6*MA6			-3.112 (2.970)		
Female	0.766 (0.688)	0.854 (0.678)	0.835 (0.677)	0.799 (0.682)	0.914 (0.682)
Series in Age of Oldest Man and Age of Oldest Woman	yes	yes	yes	yes	yes
Polynomial in Child Age	yes	yes	yes	yes	yes
Province and Urban Fixed Effects	yes	yes	yes	yes	yes
Adj R2	0.095	0.098	0.098	0.100	0.103
N	2752	2752	2752	2752	2752

* significant at 10%. ** Significant at 5%. Standard errors (in parenthesis) corrected for clustering at the psu level and arbitrary heteroskedasticity.

All regressions also include a constant.

Series expansion is a third order series expansion in the age of the oldest male, the age of the oldest female, and all of their interactions.

The polynomial in child age is a third order polynomial.

All Columns are OLS. All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

Table 2C: Child Labor and Pension Eligibility
Dependent Variable: Total Hours in Market and Household Economic Activities

	Household Economic Activities		Market Economic Activities	
	OLS	Tobit	OLS	Tobit
	1	2	3	4
Pension Eligible Female	0.287 (0.794)	0.173 (0.586)	-1.944 (1.346)	-3.167 (1.272) **
Pension Eligible Male	-1.188 (0.833)	-1.193 (0.864)	-4.686 (1.739) **	-6.146 (1.905) **
PEF * PEM	0.710 (1.244)	0.695 (1.118)	2.800 (2.086)	3.506 (2.470)
Female	1.425 (0.273) **	1.841 (0.299) **	-0.665 (0.541)	-0.693 (0.652)
Series in Age of Oldest Man and Age of Oldest Woman	yes	yes	yes	yes
Polynomial in Child Age	yes	yes	yes	yes
Province and Urban Fixed Effects	yes	yes	yes	yes
Adj R2	0.068	0.012	0.114	0.031
N	2752	2752	2752	2752

* significant at 10%. ** Significant at 5%.

 All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

Standard errors (parenthesis) corrected for clustering at the psu level and arbitrary heteroskedasticity.

All regressions also include a constant.

Series expansion is a third order series expansion in the age of the oldest male, the age of the oldest female, and all of their interactions.

The polynomial in child age is a third order polynomial.

Columns 1 and 3 are OLS. Columns 2 and 4 are tobits: a pseudo-R2 is reported.

Table 3A: Pension Eligibility and School Attendence
Probit Results, Marginal Effects Reported

	Currently Attend School	Having Problems w/ Cost of Schooling	Miss School for Work	
	1	2	3	
Pension Eligible Female	0.003 (0.011)	-0.024 (0.043)	0.059 (0.040) *	
Pension Eligible Male	0.043 (0.009) **	-0.066 (0.065)	-0.037 (0.017) *	
PEF * PEM	-0.159 (0.122) **	0.026 (0.111)	-0.026 (0.023)	
Female	-0.001 (0.005)	-0.018 (0.017)	0.013 (0.012)	
Series in Age of Oldest Man and Age of Oldest Woman	yes	yes	yes	
Polynomial in Child Age	yes	yes	yes	
Province and Urban Fixed Effects	yes	yes	yes	
Adj R2	0.193	0.038	0.106	
N	2748	2571	768	

* significant at 10%. ** Significant at 5%. Reported coefficients are for a change in the indicted variable from 0

Standard errors (parenthesis) corrected for clustering at the psu level and arbitrary heteroskedasticity.

 All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

All regressions also include a constant.

Series expansion is a third order series expansion in the age of the oldest male, the age of the oldest female, and all of their interactions.

The polynomial in child age is a third order polynomial.

The dataset is missing schooling information for 4 children.

Columns 2 and 3 are limited to children that attend school.

Table 3B: Variation in Pension Exposure and Primary School Completion (Phase 1 Sample)
Dependent Variable: Primary School (Standard 5) Completed. Regressions limited to children ages 13-17.
Probit Results. Marginal Effects Reported.

