Moral Hazard in the Family

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I build a moral hazard model of the family and test its predictions using a panel data on young adults in South Africa. I find that the transfers young adults receive from older relatives provide a higher insurance when effort is less important for earnings variation. This evidence strongly supports the idea that agency problems are important within the family. I also find that a decrease in labor supply associated to older relatives' pension does not improve schooling and young adults do not increase services by working more at home. The analysis highlights the policy implications of family exchanges.

The family is usually regarded as an environment of altruism, though it is also a place of conflict. This paper studies the possibility that opportunistic behavior precludes efficient income redistribution and risk-sharing among family members. If parents cannot perfectly observe their children's actions, they may choose punishments and rewards to motivate diligent behavior, and this would impose obstacles to insurance inside the family. In this paper, I build a moral hazard model to analyze incentives in family relationships, and I empirically test its predictions against the possibility of efficient family maximization.

The most fundamental economic choices are decided by the family or require family support: Who works for pay? Where? And for how many hours? How to spend the money? How much should be invested in health and education of the children? Accordingly, economists have long been interested in understanding the family interactions and economic exchanges. Formal studies started with the unitary model, which assumes that the combined behavior of utility-maximizing family members could be treated as the choices of an agent maximizing a single family utility function.

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Becker's (1974, 1981) Rotten Kid theorem is a notable result that provided theoretical grounds for the unitary model. Once empirical evidence cast serious doubt on the adequacy of this model to explain family resource allocation[1], Chiappori (1988, 1992) and Browning & Chiappori (1998) suggested a collective model of the household retaining only the weaker hypothesis that a family reaches a Pareto efficient agreement.[2] Even though the assumption of efficiency is weak relative to the several sets of assumptions required for validity of the unitary household representation, it remains an assumption that must be confronted with observed family behavior.

I suggest an alternative framework to analyze family economic exchanges. I set up and solve a moral hazard model in which parents and grandparents provide inefficiently low insurance to young adults as a consequence of asymmetric information about effort and uncertainty about labor market outcomes.

I derive the following test for Pareto efficiency: Are transfers that young adults receive from older family members designed to provide incentives to induce higher effort? The moral hazard model predicts that transfers provide higher insurance when effort is less important for earnings variation compared to when effort is more important for earnings variation. The idea is that a young person is not able to control some types of outcomes—for example, a serious illness—as well as he is able to control others—for example, how many hours he works. Therefore, by providing lower insurance for outcomes over which a young adult has more control, older adults are able to elicit higher effort from the young. In contrast, efficiency implies that transfers do not depend on whether the variation in the youngs' earnings is impacted by effort.

I incorporate work at home and schooling in the model to analyze substitutability in the young adults' time allocations between these activities and effort in the labor market. More specifically, the decision about how many hours to spend in the labor market is taken jointly with the decision about time spent studying and providing services to their elder relatives (such as taking care of adults, cleaning the house or preparing meals).

The South African context is particularly well suited for testing for moral hazard in the family due to two distinctive aspects. First, with the end of apartheid, a pension program that historically targeted the White minority was extended to individuals of all races.[3] The South Africa Old Age pension program makes very large cash transfers—about twice the median per capita income of African households—to women over the age of 60 and men over the age of 65, subject to a means test. While a low fraction of old Whites receive the pension, most Africans and Coloureds begin to receive the transfers when they become age-eligible, which creates a situation in which the

[1]For papers that reject the unitary model, see Schultz (1990), Thomas (1990), Hoddinott & Haddad (1991), and Altonji, Hayashi & Kotlikoff (1992). For evidence in South Africa, see Duflo (2003).

[2]Browning et al. (1994), Browning & Chiappori (1998) and Thomas & Chen (1994) test the unitary model and reject it in favor of the collective model.

[3]The official denominations of racial groups in South Africa is: Africans, Whites, Coloureds and Indians.

country's elders become much richer than its youth. Not only the elderly themselves, but also close family members rely on these social transfers. This safety net contributes to the second key characteristic of the South African context: The country has one of the highest unemployment rates in the world. In recent years, unemployment rates have been between 25% and 30%, and only 40% of the working age population has jobs. The country's dismal labor market numbers could be the result of efficient family maximization, but in this paper I show evidence of conflict in the inter-generational support arrangements.

I use data from the Cape Area Panel Study (CAPS), which was collected in four waves from 2002 to 2006 by the University of Cape Town, University of Michigan and Princeton University. The main component of the data is a panel of young adults, defined as individuals between the ages of 14 and 22 years old in 2002. A panel of households was also constructed and includes households without young adults, so that the sample is representative of the Cape Town metropolitan area. The use of panel data is important to control for crucial time-invariant unobservable household and individual characteristics, such as altruism and ability, which may determine the family arrangement and the young adults' outcomes. Since inter-generational support systems are an important issue in the South African economy, there is detailed information about family relationships and, of particular importance to my work, about transfers received by these young adults.

In the empirical investigation, I first distinguish between situations in which effort is and is not important to the young's outcomes by estimating the response of several outcomes of the young adults to pension eligibility of their elderly relatives.[4] I find that young's employment outcomes deteriorate with pension eligibility, but that health outcomes do not respond significantly. Hence, compared to variations in earnings due to health shocks, young adults have greater control over other types of variations in earnings.

Next, I use the fact that labor market outcomes were identified as being more impacted by effort compared to health outcomes to decompose the earnings of young adults into a partially controllable component and an uncontrollable component (which, in fact, only needs to be less controllable and not completely uncontrollable). I allow the controllable outcomes to be impacted by uncontrollable shocks. For example, the number of work hours can be affected by variations in health.

In order to test the main prediction of the moral hazard model that transfers provide incen-

[4]I explore the fact that pension receipt exhibits a discontinuity at age 60 for women and at age 65 for men. Usual econometric problems related to endogeneity and selection into treatment are not important for my specifications for three reasons. First, young adults are asked whether they have parents and grandparents alive and if so, what their ages are. This information is available for parents and grandparents whether or not they reside with the young adults. Therefore, there is no need to select the sample based on co-residence. Second, since age eligibility is the main determinant of pension receipt, changes in behavior intended to become eligible are not an issue when evaluating impact. Third, the fact that age eligibility is an excellent predictor of pension receipt enables use of age eligibility to define treatment status.

tives for higher effort, I examine how the transfers young adults receive respond to variations in the two components of their earnings. Since the CAPS data set has measures of several income determinants, I am able to use instruments and implement a test free of bias from measurement error.

Consistent with the prediction of the moral hazard model, I find that the transfers young adults receive provide a higher degree of insurance when effort is less important for earnings variation compared to when effort is more important for earnings variation. The magnitude is important: the response of transfers is estimated to be at least twice as large when earnings variations is less controllable. This implies that an inefficiently low degree of insurance is provided when the outcome is more dependent on unobservable actions and the possibility of shirking is present. This evidence strongly supports the idea that agency problems are important within the family; therefore, the efficiency of family allocation mechanisms, a central assumption of both the unitary and the collective models, is rejected.

The analysis takes into account health-care expenses and is robust to young adults' state-dependent utility (changes in young adults' marginal utility of consumption across health states) and to older adults' state-dependent utility (older adults being more sympathetic to sick young adults).

Furthermore, I find that the decrease in labor supply associated with the pension does not improve schooling, and young adults do not provide more services to older adults by working more at home. In fact, some types of housework exerted by young adults (such as cleaning the house) decrease in response to the pension eligibility of close relatives.

The results shows that family exchanges have far-reaching policy implications. Social cash transfers targeted to the elderly have important consequences for the behavior of young adults who are kin to the recipients of the program.[5] Also, the Old Age pension enables the extended family to provide a form of unemployment insurance to young adults in a sophisticated contract and, compared to a government that can enact a public insurance mechanism, relatives may have better information about each other. The findings highlight the importance of investigating the interaction between informal private arrangements and government-sponsored schemes when assessing the impact of interventions regarding social transfers and intergenerational redistributions.

The paper is organized as follows. Section 1 presents the related literature. Section 2 develops the theoretical model of moral hazard in family relationships. Section 3 characterizes the South African context. Section 4 describes the data and attrition. Section 5 explains the empirical strategy. Section 6 contains the main results. Section 7 demonstrates the robustness of my findings. Section 8 examines the time allocation toward housework and schooling. Section 9 discusses the implications

[5] Several papers analyze post-apartheid South Africa and evaluate its Old Age pension program. See related literature in Section 1.

of the analysis for public policy. Section 10 concludes.

1 Related Literature

This paper is closely related to the literature on the theories of the household. Surveys of this literature can be found in Lundberg & Pollak (1996), Bergstrom (1997), and Chiappori & Donni (2009). Some papers examine the issue of efficient allocations. Udry (1996) studies agricultural production in Burkina Faso and finds evidence that women's plots planted with the same crop, in the same year and in the same household, produce much lower yields than their husbands' plots, implying that total output within the family can be raised by a reallocation of factors of production and contradicting Pareto efficiency. Dercon & Krishnan (2000) find that full intra-household risk sharing does not happen in some poor Southern families in Ethiopia, and that women are more intensively affected by negative shocks, which rejects optimality for these households. Mazzocco (2007) rejects the hypothesis that household members in the US can commit to future allocations of resources.

When investigating moral hazard, I also study the effect of South Africa's Old Age pension program on employment, health, schooling and housework of young individuals who are related to elder pension recipients. Thus, my work is related to the vast empirical literature on program evaluation, and more specifically, to the several papers that analyze post-apartheid South Africa and evaluate its Old Age pension program. Banerjee et al. (2008) study the characteristics of unemployment in South Africa and conclude that the high rates observed are more likely due to structural factors than to transitory economic shocks. With national cross-sectional data, Bertrand, Mullainathan & Miller (2003) find that prime-aged adults living in three-generation households in which a pensioner is present have significantly lower labor supply outcomes than those in three-generation households without a pensioner. Using longitudinal data on a poor rural district in the KwaZulu-Natal province, Ardington, Case & Hosegood (2009) find that pension receipt increases labor migration. Duflo (2003) shows that the weights and heights of young girls improve when their grandmothers, but not their grandfathers, become eligible for the pension. Edmonds (2006) presents evidence that the program is associated with lower child labor and higher schooling levels in rural areas, but not urban areas. Of special relevance to my work, di Falco & Bulte (2011) study traditional sharing rules in KwaZulu-Natal and find evidence that households try to evade "sharing obligations" by accumulating durables that are non-sharable, increasing consumption of non-durables and reducing liquid assets.

2 Theoretical Model

The model formalizes the interaction between a young adult and an old relative. As in the standard dynastic model of the family (Becker (1974) and Barro (1974)), the old is altruistic and the young is selfish. I introduce to the problem asymmetric information about the young's effort and uncertainty about labor market outcomes. The focus is on the insurance that the young adult receives once he experiences shocks to his income.

The old (player A) proposes a contract to the young (player B), which specifies: 1) the (unobservable) young's effort level towards labor market activities (e_B); 2) the (observable) amount of education that the young acquires (s_B); 3) the (observable) amount of housework that the young performs (h_B); and 4) the schedule of transfers that the old gives to the young (τ_A).