	1	2	3	4
Years of Exposure to at least one Pension Eligible Person	0.016 (0.004) **			
Years of Exposure to a Pension Eligible Female		0.015 (0.005) **		0.016 (0.005) **
Years of Exposure to a Pension Eligible Male			0.015 (0.007) **	0.017 (0.009) **
Years of Exposure to both Pension Eligible Female and Male				-0.014 (0.012)
Female	0.145 (0.016) **	0.145 (0.016) **	0.148 (0.016) **	0.145 (0.016) **
Series in Age of Oldest Man and Age of Oldest Woman	yes	yes	yes	yes
Polynomial in Child Age	yes	yes	yes	yes
Province and Urban Fixed Effects	yes	yes	yes	yes
Adj R2	0.193	0.192	0.192	0.193
N	4896	4896	4896	4896

* significant at 10%. ** Significant at 5%. Reported coefficients are for a change in the indicted variable from 0 to 1.

 All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

Standard errors (parenthesis) corrected for clustering at the psu level and arbitrary heteroskedasticity.

All regressions also include a constant.

Series expansion is a third order series expansion in the age of the oldest male, the age of the oldest female, and all of their interactions.

The polynomial in child age is a third order polynomial.

Appendix Table A1: Means of Household Characteristics for black headed households with children 10-1

Sample	Phase 1	Phase 2			
				Households with person 50 to 75	
			No Person in HH with Age>=50 to 75	No Person of Pension Age	Person of Pension Age
	1	2	3	4	5
Sample Size	10,480	3,685	2,208	785	692
Population	3,743,031	1,250,500	712,507	271,742	266,251
Urban	0.462	0.488	0.532	0.462	0.398
Household Size	6.016	5.982	5.322	6.473	7.245
Number of Children 0-17	3.110	3.101	2.942	3.125	3.502
Number of Children 10-17	1.760	1.784	1.715	1.847	1.905
Number of Persons 50 or greater	0.647	0.614	0.062	1.211	1.483
Number of Pension Eligible Individuals	0.319	0.293	0.062		1.209
Qualify for Phase 2	0.740				
Age of Oldest Female	46.308	45.628	37.412	48.675	64.508
Age of Oldest Male	34.324	34.096	28.526	40.312	42.656
Pension Eligible Female in the Household	0.230	0.209	0.045		0.863
Pension Eligible Male in the Household	0.079	0.077	0.017		0.314
Both Pension Eligible Female and Male in the Household	0.045	0.040	0.005		0.177
Household Recieves Pension Income	0.257	0.237	0.069	0.132	0.793
Dwelling is a House	0.555	0.546	0.546	0.533	0.560
Dwelling is a Hut	0.237	0.215	0.177	0.250	0.280
Dwelling is a Shack	0.145	0.171	0.200	0.150	0.118
Dwelling is a Flat	0.020	0.026	0.035	0.023	0.005
One Room Dwelling	0.061	0.071	0.090	0.055	0.036
Two - Four Room Dwelling	0.564	0.564	0.597	0.534	0.504
Dwelling has electricity	0.626	0.633	0.659	0.601	0.594
Cook with Fire	0.327	0.310	0.258	0.344	0.416
Cook with Parafin	0.206	0.225	0.230	0.223	0.216
Heat with Fire	0.355	0.341	0.292	0.378	0.437
Heat with Parafin	0.171	0.195	0.197	0.195	0.189
Water in house	0.252	0.248	0.262	0.255	0.205
Water on Site	0.253	0.263	0.277	0.236	0.253
Uses Public Water Tap	0.227	0.240	0.236	0.255	0.235
Cultivate Land	0.364	0.362	0.318	0.382	0.461

Other than sample size, each cell contains the mean of the indicated variable weighted to be representative of the South African population.

Column 4 contains 115 households that do not have anyone between 50 and 75, but do have a person above the age of 75

Appendix Table A2: Pension Eligibility and the Co-habitation of Children and Elderly

Dependent Variable: Number of co-resident children between 10 and 17

Household level regressions - conditional on having an elder, age 50 to 75

	Full Sample		Phase 2 Sample	
	1	2	3	4
Pension Eligible Female	0.066 (0.037) *	0.013 (0.064)	0.020 (0.063)	0.000 (0.114)
Pension Eligible Male	0.073 (0.062)	0.093 (0.095)	-0.002 (0.102)	-0.005 (0.140)
PEF * PEM	-0.083 (0.090)	-0.106 (0.123)	0.038 (0.145)	-0.040 (0.200)
Constant	1.782 (0.024) **	1.321 (1.061)	1.852 (0.038) **	0.809 (2.075)
Series in Age of Oldest Man and Age of Oldest Woman	no	yes	no	yes
Adj R2	0.001	0.014	0.000	0.018
N	4372	4372	1478	1478

* significant at 10%. ** Significant at 5%. Reported coefficients are for a change in the indicted variable from 0 to 1.