The income of the old, $y_A \in \mathbb{R}_{++}$, is exogenous. The young is endowed with a set of parameters, $\theta \in \Theta$, that includes characteristics such as his age and gender. Schooling acquisition $s_B \in S$ ($S \subset \mathbb{R}_+$ is compact) increases the future earnings of the young through the smooth function $y_F : S \times \Theta \to \mathbb{R}_+$, but is also costly. Housework $h_B \in H$ ($H \subset \mathbb{R}$ is compact) has a smooth and positive impact on the utility of the old, but decreases the utility of the young. The current income of the young, denoted by $y_B \in \mathbb{R}_+$, has two stochastic components: one that depends on effort $y_X \in Y_X$ ($Y_X \subset \mathbb{R}_+$ is compact) and the other that does not depend on effort $y_Z \in Y_Z$ ($Y_Z \subset \mathbb{R}_+$ is compact). Hence: $y_B = y_X + y_Z$. The first component, y_X, is stochastically determined by the effort level chosen by the young $e_B \in E$ ($E \subset \mathbb{R}_+$ is compact). Information is asymmetric: the old cannot observe the young's effort, but can observe his final income. There are two types of outcomes: one with a distribution that depends on effort, $x \in \mathscr{X}$ ($\mathscr{X} \subset \mathbb{R}$ is compact), and one with a distribution that does not depend on effort, $z \in \mathscr{Z}$ ($\mathscr{Z} \subset \mathbb{R}$ is compact). One interpretation of x is hours worked. One interpretation of z is a serious illness that the agent cannot control. For each $z \in \mathscr{Z}$, $\mathscr{X}_z$ ($\mathscr{X}_z \subset \mathbb{R}$ is compact) is the support of outcomes x given z.[6] The probability density function of x is $f(x \mid e_B, z)$, with cumulative distribution function $F(x \mid e_B, z)$. The probability density function of z is $g(z)$, with cumulative distribution function $G(z)$. It is assumed that f satisfies the following:

1) Full support: $f(x \mid e_B, z) > 0$, $\forall x \in \mathscr{X}_z$ and $\forall e_B \in E$;

2) $f(x \mid \cdot, z) : E \to \mathbb{R}_+$ is twice continuously differentiable $\forall x$;

3) Monotone likelihood ratio condition: for all $z \in \mathscr{Z}$, if $\hat{e}_B \leq \tilde{e}_B$ then $f(x \mid \hat{e}_B, z) / f(x \mid \tilde{e}_B, z)$ is nonincreasing in x;

4) Convexity of the distribution function condition: $f_e(x \mid e_B, z)$ is nonnegative $\forall x \in \mathscr{X}_z$ and $\forall e_B \in E$.

The outcome x leads to earnings through the strictly increasing and smooth mapping $y_X : (\mathscr{X}, \Theta) \to \mathbb{R}_+$. Analogously, the component y_Z, which does not depend on effort, is given by

[6] One interpretation is that the support of labor market outcomes may depend on health status.

the strictly increasing and smooth mapping on z, $y_Z : (\mathscr{Z}, \Theta) \to \mathbb{R}_+$.

Assume that for any (x,z) interior[7] the following holds: $\frac{d\left(\frac{f_e(x|e_B,z)}{f(x|e_B,z)}\right)}{dz} \leq 0$. This assumption implies that when the outcome x is high and the young also has a high z, this is less informative about his effort than when the outcome x is high and the young has a low z. An interpretation is that a high labor outcome when the young is healthy is less indicative of high effort than a high outcome when he is sick.

The cost of effort towards labor market activities, schooling and housework is $c(e_B, s_B, h_B)$, where $c : \mathbb{R}^3_+ \to \mathbb{R}$ is a strictly increasing and smooth function with $\frac{\partial^2 c}{\partial e^2} > 0$. The state z leads to a monetary cost $m(z)$, where $m : \mathscr{Z} \to \mathbb{R}_+$ is smooth and non-increasing. For each $z \in \mathscr{Z}$, $m(z)$ can be interpreted as the cost of health care in that state.

The schedule of transfers from the old to the young, denoted by $\tau_A(x, z, s_B, h_B; \theta)$, sets the transfer for each possible state of the world, that is, each possible realization of the income of the young.[8] For tractability, I assume that transfers are interior so that the First Order Approach method (Rogerson, 1985) can be directly applied. Analogous testable predictions can be derived for the old's decision about whether or not to make transfers.

The utility of the young is $u_B - c$, where $u_B : \mathbb{R}^2_+ \to \mathbb{R}$ is a smooth, increasing and strictly concave function of consumption and future income respectively. Hence, the young's expected utility is:

$$\int_{\mathscr{X}}\int_{\mathscr{Z}} u_B\left(y_X(x;\theta) + y_Z(z;\theta) - m(z) + \tau_A(x,z;\theta), y_F(s_B;\theta)\right) dF(x \mid e_B, z)\, dG(z) - c(e_B, s_B, h_B).$$

The old's utility has 2 components. First, she values consumption and housework, which is represented by the smooth, increasing and strictly concave function $u_A : \mathbb{R}^2_+ \to \mathbb{R}$. Second, she is altruistic towards the young, with altruism parameter $\phi > 0$. Hence, the old expected utility is:

$$\int_{\mathscr{X}}\int_{\mathscr{Z}} u_A\left(y_A - \tau_A(x,z;\theta), h_B\right) + \phi\left(u_B\left(y_X(x;\theta) + y_Z(z;\theta) - m(z) + \tau_A(x,z;\theta), y_F(s_B;\theta)\right) - c(e_B, s_B, h_B)\right) dF(x \mid e_B, z)\, dG(z).$$

The old chooses the best mechanism to maximize her utility, taking into consideration that the young will choose his effort towards the labor market strategically. This mechanism has three stages:

Stage 1. The old commits to a schedule of transfers $\tau_A(x, z, s_B, h_B; \theta)$.[9]

[7] (x,z) is interior if there exists $\varepsilon > 0$ such that $\|(x,z) - (x',z')\| < \varepsilon$ implies $f(x' \mid e_B, z')\, g(z') > 0$ for all e_B.

[8] Without loss of generality, I write $\tau_A(x,z,s,h;\theta) = \tau_A(x,z;\theta)$ and I set $\tau_A(x,z,s,h;\theta) = 0$ if $(s,h) \neq (s^*, h^*)$.

[9] In the model, the ability of the old to credibly commit to a schedule of transfers is exogenous. There are different reasons for expecting the old to be able to make such a commitment: 1) Old adults might want to keep a promise they

Stage 2. The young acquires schooling, performs housework and exerts effort toward the labor market.

Stage 3. Outcomes are realized and transfers are delivered.

Since effort is not observable, the old maximizes her utility subject to the incentive compatibility constraint of the young:

$$\max_{e_B,s_B,h_B,\tau_A} \int_{\mathscr{X}}\int_{\mathscr{Z}} u_A\left(y_A-\tau_A\left(x,z;\theta\right),h_B\right) \tag{1}$$
$$+\phi\left[u_B\left(y_X(x;\theta)+y_Z\left(z;\theta\right)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)-c(e_B,s_B,h_B)\right]dF\left(x\mid e_B,z\right)dG(z)$$
$$s.t: e_B \in \tag{2}$$
$$\arg\max \int_{\mathscr{X}}\int_{\mathscr{Z}} u_B\left(y_X(x;\theta)+y_Z\left(z;\theta\right)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)dF\left(x\mid e_B,z\right)dG(z)-c(e_B,s_B,h_B)$$

It is straightforward to check that the assumptions imposed on the model allow the use of the First-Order Approach (Rogerson, 1985), which essentially consists in replacing the young's incentive compatibility constraint with his first-order condition (FOC) with respect to effort. Taking the FOC of the young with respect to effort:

$$\int_{\mathscr{X}}\int_{\mathscr{Z}} u_B\left(y_X(x;\theta)+y_Z\left(z;\theta\right)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)dF_e\left(x\mid e_B,z\right)dG(z)-c_1(e_B,s_B,h_B)=0. \tag{3}$$

Next, using (3) to replace the incentive compatibility constraint (2), I rewrite the problem as:

$$\mathscr{L}=\max_{e_B,s_B,h_B,\tau_A} \int_{\mathscr{X}}\int_{\mathscr{Z}} u_A\left(y_A-\tau_A\left(x,z;\theta\right),h_B\right) \tag{4}$$
$$+\phi\left[u_B\left(y_X(x;\theta)+y_Z\left(z;\theta\right)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)-c(e_B,s_B,h_B)\right]dF\left(x\mid e_B,z\right)dG(z)$$
$$+\lambda\left[\int_{\mathscr{X}}\int_{\mathscr{Z}} u\left(y_X(x;\theta)+y_Z\left(z;\theta\right)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)dF_e\left(x\mid e_B,z\right)dG(z)-c_1(e_B,s_B,h_B)\right].$$

The most relevant FOC to the discussion in this section is the one with respect to transfers (τ_A)[10]:

made (MacLeod (2007) shows that the performance of the relationship between two parties is substantially improved when one of the sides undergo some loss of utility when breaking an agreement.); 2) Old adults might have a preference for fairness (MacLeod (2007) shows that contract theory can be a basis for theory of fairness.); or 3) a repetition of the relationship. Although commitment is an assumption in my model, the hypothesis of non-commitment is empirically rejected since the data reveals a lower level of insurance when effort is more important compared to when effort is less important for the young adults' outcomes.

[10]The other FOCs are in the Appendix.

$$\frac{u_{A1}\left(y_A-\tau_A\left(x,z;\theta\right),h_B\right)}{u_{B1}\left(y_X\left(x;\theta\right)+y_Z\left(z;\theta\right)-m(z)+\tau_A\left(x,z;\theta\right),y_F\left(s_B;\theta\right)\right)}-\phi=\lambda\frac{f_e\left(x\mid e_B,z\right)}{f\left(x\mid e_B,z\right)}. \tag{5}$$

The optimality condition (5) highlights the trade-off between incentives and risk-sharing present in the model. Providing efficient risk-sharing would imply setting the ratio of marginal utilities equal to the altruism parameter ϕ. However, in this case, the old would provide very weak incentives for the young. In order to elicit more effort, the old must reward the young after observing outcomes that signal high effort, i.e. the ones associated with high $\frac{f_e(x|e_B,z)}{f(x|e_B,z)}$, and punish the young after observing outcomes that signal low effort, i.e. the ones associated with low $\frac{f_e(x|e_B,z)}{f(x|e_B,z)}$. Hence, the old commits to providing a transfer greater (lower) than the optimal risk-sharing transfer (obtained by setting the LHS of (5) equal to zero) when $\frac{f_e(x|e_B,z)}{f(x|e_B,z)}$ is positive (negative). The multiplier λ sets the optimal way to balance this trade-off.

But is the old providing insurance to the young? In order to investigate this question, it should be asked whether the young would prefer the replacement of the transfer schedule τ_A^* with its expected value $E\left[\tau_A\right]$. For this analysis, I write $U_B\left(s_B,h_B,\tau_A\right)$ for the indirect utility of the young when he chooses $\left(s_B,h_B\right)$ and the old promises the schedule τ_A. Hence, the expected utility of the old from τ_A^* is $E\left[u_A\left(y_A-\tau_A^*\left(x,z;\theta\right),h_B\right)\right]+\phi U_B\left(s_B,h_B,\tau_A^*\right)$. A transfer schedule τ_A provides insurance if $U_B\left(s_B,h_B,\tau_A\right)>U_B\left(s_B,h_B,E\left[\tau_A\right]\right)$, that is, if the young strictly prefers to receive the transfer schedule τ_A over its expected value. According to Proposition 1 below, the optimal transfer schedule provides insurance. All proofs are in the Appendix.