All data in columns 1 & 2 are from the phase 1 of the Survey of the Activities of Young People, 1999. Columns 3 & 4 are from phase 2.

Standard errors (parenthesis) corrected for clustering at the psu level and arbitrary heteroskedasticity.

Series expansion is a third order series expansion in the age of the oldest male, the age of the oldest female, and all of their interactions.

All regressions also include a constant

Appendix TableA 3: Pension Eligibility, Child Labor, and School Attendence for Stationary Children

Regressions limited to children that have not moved within the last two years

	Total Hours Economically Active	Household Economic Activities	Market Economic Activities	Currently in School
	OLS	OLS	OLS	Probit
	1	2	3	5
Pension Eligible Female	-2.031 (1.799)	-0.061 (0.821)	-1.970 (1.357)	-0.001 (0.012)
Pension Eligible Male	-4.741 (2.041) **	-1.347 (0.889)	-3.393 (1.530) **	0.036 (0.009) **
PEF * PEM	3.785 (2.850)	0.864 (1.270)	2.921 (2.069)	-0.057 (0.061)
Female	0.714 (0.700)	1.425 (0.273) **	-0.710 (0.562)	0.001 (0.006)
Series in Age of Oldest Man and Age of Oldest Woman	yes	yes	yes	yes
Polynomial in Child Age	yes	yes	yes	yes
Province and Urban Fixed Effects	yes	yes	yes	yes
Adj R2	0.102	0.072	0.112	0.191
N	2590	2590	2590	2589

* significant at 10%. ** Significant at 5%. Reported coefficients are for a change in the indicted variable from 0 to 1.

 All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

Standard errors corrected for clustering at the psu level and arbitrary heteroskedasticity.

All regressions also include a constant.

Series expansion is a third order series expansion in the age of the oldest male, the age of the oldest female, and all of their interactions.

The polynomial in child age is a third order polynomial.

Marginal effects reported for probits.

Appendix Table A4: Household Composition Controls and the Efficiency of Child Labor
Percentage Change in Estimated Regression Coefficients after Partialling Out Household Composition

	Total Hours Economically Active	Household Economic Activities	Market Economic Activities	Currently in School
	1	2	3	5
Pension Eligible Female				
% Δ in β	-0.519	0.958	-0.301	-0.705
P-Value for H0: Δ = 0	0.606	0.717	0.645	0.749
P-Value for H0: β2 = 0	0.633	0.459	0.286	0.893
Pension Eligible Male				
% Δ in β	-0.062	-0.049	-0.065	-0.209
P-Value for H0: Δ = 0	0.869	0.944	0.865	0.429
P-Value for H0: β2 = 0	0.012	0.174	0.015	0.003
PEF * PEM				
% Δ in β	0.032	-0.015	0.044	-0.322
P-Value for H0: Δ = 0	0.968	0.993	0.953	0.662
P-Value for H0: β2 = 0	0.198	0.563	0.161	0.357

First stage regressions follow the specification used throughout tables 4-7.

 All data are from the phase 2 of the Survey of the Activities of Young People, 1999.

The second stage regressions are in two steps. First, the indicated dependent variable is regressed on household compositio controls. The residuals from this first step are then regressed on the regression specificication used in the first stage.

The row "% Δ in β" contains the percentage change in the indicated regression coefficient in the second step of the second stage, treating the first stage regression as the baseline.

The row "P-Value for H0: Δ = 0" contains the P-Value for the null hypothesis that that the change in regression coefficients between the first and second stage is zero.

The row " P-Value for H0: β2 = 0" contains the P-Value for the null hypothesis that that the coefficient on the indicated coefficient in the second step of the second stage is zero.

Household composition controls are a vector of dummies for the presence of a mother, a father, a grandparent, grandparents and parents, the number of household members 0-5, 6-9, 10-13, 14-17, 18-22, 22-49, 50-75, and 76 plus.