Proposition 1. *The optimal schedule of transfers $\tau_A^*\left(x,z\right)$ provides insurance.*

The most important theoretical prediction is the following: If there is moral hazard in the family, old adults will provide less insurance when outcomes depend on effort than when outcomes do not depend on effort. Proposition 2 presents a property of the model that implies this prediction.

Proposition 2. *For every interior $\left(x,z\right)$:*

$$\frac{\partial\tau_A^*\left(x,z\right)}{\partial y_Z}<\frac{\partial\tau_A^*\left(x,z\right)}{\partial y_X}$$

This Proposition provides a test for moral hazard. The easier way to interpret this inequality is to rewrite it as $\frac{\partial\tau(x,z)}{\partial(-y_Z)}>\frac{\partial\tau(x,z)}{\partial(-y_X)}$. This implies that transfers respond more to a negative shock to income affecting the uncontrollable component than to a similar shock to income affecting the controllable component. The intuition behind this result is the following: When incentive problems are present, the old would like to elicit effort and the optimal way to do so is to provide less insurance for shocks

that are partially controllable by the young. In the absence of incentive problems, the old would like to provide the same degree of insurance to shocks of the same magnitude, independently of their kind.

Hence, the theoretical model has a testable prediction regarding the slope of the transfer schedule: it is more negative when income variation is not subject to moral hazard. Efficiency, which is an assumption both of the unitary and the collective models, implies that the slope will be the same, independent of the source of income variation. As will be discussed in Section 5, the empirical strategy consists of testing the relative responsiveness of transfers to income changes that can be controlled by the young adult and to income changes that cannot be controlled, computed through differences in the slopes.

One prediction of Becker's Rotten Kid theorem and of other versions of the unitary model is that every time the total amount of resources within the family are the same, the distribution of consumption among members should be the same. Hence, Preposition 2 provides a direct test for another unitary prediction. The unitary model is empirically rejected if the following is observed: The same loss of income generated by different reasons implies different resource allocations. For example, a young adult can lose his job because of a serious illness, or he can lose his job due to an unobserved reason. A different allocation of resources in these two cases rejects the unitary model.

Due to the number of endogenous variables present in the model, it is not simple to obtain unambiguous comparative statics. In order to have an idea about these interactions, I simulated the model. Of special interest for the empirical strategy is the response of effort to an increase in the income of the old. It is possible to show that the effort of the young always decreases after a large increase in the income of the old due to the income effect. In the simulations, this prediction was quantitatively corroborated for small shocks. Due to the many substitution effects, the change in schooling and housework following an increase in the income of the old is an empirical question.

3 The South African Context

Post-apartheid South Africa has two distinctive aspects that make the country particularly suitable for testing moral hazard in family relationships. First, it has very large social cash transfers targeted to the old aged, on which not only the elderly themselves but also close family members rely. The Old Age pension program is an unusually large cash transfer program that generates a situation in which the elder adults frequently become the main breadwinners in their families.

Historically, this social pension was racially discriminatory; it was introduced in the 1920s for

Whites in order to protect those not covered by occupational pensions. The pension system was expanded over the years to include individuals of other races, but the benefits remained largely unequal in several dimensions including the size of the transfers, the means test, and the system for distribution of the benefits. With the end of apartheid, the government sought to achieve parity in the social pension among races. Expansion of the pension system, implemented mainly by increasing the size of the benefits for previously deprived racial groups and unifying eligibility criteria, was initiated in 1991 and mostly completed by 1993, covering all areas of the country.

The new system is noncontributory and transfers a large sum of cash to women over the age of 60 and to men over the age of 65, subject to a means test. The means test is widely reported not to be effectively implemented; in particular, it mainly leads to exclusion from the government system of individuals with private pensions from their occupations. As a consequence, only one third of the country's Whites who qualify by age actually receive the pension, while most age-eligible Africans and Coloureds do not have occupational pensions and receive the government's benefit. Descriptive characteristics of the households in the Cape Town Area in 2002, the year of the first wave of the CAPS panel, are in Table A2 in the Appendix.[11] Median work income per capita of African households was 312.50 rands (R) a month and in Coloured households R 633.33 in 2002. In this year, the Old Age Pension was R 620.00 a month. According to Table A2, 15% of the Whites in the Cape Area who qualify by age receive the pension; for Africans and Coloured the figures are 79% and 75% respectively. Also, the income of other household members is not taken into account, and more than one member can receive the pension simultaneously. Hence, the Old Age pension produces no direct incentives to partition the household or to other family members to stop working.

A second important aspect of the South African context is that unemployment rates are among the highest in the world (see Table A3 in the Appendix). It has often been pointed out that the Old Age pension may be one important mechanism that contributes to the persistence of high unemployment rates over the years (see Banerjee et al. 2008, Bertrand, Mullainathan & Miller 2003).[12] In Section 6.1, I show evidence that the Old Age pension program contributes to the

[11]The sample is representative of the entire population of the Cape Town Area. Cape Town is the second most populous city in South Africa, a regional manufacturing center and the main economic area of Western Cape, one of the richest provinces in South Africa.

[12]Other possible causes of unemployment in South Africa have also been pointed out. Banerjee et al. (2008) state that structural changes in the economy after the end of apartheid resulted in a high equilibrium unemployment rate. The authors argue that demand for unskilled labor has fallen, while the supply of less-skilled labor (in particular, African women) has increased. They also note that large fractions of the population only have access to low quality education and many Africans live very far from where the jobs are. Magruder (2012) argues that centralized bargaining agreements in unionized large firms are extended to non-unionized smaller firms and contribute to decrease employment.

unemployment of young adults in Cape Town. The pension may discourage some individuals from seeking or taking a job that they would be interested in if they could not rely on someone else to support them.

The transition from school to the labor market for African and Coloured young adults in the CAPS data is not rapid.[13] Unemployment is a greater problem for the young cohorts: at age 20, broad unemployment (which includes individuals who want to work, even if they are not actively looking for a job) is 51%. Even at age 26, while 65% are working, broad unemployment is still around 30%. Given that these young adults stay in school for many years (at age 26, they reach 11 years of education), the returns obtained per year of schooling are very low.

On average, young adults live in households with 5.7 members (Descriptive characteristics of these young adults in the period 2002-2006 can be seen in Tables A4 and A5 in the Appendix). Few parents (co-residents or not) are eligible for the pension because of their age, but most of the alive grandparents are eligible. The average number of grandmothers alive is 0.66 and the average number of eligible grandmothers is 0.45. The corresponding numbers for grandfathers are much lower: 0.30 and 0.15, respectively.[14] Table A5 shows that only 31% of the young adults worked in the week prior to the survey and that they spend more hours doing unpaid work at home than working for pay.

The descriptive analysis in this section suggests that intergenerational support is an important aspect of the South African society. Further evidence is shown more rigorously in Section 6.1. In this paper, I investigate whether the family redistributions are efficient or whether there is conflict and evidence of moral hazard.

4 Data

The Cape Area Panel Study (CAPS) was collected between 2002 and 2006 by the University of Cape Town, University of Michigan and Princeton University. It has as its main component a panel of young adults, defined as individuals who were between the ages of 14 and 22 years old in 2002. Up to three young adults were interviewed in each household. When there were more than three individuals between 14 and 22 years old, the three youngest were selected[15]. Table 1 shows

[13] Whites are excluded from the analysis in this paper due to their low response rates to the first wave and high attrition in the following waves, as explained in the next section.

[14] 297 grandmothers and 202 grandfathers cross the age eligibility threshold or is eligible and die during the 4 years of the panel. This is important for the regressions that estimate the impact of the pension on several outcomes that include person fixed effects, as will be clear in the following sections.

[15] Around 45% of the young adults live in households with only one person between the ages of 14 and 22 years old, 38% come from households with two persons in this age range, and 17% come from households with three persons in

Table 1: CAPS Data, by Wave

	Wave 1	Wave 2a	Wave 2b	Wave 3	Wave 4
Young Adults	4752	1377	2588	3531	3439
Households	5282			3636	3459

Note: Of the 5,282 households interviewed in Wave 1, 3,304 have young adults who completed the respective individual questionnaires.

Table 2: Young Adults Response Rates in Wave 1, by Majority Population Group Enumeration Area

	African	Coloured	White	Total
Wave 1	2126	1879	747	4752
Composite YA Response Rate	82.6%	72.0%	41.5%	67.5%

the basic structure of the four waves (2002-2006).

A comprehensive survey of young adults collected a broad array of information on employment, health, schooling, time allocation and family relations. Since intergenerational support is generally regarded as an important aspect of the South African context, young adults were asked to provide detailed information about transfers as well as information about their parents and grandparents, whether or not they were co-residents. For each household with a young adult, a household survey was also collected, focusing on the socio-economic condition of households. In order to obtain a representative sample of the entire population of the Cape Town area, households with no young adults were also interviewed.

The population of Cape Town is around 2.5 million (6% of South Africa) and is ethnically diverse: 32% Africans, 48% Coloureds, 1.5% Indians, and 19% Whites. Compared to the total of the country, Africans are underrepresented and Coloureds overrepresented.[16] I restrict my empirical work to Africans and Coloureds because these two racial groups have good response rates (see Tables 2 and 3).[17] In the first wave, the response rates of young adults were only 41.5% in enumeration areas where the majority populations were White.[18] Whites are also more likely to drop out of the sample in subsequent waves. In Wave 4, 74% and 80% of the original African and Coloured

this age range. Looking at the household file, 2.2% were excluded from the young adults sample because no more than three were selected per household.

[16] South Africa: 77% African, 9% Coloured, 2.6% Indian, and 11% White.

[17] Reasons for non-responses are described in the Appendix.

[18] Details of the sample design are in the Appendix.

Table 3: Young Adults Successful Interviews Across Waves 1-4, by Race

	African	Coloured	White	Total
Wave 1	2151	2005	596	4752
Wave 2	1821	1693	413	3927
Wave 2 (%)	84.7%	84.4%	69.3%	82.6%
Wave 3	1515	1679	337	3531
Wave 3 (%)	70.4%	83.7%	56.5%	74.3%
Wave 4	1596	1594	249	3439
Wave 4 (%)	74.2%	79.5%	41.8%	72.4%

young adults were successfully re-interviewed as opposed to only 42% of White young adults. A low response rate for the White population is a common issue involving surveys in South Africa.[19] A second reason to drop Whites from the sample is that I need a mechanism to exogenously shift the schedule of transfers. In the empirical work, this mechanism is provided by the Old Age pension, which is much more relevant for Africans and Coloureds. This happens because, as already mentioned, a high proportion of elder adults in these two racial groups receive the pension, and also because the pension is very large relative to their median income.

5 Empirical Strategy

The empirical implementation has two parts. The first part is to distinguish between situations in which effort is important and situations in which effort is not important for the outcome. From the theoretical model, a sufficiently high increase in the old's income leads to a decrease in the young's optimal effort level. The Old Age pension—which is an important source of exogenous variation in the old's income—provides a shift in the schedule of transfers. Accordingly, I explore the fact that pension receipt exhibits a discontinuity at age 60 for women and at age 65 for men.

Let Y_{iht} be any of the variables that measure the labor market and health outcomes of young adult i in household h at time t. The equation relating older adult eligibility to Y_{iht} is:

$$\begin{aligned} Y_{iht} &= \pi_{grandm}(Eligible\ Grandmother)_{iht} + \pi_{grand\,f}(Eligible\ Grand\,father)_{iht} + \\ &\quad + controls + \mu_s + \xi_{iht} \qquad for\ \ s = i,h \end{aligned} \tag{6}$$

[19] Other surveys that find low response rates for Whites are the 1993 Project for Statistics on Living Standards and Development (PSLSD) and the 2005 South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey. See Ardington et al. (2008).

Equation (6) is estimated either with person μ_i or with household μ_h fixed effects in order to control for altruism, ability and other possible time-invariant unobservable characteristics. The regressions include controls for the number of parents alive, mother's age, father's age, a complete set of indicators for whether each of the four grandparents are alive, age of the oldest grandparent, a complete set of indicators for whether the age of each of the four grandparents is reported as not known, and the year. Regressions with household fixed effects also include controls for the young adult's age and age squared and an indicator for gender.

Usual econometric problems related to endogeneity and selection into treatment are not important for my specification for three reasons. First, young adults are asked whether all parents and grandparents are alive, and if so, what their ages are. This information is available for parents and grandparents whether or not they reside with the young adults. Therefore, there is no need to select the sample based on co-residence. Second, since age eligibility is the main determinant of pension receipt, changes in behavior intended to become eligible are not an issue when evaluating the pension's impact. Third, the fact that age eligibility is an excellent predictor of pension receipt enables use of age eligibility to define treatment status.

Hence, this first part analyzes the indirect effects of the social cash transfers, since I study the outcomes of young adults who are related to elder pension recipients and not the outcomes of the recipients themselves. In Section 8, equation (6) is also used to analyze the substitutability in time allocation among effort toward the labor market, schooling and housework. In this case, young adults' outcomes measuring schooling and housework are used as dependent variables.

The second part of the implementation strategy is to estimate the degree of insurance that the young receive from older adults and to test the main prediction of the moral hazard model that transfers depend on whether the outcome of the selfish agent can be affected by effort. I can compare the predictions of the moral hazard versus the efficiency model using the following equation:

$$\tau^* = \beta_X y_X + \beta_Z y_Z + controls + \mu_s + \varepsilon_\tau \qquad for \;\; s = i,h \tag{7}$$

where the error term ε_τ represents the measurement error in the transfer data. In order to control for the income of older family members, equation (7) includes the same controls as equation (6) and, in addition, controls for the number of grandmothers and the number of grandfathers eligible for the Old Age pension.

Since the moral hazard model predicts that the optimal schedule of transfers ($\tau_A^*(x,z)$) provides insurance to the young adults, the β's are predicted to be negative. Also, the main theoretical pre-

diction is that this schedule provides less insurance when outcomes depend on effort than when outcomes do not depend on effort. Hence, the moral hazard model implies $|\beta_X| < |\beta_Z|$. The efficiency model argues that transfers respond equally to partially controllable (y_X) and uncontrollable (y_Z) income components, which means that all types of earnings variations receive the same degree of insurance. Efficiency implies $\beta_X = \beta_Z$.

The test of the two models is based on an equation that relates the transfers to a component of y_{Biht} that is uncontrollable by the young adult and a component that is at least partially controllable by the young adult and depends on effort unobservable to the old. The approach follows some of the steps that Altonji & Siow (1987) used in a different context.[20]

I first decompose the young adults' earnings into: 1) a component that is uncontrollable; 2) a component that is in part controllable; and 3) a composite error term. In order to do that, I use the findings from the first part of the implementation strategy (presented in the next section) that the young's employment outcomes deteriorate with the pension eligibility of their relatives, but health outcomes do not respond significantly. Therefore, I use variation in health outcomes to distinguish less controllable from more controllable components of the young's earnings.

Denote by X_{iht} the vector of partially controllable outcomes, which includes variables that depends more on effort, such as hours of work. Also, let Z_{iht} be the vector of determinants of income that are uncontrollable by the young, such as health outcomes. Let Z^*_{iht} be a set of measures of Z_{iht}. Assume that

$$y_{Biht} = k_1 X^*_{iht} + k_2 Z^*_{iht} + v_{iht}, \tag{8}$$

where v_{iht} is an error component. By definition of k_1 and k_2, v_{iht} is orthogonal to Z^*_{iht}. I assume that Z^*_{iht} is uncorrelated with $\varepsilon_{\tau iht}$. Also, let y^*_{Biht} be observed y_{Biht}

$$y^*_{Biht} = y_{Biht} + \varepsilon_{yiht}, \tag{9}$$

where ε_{yiht} is income measurement error. Also,

$$Z^*_{iht} = Z_{iht} + \varepsilon_{ziht}, \tag{10}$$

where ε_{ziht} is a vector of measurement errors in Z^*_{iht}. I assume that Z^*_{iht} is uncorrelated with ε_{yiht}.

Let the decomposition of X^*_{iht} into its linear least squares projection on its uncontrollable part and the error component u_{xiht} be

[20] Altonji & Siow (1987) test the rational expectations lifecycle model of consumption against the Keynesian model.

$$X^*_{iht} = \eta Z^*_{iht} + u_{xiht}, \tag{11}$$

where u_{xiht} is a component of the controllable change in income. By construction, u_{xiht} is uncorrelated with ηZ^*_{iht}. Note that the decomposition in (11) takes into account the fact that part of the variation of components that are dependent on effort, such as hours of work, can be out of control of the young adult. For example, the young adult may have to reduce his working hours due to an illness.

Equations (8), (9) and (11) imply that the regression equation that relates y^*_{Biht} and Z^*_{iht} is

$$y^*_{Biht} = [k_1\eta + k_2]\, Z^*_{iht} + k_1 u_{xiht} + v_{iht} + \varepsilon_{yiht}. \tag{12}$$

Therefore, I can examine the relationship between transfers and income using

$$\tau^*_{iht} = \gamma[k_1\eta + k_2]\, Z^*_{iht} + \alpha k_1 u_{xiht} + controls + \mu_s + \mathrm{e}_{\tau iht} \qquad for\ \ s = i,h \tag{13}$$

Equation (13) decomposes the transfer τ^*_{iht} into its least squares linear projection on $[k_1\eta + k_2]\, Z^*_{iht}$, and $k_1 u_{xiht}$ and an orthogonal error, $\mathrm{e}_{\tau iht}$.

The moral hazard model implies that $|\gamma| > |\alpha|$. Intuitively, $|\alpha|$ should be smaller because $k_1 u_{xiht}$ contains components that are dependent on effort. Although $k_1 u_{xiht}$ may still contain components that cannot be controlled, it also includes elements that can be subject to moral hazard. On the other hand, efficient risk-sharing implies that $|\gamma| = |\alpha|$ (compare (7) with (13)): the component of y^*_{Biht} due to Z^*_{iht} and the component arising from u_{xiht} have the same effect on τ^*_{iht}.

Given the definition of v_{iht} in (8) and the assumption that the measurement error components are independent of the true variables and each other, $k_2 u_{xiht}$ and $[k_1\eta + k_2]\, Z^*_{iht}$ are both orthogonal to v_{iht} and $e_{\tau iht}$. Estimation of (13) is complicated by the fact that I cannot observe $[k_1\eta + k_2]\, Z^*_{iht}$ and $k_2 u_{xiht}$. However, I can form instruments for these variables from regressions of y^*_{Biht} on X^*_{iht} and Z^*_{iht}.

For convenience, I use the fact that $u_{xiht} = X^*_{iht} - \eta Z^*_{iht}$ implies $k_1 u_{xiht} = k_1 X^*_{iht} - k_1\eta Z^*_{iht}$. And this implies $k_1 u_{xiht} = [k_1 X^*_{iht} + k_2 Z^*_{iht}] - [k_1\eta + k_2] Z^*_{iht}$. I can rewrite (13) in the form

$$\begin{aligned}
\tau^*_{iht} &= \gamma[k_1\eta + k_2]\, Z^*_{iht} + \alpha([k_1 X^*_{iht} + k_2 Z^*_{iht}] - [k_1\eta + k_2]Z^*_{iht}) + controls + \mu_s + \mathrm{e}_{\tau iht} \\
\tau^*_{iht} &= \alpha([k_1 X^*_{iht} + k_2 Z^*_{iht}] + (\gamma - \alpha)\,[k_1\eta + k_2]Z^*_{iht} + controls + \mu_s + \mathrm{e}_{\tau iht} \qquad (14) \\
&\qquad\qquad for\ \ s = i,h
\end{aligned}$$

Then, I rewrite (14) by replacing $[k_1\eta + k_2]Z^*_{iht}$ with the estimate $[\widehat{k_1\eta + k_2}]Z^*_{iht}$ obtained from the least squares estimation of (12) and by using equation (9) to replace the unobservable $[k_1 X^*_{iht} + k_2 Z^*_{iht}]$ with y^*_{Biht} and an error component. These changes lead to

$$\tau^*_{iht} = \alpha y^*_{Biht} + [\gamma - \alpha][\widehat{k_1\eta + k_2}]Z^*_{iht} + controls + \mu_s + w_{\tau iht} \qquad for\ \ s = i,h \qquad (15)$$

where the composite error term $w_{\tau iht}$ is equal to

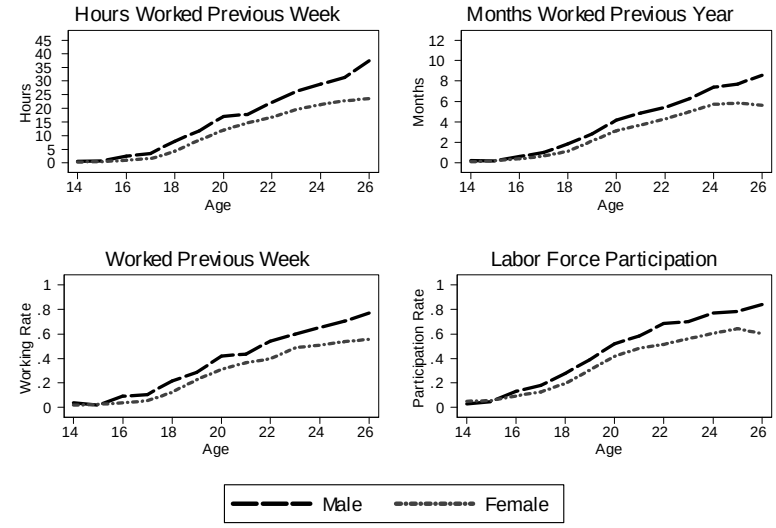
$$w_{\tau iht} = [\gamma - \alpha]\left\{[k_1\eta + k_2] - [\widehat{k_1\eta + k_2}]\right\} Z^*_{iht} - \alpha[v_{iht} + \varepsilon_{yiht}] + \mathrm{e}_{\tau iht} \qquad (16)$$

Equation (15) can be estimated by two-stage least squares, using X^*_{iht} and Z^*_{iht} as instrumental variables for y^*_{Biht}.

Equation (15) allows me to examine how transfers from older adults respond to variations in young earnings that have been identified as out of control and to the variations that can be partially controlled. As noted, efficient risk-sharing implies $\gamma = \alpha$. If I reject that $\gamma - \alpha$ is equal to zero, I reject the efficiency model.

Since the CAPS data set has measures of several income determinants, I am able to use instruments and implement a test that is free of measurement error bias. Note also that reverse causality is not a concern when estimating equation (15) since the young adult's effort level (which stochastically determine the partially controllable component of income) is pinned down by the optimal insurance contract. The coefficients α and $[\gamma - \alpha]$ give the slopes of the optimal contract which is determined by the level of old adults income (for which I control) and by family altruism (for which I use fixed effects).

Figure 1: Young Adults Labor Supply, by Gender



Source: All waves (pooled)

6 Results

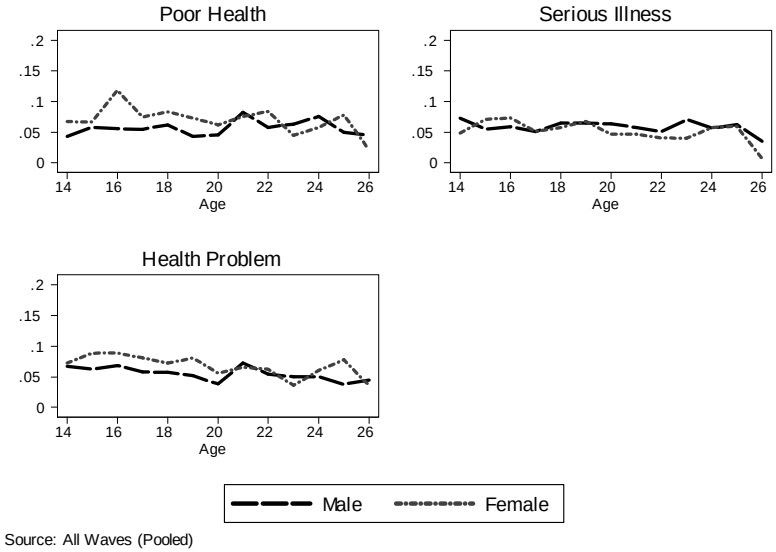
6.1 Which Outcomes Can Young Adults Control?

This section implements the first part of the empirical strategy. The main goal is to separate outcomes that are (partially) controllable from those outcomes that are less controllable in the young adults' perspective. (Partially) controllable outcomes are those more impacted by effort.

From the theoretical model, a sufficiently high increase in the old's income leads to a decrease in the young's optimal effort level. The Old Age pension eligibility of grandparents, which is an important source of exogenous variation in the incomes of these families, provides a shift in the schedule of transfers that older adults offer to the young. As explained in Section 5, I study the response of several outcomes of young adults to the pension eligibility of their elder relatives exploring the fact that pension receipt exhibits a discontinuity at age 60 for women and age 65 for men.

Consistent with the high unemployment patterns observed in South Africa, Figure 1 shows that labor supply outcomes of the young adults in Cape Town are weak, specially at younger ages. For example, only 39% of the sample participate in the labor force (either by working or looking for a job), and 31% work in the week prior to the survey. As noted in Section 3, the transition of a typical young adult from school to the labor market is not smooth, but disrupted by a few years in which he is not a student, but is out of work.

Figure 2: Young Adults Health, by Gender



Source: All Waves (Pooled)

In order to analyze the impact of the pension on the four labor supply outcomes shown in Figure 1, I estimate equation (6), which relates older adult eligibility to a young adult's outcome.[21] Table 4 shows estimates of this equation. The first two columns for each variable shows the estimates with person fixed effects, and the next two columns use household fixed effects. According to Table 4, all labor market outcomes decline with the pension eligibility of grandmothers. For example, the number of hours worked in the week prior to the survey, which average 12 hours for the sample, significantly decreases by almost 3 hours when a grandmother becomes eligible (from the specification with person fixed effects). Also, eligibility of the grandmother leads to a decrease of 7 percentage points in the probability that a young adult works in that week. The table also shows that males have a greater response to pension eligibility than females. Higher employment outcomes for males are a potential explanation. There is no significant effect of eligibility of grandfathers, which is consistent with evidence in the program evaluation literature that women tend to share more of their income with other family members.[22]

The null hypothesis of no effect of the Old Age pension program on young adults' outcomes is rejected for the four measures of labor supply at conventional significance levels. Hence, the

[21] All regressions include controls for the number of parents alive, mother's age, father's age, a complete set of indicators for whether each of the four grandparents are alive, age of the oldest grandparent, a complete set of indicators for whether the age of each of the four grandparents is reported as not known, and the year. Regressions with household fixed effects also include controls for the young adult's age and age squared and an indicator for gender.

[22] See Thomas (1990). For other evidence on the South African Old Age pension, see Duflo (2003). Based on the evidence that women tend to transfer more to their offspring, policymakers have favored transfers targeted to women. This is the case of the Progresa program in Mexico.

Table 4: The Impact of Old Age Pension Eligibility on Young Adults Labor Supply

	Hours Worked Previous Week				Months Worked Previous Year			
Elig. Grandmother	-2.72*	-2.92	-2.28*	-3.46***	-0.48	-0.44	-0.47*	-0.70**
	(-1.72)	(-1.32)	(-1.87)	(-2.57)	(-1.51)	(-0.98)	(-1.88)	(-2.53)
Elig. Grandfather	1.02	0.49	1.62	1.28	0.07	-0.19	0.28	0.21
	(0.50)	(0.17)	(1.05)	(0.70)	(0.17)	(-0.32)	(0.87)	(0.55)
Female			-2.16***	-2.99***			-0.46***	-0.63***
			(-3.41)	(-4.02)			(-3.57)	(-4.10)
Elig. Grandmother		0.33		2.04**		-0.09		0.40*
*Female		(0.13)		(2.03)		(-0.16)		(1.94)
Elig. Grandfather		0.85		0.21		0.42		0.04
*Female		(0.25)		(0.13)		(0.61)		(0.12)
Person Fixed Effects	Yes	Yes			Yes	Yes		
HH Fixed Effects			Yes	Yes			Yes	Yes
Num of obs	9229	9229	9082	9082	9794	9794	9649	9649

	Worked Previous Week				Labor Force Participation			
Elig. Grandmother	-0.07*	-0.07	-0.05**	-0.08***	-0.05	-0.02	-0.05	-0.06*
	(-1.85)	(-1.32)	(-2.00)	(-2.74)	(-1.30)	(-0.32)	(-1.58)	(-1.84)
Elig. Grandfather	0.04	0.03	0.04	0.02	-0.00	-0.07	-0.01	-0.05
	(0.91)	(0.43)	(1.09)	(0.41)	(-0.07)	(-1.06)	(-0.17)	(-1.14)
Female			-0.05***	-0.07***			-0.05***	-0.07***
			(-3.18)	(-4.03)			(-3.53)	(-3.95)
Elig. Grandmother		0.00		0.05**		-0.06		0.02
*Female		(0.00)		(2.10)		(-0.92)		(0.80)
Elig. Grandfather		0.02		0.03		0.12		0.06*
*Female		(0.28)		(0.71)		(1.43)		(1.72)
Person Fixed Effects	Yes	Yes			Yes	Yes		
HH Fixed Effects			Yes	Yes			Yes	Yes
Num of obs	9216	9216	9069	9069	9819	9819	9671	9671

Notes: t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

increase in older adults' incomes and the resulting shift in the schedule of transfers lead to a decline in effort towards labor market activities. Since labor supply responds to the program, I conclude that these outcomes are, at least partially, under the control of the young adults.

This analysis also highlights the importance of intergenerational support; that is, unemployed young adults rely on older family members when they experience a decrease in their earnings. Therefore, this finding suggests that the large cash transfers from the Old Age pension program contribute to explaining the extraordinarily high unemployment rates in South Africa.

Next, I examine several measures of young adults' health and investigate whether the pension program has an impact on these outcomes. Figure 2 shows that young adults in the sample are typically very healthy. When asked to classify their health in one of five categories (poor, fair, good, very good or excellent), only 1% report poor health and 5% report fair health. The first panel in Figure 2 aggregates those who answered "poor" and "fair" in the poor health category. Also, only 6% report that they had a serious illness or injury that prevented them for doing normal activities.[23] Females are slightly more likely to report poor health, but the outcomes "serious illness" and "health problem" are not very different between males and females.

Table 5 shows the estimates of equation (6) for these three health measures. The coefficient on the interaction between eligible grandfather and female is the only one statistically significant at conventional levels and indicates that an eligible grandfather could improve the health of granddaughters.

One can argue that health outcomes are potentially affected by income and that wealthier individuals usually can afford better food and have more resources to care for themselves. The finding of little effect of the pension on health outcomes may reflect the fact that income usually has a greater impact on health earlier in life combined with use of person/household fixed effects. Since these young adults are in general very healthy as shown above, improvements in health outcomes following pension receipt are insignificant over a short period (the panel covers 2002 to 2006).

It is important to note that in order to perform the test for moral hazard, the uncontrollable outcomes, in fact, only need to be less controllable and not completely uncontrollable. This means that health outcomes should depend less on effort compared to the partially controllable outcomes, such as hours of work. Therefore, even if young adults have partial control over their chances of contracting a serious illness, what is crucial for the analysis is that there exists other types of outcomes that are more dependent on effort.

[23] At first glance, this number may appear low for a country known to have one of the highest prevalence of HIV/AIDS in the world. According to South Africa's National Department of Health, the estimated HIV prevalence among antenatal clinic attendees was 26.5% in 2002 and 29.1% in 2006. The province of Western Cape, where metropolitan Cape Town is located, presents the lowest rates in the country: 12.4% in 2002 and 15.1% in 2006. In addition, the highest prevalence of HIV is among the antenatal attendees between the ages of 25 and 29, for which the country's figure is 38.7% in 2006, and between the ages of 30 and 34, for which the respective figure is 37.0%. The CAPS data does not attempt to directly identify individuals with the HIV virus. The young adults who state that they have a health problem are asked to provide a description of this problem. Information about HIV is only available if the person volunteers to declare this virus as his/her health problem. Few young people in the sample make such a statement. This can be for three reasons: 1) These individuals are young and the HIV virus can take several years before a person experiences symptoms; these young adults may be asymptomatic and not know that they have the virus; 2) Some young adults may know their HIV status, but believe HIV is not a serious illness unless they are presently sick; 3) Some young adults may know their HIV status, but may be unwilling to reveal it because of the stigma directed at people with HIV.

Table 5: The Impact of Old Age Pension Eligibility on Young Adults Health

	Poor Health				Serious Ilness			
Elig. Grandmother	-0.01	-0.03	0.02	0.00	-0.02	0.00	-0.00	0.01
	(-0.49)	(-0.92)	(0.91)	(0.21)	(-0.81)	(0.08)	(-0.22)	(0.35)
Elig. Grandfather	-0.04	0.03	-0.03	-0.01	0.03	0.04	0.01	0.01
	(-1.36)	(0.76)	(-1.49)	(-0.21)	(0.94)	(1.02)	(0.44)	(0.31)
Female			0.02**	0.02			-0.01	-0.01
			(1.99)	(1.49)			(-1.48)	(-0.65)
Elig. Grandmother		0.03		0.02		-0.03		-0.02
*Female		(0.86)		(1.62)		(-0.92)		(-1.30)
Elig. Grandfather		-0.12**		-0.05**		-0.02		0.01
*Female		(-2.39)		(-2.09)		(-0.48)		(0.26)
Person Fixed Effects	Yes	Yes			Yes	Yes		
HH Fixed Effects			Yes	Yes			Yes	Yes
Num of obs	9238	9238	9090	9090	9218	9218	9069	9069

	Health Problem			
Elig. Grandmother	-0.00	0.02	0.01	0.01
	(-0.04)	(0.79)	(0.54)	(0.58)
Elig. Grandfather	-0.01	-0.02	-0.02	-0.01
	(-0.24)	(-0.63)	(-1.08)	(-0.39)
Female			0.00	0.01
			(0.23)	(0.55)
Elig. Grandmother		-0.04		-0.00
*Female		(-1.18)		(-0.12)
Elig. Grandfather		0.03		-0.02
*Female		(0.68)		(-0.94)
Person Fixed Effects	Yes	Yes		
HH Fixed Effects			Yes	Yes
Num of obs	9217	9217	9069	9069

Notes: t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

In summary, this section shows that employment outcomes among the youth deteriorate with the pension eligibility of their elders, but health outcomes tend not to respond significantly. Hence, it is possible to distinguish outcomes over which young adults have more control and outcomes over which they have less control. It follows that compared to variations in earnings due to health shocks, young adults have greater control over other types of variations in earnings. The main question in this paper can be answered by estimating how much insurance these young adults receive from their parents and grandparents when they experience an uncontrollable variation in their earnings

compared to a (partially) controllable variation. This is examined in the next step of the empirical implementation, which is discussed in the following section.

6.2 Testing for Moral Hazard

This second part of the empirical implementation tests for moral hazard. The objective is to find how much insurance a young adult receives in order to answer the question: Do the transfers that a young adult receives differ in situations in which he does not control the outcome compared to situations in which effort has an important effect on outcome?

As shown in the previous section, young adults have less control over health outcomes than over their labor supply. Hence, a decrease in earnings as a consequence of a negative health shock is less under the young's control than a decrease in earnings as a result of a variation in work hours. The number of hours worked is (partially) under control and can be affected by effort. However, illness is potentially important for the young's ability to perform in the labor market, so a portion of the variation in hours may also be considered out of the young's control. The methodology implemented below, as detailed in Section 5, allows the controllable outcomes to be impacted by uncontrollable shocks.

Equation (12) decomposes the young adult's earnings into three components: one that is not under his control, another that is (partially) under his control, and a composite error term. Since health outcomes were identified as less controllable by the young adults, I use the health measures to form the vector of determinants of earnings Z_{it}. Estimation of equation (12) is presented in Table 6. Young adults' annual earnings average 2747.64 rands in the sample and, as expected, worse health outcomes significantly decrease their annual earnings.

In order to calculate the term $[\widehat{k_1\eta + k_2}]Z^*_{it}$, I use health outcomes with full interactions with young adults characteristics (age and gender), since this improves the prediction of the less controllable component of earnings. I also estimate equation (12) separating the impact of health on: 1) the probability that earnings are greater than zero; and 2) earnings that are positive.

Next, I calculate the cost of health care associated with each possible health state z. Since data on health expenses are reported at the household level, I estimate the predicted annual health expenses on each possible young adult health status controlling for the health status of all other members of the household.[24] This estimation is reported in Table 7 and shows that a young adult's serious illness has a significant impact on annual health expenses.

[24]Controls are the number of other household members in each age group 0 to 10, 11 to 20, ... , 91 to 100 years old interacted with each possible health status reported in 3 measures: 1) poor/fair/good/very good/excellent health; 2) health problem; and 3) serious illness.

Table 6: The Impact of Health on Young Adults Annual Earnings

	Earnings	
Poor Health	-444.00	-1166.75**
	(-0.78)	(-2.15)
Fair Health	-312.91	-431.02
	(-1.08)	(-1.56)
Good Health	-417.71***	-391.74***
	(-3.06)	(-2.95)
Very Good Health	-249.36	-271.02*
	(-1.59)	(-1.77)
Excellent Health	-	-
Health Problem	249.14	78.47
	(0.82)	(0.28)
Serious Illness	-63.99	-397.39
	(-0.13)	(-0.86)
Female	-	-1134.16***
		(-6.52)
Person Fixed Effects	Yes	
HH Fixed Effects		Yes
Num of obs	11704	11704

Notes: Controls: young adult's age, year. t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

Once I calculate $[\widehat{k_1\eta + k_2}]Z_{it}^*$ and the health care expenses, I insert these terms into Equation (15), which provides the test for moral hazard. Estimation of this equation is reported in Table 8. The dependent variable is the probability of receiving transfer from a parent or a grandparent for schooling, clothes, gifts or pocket money. The exact transfer categories are not relevant to the extent that transfers are fungible.

The first line in the table reports the estimated coefficient on total annual earnings, $\hat{\alpha}$. An increase in the young adult's annual earnings of 1,000 rands leads to a decrease in the probability of receiving transfers of about 2 percentage points. This evidence is consistent with the prediction of the theoretical model that parents and grandparents provide insurance to their children.

The test for moral hazard is given in the second line of Table 8, which reports estimates of the coefficient $\gamma - \alpha$. The null hypothesis, that transfers are efficient ($H_0 : |\gamma - \alpha| = 0$), is rejected in all specifications at conventional significance levels. In fact, as predicted by the moral hazard model, transfers react more to variations in earnings that are less under the young's control. Magnitude is

Table 7: The Impact of Young Adults Health on Annual Household Health Care Expenses

	Health Expenses	
Poor Health	-508.19	-417.15
	(-0.48)	(-0.50)
Fair Health	-450.11	-372.95
	(-0.83)	(-0.89)
Good Health	109.77	50.57
	(0.44)	(0.26)
Very Good Health	193.71	158.46
	(0.69)	(0.72)
Excellent Health	-	-
Health Problem	801.98	590.34
	(1.45)	(1.46)
Serious Illness	1909.41***	1145.61***
	(3.91)	(3.00)
Person Fixed Effects	Yes	-
HH Fixed Effects	-	Yes
Num of obs	6250	5785

Notes: Controls: health of all other household members, female, year. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

Table 8: Transfer Response to Variation in Young Adult Earnings

	Received Transfer (1)	Received Transfer (1)	Received Transfer (2)	Received Transfer (2)
Earnings	-0.023***	-0.021***	-0.023***	-0.021***
(α)	(-6.41)	(-7.91)	(-6.30)	(-7.76)
Pred. Uncontroll. Earnings	-0.030***	-0.034*	-0.015***	-0.024*
(γ - α)	(-3.06)	(-1.76)	(-3.86)	(-1.85)
Health Care Cost	0.037**	0.024	0.037**	0.022
	(2.17)	(1.24)	(2.15)	(1.14)
Person Fixed Effects	Yes		Yes	
HH Fixed Effects		Yes		Yes
Num of obs	4992	4992	4992	4992

Notes: (1)Predicted uncontrollable earnings from the earnings equation without separating Prob(earnings)>0 and earnings that are positive. (2)Predicted uncontrollable earnings from the earnings equation separating Prob(earnings)>0 and earnings that are positive.
Instruments for earnings: earnings from the household questionnaire, hours worked, health outcomes, predicted uncontrollable earnings and controls. t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level

Table 9: Transfer Response to Variation in Young Adult Earnings

	Coresidence	Coresidence	Transfer Outside HH	Amount Outside HH
Earnings	0.000	0.000	0.001	20.05
(α)	(0.46)	(0.32)	(0.30)	(1.09)
Pred. Uncontroll. Earnings	-0.001	0.003	-0.042*	-199.88*
(γ - α)	(-0.14)	(0.76)	(-1.73)	(-1.79)
Health Care Cost	0.010	0.015	0.062	-59.53
	(0.20)	(0.22)	(0.84)	(-0.17)
Person Fixed Effects	Yes			
HH Fixed Effects		Yes	Yes	Yes
Num of obs	6834	6834	1811	1811

Notes: Predicted uncontrollable earnings from the earnings equation separating Prob(earnings)>0 and earnings that are positive. Instruments for earnings: earnings from the household questionnaire, hours worked, health outcomes, predicted uncontrollable earnings and controls. Regressions with person fixed effects cannot be estimated because the questions about transfers specifically from outside the household were only asked in 2006. t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

also important: in most specifications the response is estimated to be at least twice as large when earnings variations is less controllable compared to all types of variations in earnings.

Table 9 shows the estimates of equation (15) for co-residence with parents and grandparents and transfers from outside the household. Variations in earnings do not have an impact on co-residence, which may be explained by the fact that a typical household in South Africa can have three or even four generations living together. In a context of high unemployment, co-residence is not used by older adults to punish young adults for their weak labor supply outcomes.

Furthermore, transfers from outside the household only respond to the less controllable component of young adults earnings: a decrease of 1,000 rands in young adults' earnings due to poorer health leads to an increase in 200 rands in transfers from outside the household. This may reflect the lower observability of effort when older adults do not reside with young adults; in this case, more incentives should be provided to motivate diligent behavior.

Therefore, I find that the schedule of transfers that young adults receive provides a higher degree of insurance when effort is less important for earnings variation compared to when effort is more important for earnings variation. This evidence is consistent with the prediction of the moral hazard model that when parents and grandparents cannot perfectly observe their children's actions, they design the schedule of transfers to provide incentives to induce higher effort. These punishments and rewards preclude efficient income redistribution and risk-sharing among family members.

7 Robustness Checks

7.1 The Impact of Health on the Marginal Utility of Consumption

This section considers young adults' health state dependence, i.e., the impact of health outcomes on their utility. If health affects the level of utility, but does not affect the marginal utility of consumption, then it does not cause a problem for the interpretation of my main findings as given in the previous section. However, if the marginal utility of non-medical consumption increases when the young adult becomes sick, this could potentially explain higher transfers in the event of bad health shocks. For example, a sick person may place higher value on a TV or another electronic device. In this section, I show evidence against such type of state dependence.

I analyze state dependence by investigating the relationship between health and the timing of consumption. The idea is that individuals arrange their consumption paths to increase consumption in periods when marginal utility is high, but decrease it in periods when marginal utility is low.[25] Table 10 shows the impact of health outcomes on monthly household health care expenses per capita. Each health explanatory variable measures the fraction of household members in that particular state. South Africa has a public health care system that serves the vast majority of the population, so per capita health expenses are very low (24 rands per month). The only outcome that has a significant and important impact on health care expenses is a serious illness: If a household member acquires a serious illness, then medical expenses increase by 193.76 rands.

Table 11 shows the impact of a serious illness on other household expenses. Each line is obtained from a regression with per capita household expenses on each item as a dependent variable and the fraction of household members with a serious illness as well as the fraction of household members on each of the other health states from Table 10 as independent variables. Per capita non-medical expenses decrease by 238.78 rands. This implies that in the event of a serious illness, even after considering the increase in medical costs, total household expenses decline. The item that most contributes to the decline is "any other large purchase or large expenses" not previously specified in the list provided in the CAPS questionnaire. When asked for a description of these other expenses, most respondents mention appliances, electronics or celebrations. Hence, household consumption declines in the event of a deteriorating health. This finding suggests that the marginal utility of consumption is lower in bad health states.

[25] This requires the ability to borrow or, at least, to save resources. In 2006, 76% of households report that a member has a bank or savings account, while 45% declare either that they have savings or that someone participates in a Stokvel, Goi Goi, mgalelo or community savings scheme. Also, 48% of households report that a member is buying something on credit, including hiring purchases, store cards, credit cards, charge cards or lay-buy.

Table 10: The Impact of Health on Monthly Household Health Care Expenses Per Capita

	Health Expenses
Poor Health	-
Fair Health	2.00
	(0.03)
Good Health	-17.26
	(-0.29)
Very Good Health	8.12
	(0.14)
Excellent Health	0.51
	(0.01)
Serious Illness	193.76***
	(3.49)
Tuberculosis	-14.40
	(-0.12)
Other Respiratory	5.37
Problem	(0.15)
Sight, Hearing	13.31
or Speech Problem	(0.13)
Handicapped	-58.26
	(-0.48)
HH Fixed Effects	Yes
Num of obs	4503

Notes: Controls: household income, year. t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

Table 11: The Impact of Serious Illness on Monthly Household Other Expenses Per Capita

	Serious Illness
Food at Home	10.89
	(0.32)
Food Outside Home	-3.02
	(-0.24)
Utilities	3.09
	(0.24)
Rent	-29.59
	(-0.98)
Cloth	15.19
	(0.11)
Phone	7.04
	(0.48)
Transport	-0.51
	(-0.02)
Schooling	-30.49
	(-0.13)
Insurance	-27.16*
	(-1.73)
Payments Over Time	18.10
	(0.70)
Other Large Expenses	-202.32***
(Include Durables and Celebrations)	(-2.67)

Notes: Each row is obtained from a separate regression with per capita household expenses on each item as a dependent variable. Controls are the fraction of household members in each health category (fair, good, very good and excellent health), the fraction of household members with several health problems (tuberculosis, other respiratory problems, problems with sight, hearing or speech, and handicapped), household income, year. Each regression include household fixed effects. t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

This evidence is consistent with the empirical literature that studies how the marginal utility of consumption varies with health. Using subjective well-being measures, Finkelstein, Luttmer & Notowidigdo (Forthcoming) find robust evidence that the marginal utility of consumption decreases when poor health is present. Their central estimate is that a one-standard deviation increase in the number of chronic diseases is associated with an 11 percent reduction in the marginal utility of consumption. Implementing an approach based on the estimation of compensating wage differentials associated with job-related health risks, Evans & Viscusi (1991) find no evidence of state depen-

dence and Viscusi & Evans (1990) estimate that marginal utility in a sick state is 77-93 percent of that of a healthy state.

Hence, using an approach based on revealed demand for moving resources across health states, this section provides evidence that the marginal utility of consumption is lower in poor health conditions, which is consistent with the empirical literature on this subject. Therefore, the higher transfers from older adults to young adults following a less controllable decline in earnings found in the previous section is unlikely to be explained by a higher marginal utility of consumption.

7.2 Are parents more sympathetic to a young adult when he is sick?

This section considers old adults' health state dependence, i.e., the impact of young adults' health outcomes on the utility of the old. Parents and grandparents may be more sympathetic to a young adult when he is sick and try to compensate the unhappiness of bad health with more transfers.

In order to investigate this possibility, I investigate how transfers respond directly to health of young adults who are mostly out of the labor force. From Figure 1, young adults up to 18 years old are very unlikely to work. For example, average weekly working hours increases monotonically with age, but at age 18 the average for the sample is still only 6 working hours.

In Table 12, I estimate the impact on transfers of health state of young adults in these earlier age groups. No health coefficient is statistically significant at conventional levels.[26] Hence, I find no evidence that the higher transfers from older adults when there is a less controllable variation in earnings are due to more sympathy towards sick young adults.

8 Extension: Young Adults' Time Allocation toward Housework and Schooling

This section studies the substitutability between labor market effort and time allocated to schooling and housework. From the theoretical model, the decision of how many hours to spend in the labor market is taken jointly with the decision about the time to spend studying and providing services to elderly relatives (such as taking care of adults, cleaning house or preparing meals). I

[26]Note also that health care costs (measured in 1,000 rands) seems to have a negative impact on transfers (even though the coefficient is not significant at conventional levels). This suggest that older adults may be paying the health care cost for young adults in these age groups (and not the young adults themselves).

Table 12: Transfer Response to Variation in Young Adult Health

	Received Transfers				
	Age ≤ 15	Age ≤ 16	Age ≤ 17	Age ≤ 18	Age ≤ 18
Poor Health	-	0.149	0.036	0.086	0.182
		(0.80)	(0.26)	(0.95)	(1.19)
Fair Health	-0.002	-0.027	0.060	0.009	-0.032
	(-0.01)	(-0.28)	(1.18)	(0.25)	(-0.63)
Good Health	0.036	0.001	-0.013	0.019	-0.004
	(0.50)	(0.02)	(-0.53)	(1.05)	(-0.17)
Very Good Health	0.099	0.026	-0.000	0.013	0.037
	(1.13)	(0.50)	(-0.01)	(0.61)	(1.30)
Excellent Health	-	-	-	-	-
Health Problem	0.112	0.001	-0.031	0.001	0.005
	(0.68)	(0.02)	(-0.63)	(0.03)	(0.10)
Serious Illness	0.363	-0.097	-0.029	-0.016	0.087
	(1.36)	(-0.60)	(-0.31)	(-0.24)	(0.88)
Health Care Cost	-0.249	-0.100	-0.000	-0.021	-0.059
	(-1.16)	(-1.10)	(-0.07)	(-0.64)	(-1.25)
Person Fixed Effects					Yes
HH Fixed Effects	Yes	Yes	Yes	Yes	
Num of obs	840	1340	2035	2768	2768

Notes: t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

now investigate whether young adults are withdrawing from the labor market in response to the pension in order to study more or provide housework services.

Figure 3 shows that the probability of being a student decreases from more than 95% for 14 year olds to less than 10% for 26 year olds. Also, the average number of hours per week spent doing homework is 3 and, as expected, young adults dedicate less time to this activity as they grow older. Table 13 shows the estimations of the regression that relates young adults' outcomes to pension eligibility of grandparents (equation 6) with these two education measures as dependent variables. Controls are the same as in Section 6.1.[27] The only statistically significant coefficient in the table is the one for the interaction of eligible grandfather and the female dummy in the regression with student status as the dependent variable and indicates that grandfathers may care less about the education of their granddaughters than that of their grandsons. Hence, I find no evidence that the decline in labor supply due to the Old Age pension contributes to facilitate schooling.

I now investigate whether eligible grandparents want young adults to spend more time at home in order to provide services in the form of housework. Figure 4 shows that young adults spend

[27] See footnote 20.

Figure 3: Young Adults Schooling, by Gender

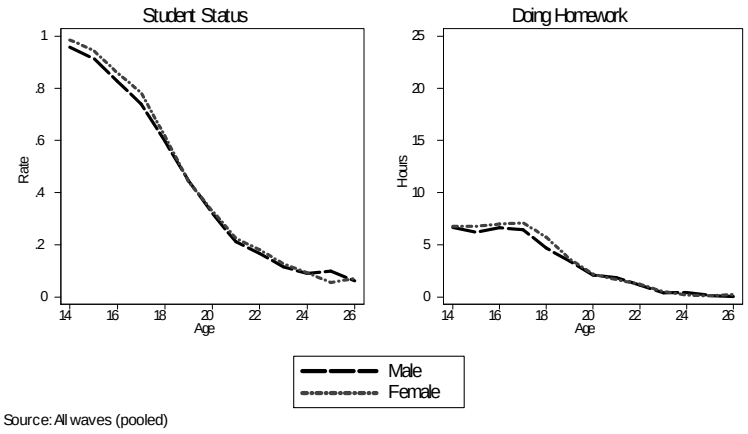


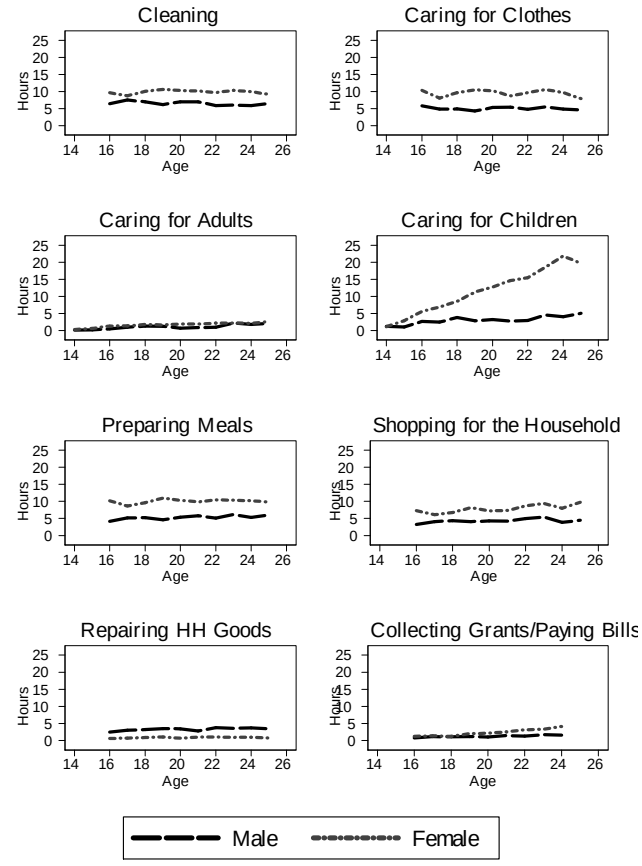
Table 13: The Impact of Old Age Pension Eligibility on Young Adults Schooling

	Student Status				Hours Doing Homework			
Elig. Grandmother	-0.04	-0.03	-0.02	-0.03	0.05	0.47	0.29	0.52
	(-1.25)	(-0.65)	(-0.97)	(-1.02)	(0.10)	(0.67)	(0.73)	(1.20)
Elig. Grandfather	-0.05	-0.04	0.00	0.05	0.00	-0.37	0.41	0.13
	(-1.36)	(-0.69)	(0.12)	(1.35)	(0.00)	(-0.39)	(0.82)	(0.22)
Female			-0.00	0.00			-0.05	0.05
			(-0.35)	(0.14)			(-0.25)	(0.19)
Elig. Grandmother		-0.02		0.01		-0.72		-0.43
*Female		(-0.32)		(0.54)		(-0.86)		(-1.35)
Elig. Grandfather		-0.02		-0.08**		0.63		0.51
*Female		(-0.33)		(-2.33)		(0.57)		(1.01)
Person Fixed Effects	Yes	Yes			Yes	Yes		
HH Fixed Effects			Yes	Yes			Yes	Yes
Num of obs	11285	11285	9682	9682	9905	9905	9681	9681

Notes: t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

several hours per week on various types of work at home. This is particularly true for females, who report spending an average of 10 hours per week cleaning the house, another 10 hours cooking, setting and serving tables and washing up and 9 hours more washing, ironing, sorting and mending clothes. Time spent taking care of children increases steeply as females get older: after the age of 24, women spend an average of more than 20 hours per week caring for children. The only type of housework in which males spend more time than females is repairing and maintaining household goods (males report 3 weekly hours, while females report 1). Taking care of adults, which includes looking after or helping sick, disabled and elderly relatives, is a service on which older adults potentially have a direct interest. However, this is not an activity that consumes much the young

Figure 4: Young Adults Time Allocation towards Housework, by Gender



Source: All Waves (Pooled)

adults' time (females report 1.7 and males report 1.1 hours per week).

Tables 14 and 15 show the estimation of equation 6 using each of these housework activities as a dependent variable. The results suggest that pension eligibility of grandparents does not increase the number of hours that young adults spend on any of the various activities. Rather, the number of hours that young adults of both genders spend cleaning the house and surroundings decreases substantially with the Old Age pension: a decline of more than 4 hours of cleaning per week when either a grandmother or a grandfather becomes eligible (the average for the sample is 8 hours per week). One explanation is that cleaning is a service that has a clear market substitute and a richer grandparent has his/her grandchild performing less of this service. If what matters is to have the house clean, an outside worker can provide this service. Another possibility is that older adults (including the pensioner) may also spend less time on the labor market once a family member receives the pension and, therefore, may spend more time on household chores.

One service that grandparents may prefer their grandchildren to perform is helping to look after

Table 14: The Impact of Old Age Pension Eligibility on Young Adults Hours of Housework - I

	Cleaning the House				Caring for Clothes			
Elig. Grandmother	-4.30*	-1.37	-2.71*	-2.86*	3.49	6.40	0.98	1.05
	(-1.74)	(-0.30)	(-1.66)	(-1.65)	(1.33)	(1.33)	(0.59)	(0.59)
Elig. Grandfather	-4.47**	-2.94	-3.60**	-3.35*	-0.10	0.69	-1.75	-2.18
	(-2.04)	(-0.90)	(-2.08)	(-1.73)	(-0.04)	(0.20)	(-0.99)	(-1.10)
Female			3.27***	3.24***			3.48***	3.43***
			(6.47)	(5.51)			(6.77)	(5.74)
Elig. Grandmother		-3.99		0.26		-3.96		-0.16
*Female		(-0.78)		(0.28)		(-0.72)		(-0.17)
Elig. Grandfather		-2.65		-0.43		-1.37		0.68
*Female		(-0.63)		(-0.31)		(-0.31)		(0.49)
Person Fixed Effects	Yes	Yes			Yes	Yes		
HH Fixed Effects			Yes	Yes			Yes	Yes
Num of obs	3307	3307	3131	3131	3307	3307	3131	3131

	Caring for Adults				Caring for Children			
Elig. Grandmother	-0.38	0.25	-0.58	-0.96*	-1.13	0.77	-0.48	0.15
	(-0.48)	(0.23)	(-1.09)	(-1.67)	(-0.67)	(0.33)	(-0.40)	(0.11)
Elig. Grandfather	1.59	0.75	0.76	0.83	0.99	-0.73	0.68	-0.70
	(1.58)	(0.50)	(1.14)	(1.06)	(0.47)	(-0.23)	(0.45)	(-0.39)
Female			0.84***	0.59*			7.30***	7.47***
			(3.14)	(1.84)			(11.78)	(10.12)
Elig. Grandmother		-1.15		0.70*		-3.46		-1.29
*Female		(-0.81)		(1.66)		(-1.15)		(-1.34)
Elig. Grandfather		1.36		-0.24		2.91		2.44
*Female		(0.77)		(-0.36)		(0.79)		(1.55)
Person Fixed Effects	Yes	Yes			Yes	Yes		
HH Fixed Effects			Yes	Yes			Yes	Yes
Num of obs	7288	7288	7113	7113	7205	7205	7034	7034

Notes: t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

themselves (as noted, young adults typically spend very little time on this activity). However, male young adults decrease the number of hours taking care of adults when a grandmother becomes eligible for the pension. Thus, the evidence is that grandmothers prefer their grandsons not to provide this kind of service when they are eligible for the pension.

The evidence in this section indicates that the decrease in labor supply does not lead to an increase in schooling and that young adults do not provide more services to older adults by working more at home after their grandparents become pension eligible.

Table 15: The Impact of Old Age Pension Eligibility on Young Adults Hours of Housework - II

	Preparing Meals				Shopping for the Household			
Elig. Grandmother	1.02	-2.77	1.06	1.00	1.46	0.48	1.32	1.68
	(0.42)	(-0.63)	(0.67)	(0.60)	(0.52)	(0.09)	(0.72)	(0.86)
Elig. Grandfather	0.27	0.62	-0.24	0.55	-1.93	0.17	-3.00	-2.35
	(0.13)	(0.19)	(-0.14)	(0.29)	(-0.78)	(0.05)	(-1.54)	(-1.08)
Female			5.68***	5.80***			2.57***	2.86***
			(11.59)	(10.16)			(4.53)	(4.33)
Elig. Grandmother		5.17		0.18		1.34		-0.47
*Female		(1.03)		(0.21)		(0.23)		(-0.46)
Elig. Grandfather		-0.60		-1.22		-3.63		-0.88
*Female		(-0.14)		(-0.93)		(-0.76)		(-0.57)
Person Fixed Effects	Yes	Yes			Yes	Yes		
HH Fixed Effects			Yes	Yes			Yes	Yes
Num of obs	3305	3305	3129	3129	3307	3307	3131	3131

	Repairing and Mantaining				Collecting Grants and Paying Bills [1]	
Elig. Grandmother	-0.06	-0.08	0.06	-0.24	2.47	2.65
	(-0.04)	(-0.03)	(0.06)	(-0.24)	(0.79)	(0.83)
Elig. Grandfather	0.06	0.79	0.09	-0.44	-0.67	-0.16
	(0.05)	(0.41)	(0.09)	(-0.39)	(-0.21)	(-0.05)
Female			-2.55***	-2.79***	0.89	1.03
			(-8.70)	(-8.20)	(1.64)	(1.63)
Elig. Grandmother		0.02		0.39		-0.04
*Female		(0.01)		(0.75)		(-0.04)
Elig. Grandfather		-1.25		0.73		-0.75
*Female		(-0.51)		(0.92)		(-0.52)
Person Fixed Effects	Yes	Yes				
HH Fixed Effects			Yes	Yes	Yes	Yes
Num of obs	3307	3307	3131	3131	1203	1203

Notes: [1]Information about time spent collecting grants and paying bills is only available in Wave 2b (Wave 2 was split in 2 parts. See Section 4 for details). Hence, estimation with this activity as a dependent variable cannot be performed using person fixed effects. t-statistics in parentheses. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

9 Policy Implications

This paper presents evidence that family exchanges have far-reaching policy implications. I show that social cash transfers targeted to the elderly have important consequences for the behavior of young adults closely related to the recipients of the program. According to Sections 6.1 and 8, young adults decrease their labor supply and some types of housework in response to the Old

Age Pension, but the program has no effect on their schooling and health outcomes. The estimates imply that a young adult decreases his labor supply by about one quarter when his grandmother becomes eligible for the pension. For example, young adults work on average 12 hours in the week prior to the survey and the impact of a change in eligibility of one of his grandmothers is -2.72 hours according to the regression with person fixed effect in Table 4.

As previously pointed out, several explanations for the high and persistent unemployment rates in South Africa have been suggested. This paper's results show evidence that the Old Age Pension contributes to the dismal labor outcomes among young adults by discouraging labor supply. The Old Age Pension implies that African and Coloured young adults in the Cape Area work 10% less hours, have a probability of working 10% lower and have a labor force participation 6% lower than they would have in the absence of the program.[28]

On the other hand, the Old Age Pension is important for alleviating poverty among populations that historically had restricted opportunities under the apartheid regime. Over one third of African households rely on this program, which benefits several members of the extended family. For young adults, the family is a crucial source of support and provides a form of unemployment insurance in an environment in which employment opportunities are bleak. Furthermore, young adults usually do not have access to unemployment insurance from the State because government insurance provides short-term financial support only to workers who previously contributed to the Unemployment Insurance Fund.[29]

The unemployment insurance provided by the extended family suffers a loss of efficiency due to the asymmetry of information regarding the young adults' labor market effort. It should be clear that this asymmetry of information and the consequent moral hazard problem is not due to the Old Age Pension. This problem is just more evident and easier to identify in the South African context because the combination of elders with a large government-provided income and widespread joblessness among young people implies that transfers flow mostly from older adults to young adults. In fact, future research should attempt to replicate for other countries the result that efficient family risk sharing cannot be achieved because parents and grandparents need to provide incentives to induce diligent behavior.

[28]The calculation for hours worked uses the following: From Table A4, a young adult has on average 0.45 eligible grandmothers. From Table A5, young adults worked on average 12.42 hours in the week prior to the survey. From Table 4, an eligible grandmother implies a 2.72 less hours of work. For the calculations involving the probability of working and labor force participation, the respective results from Table 4 are also used.

[29]In 2006, only 6 young adults in the CAPS sample declare that they receive unemployment insurance from the government.

The public finance literature shows that any social unemployment insurance suffers from a moral hazard problem (see Shavell & Weiss 1979, Gruber 2007, Chetty 2008). In fact, it can be argued that the family has better information about its members and the shocks affecting their labor supply than the government and, aware of the possibility of shirking, is providing insurance in a sophisticated contract. Hence, the Old Age Pension might be a constrained efficient mechanism for insurance provision, since the extended family can monitor employment efforts of young adults.

10 Conclusion

This paper examines the relationship between young adults and their parents and grandparents. I introduce asymmetric information about effort and uncertainty about outcomes to analyze risk-sharing in family relationships and I derive a test for Pareto efficiency: Do transfers that young adults receive from older family members respond equally to controllable and uncontrollable variations in the youngs' earnings; or are transfers designed to provide incentives to induce higher effort?

Using panel data on young adults in South Africa, I first show evidence that the labor market outcomes of young adults respond to changes in the eligibility of their relatives for the Old Age pension, while health outcomes of the young do not respond. This step allows me to decompose the young adults' earnings into: 1) an uncontrollable component; 2) a partially controllable component; and 3) a composite error term. Compared to the uncontrollable component, the partially controllable component of earnings is more dependent on effort. As predicted by the moral hazard model, I find that the transfers young adults receive provide a higher degree of insurance when effort is less important for earnings variation compared to when effort is more important for earnings variation. This finding rejects the efficiency of family allocation mechanisms, a central assumption of the unitary model and, more generally, of the collective model of the household.

The findings are robust along a number of different dimensions, including health-care expenses, changes in the marginal utility of consumption of young adults across health states, and older adults' state-dependent utility. I also find that the decrease in labor supply associated to the pension does not improve schooling and young adults are not providing more services to older adults by working more at home. This analysis shows the important consequences of the social cash transfers targeted to the elderly for the behavior of close relatives and the far-reaching policy implications of family exchanges. Hence, the investigation in this paper not only contributes to understand people's behavior and informal economic operations in society, but also provides evidence relevant

to policy makers, who should consider the interaction between informal private arrangements and government schemes when assessing the effectiveness of interventions regarding social transfers and intergenerational redistribution.

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Appendix: First-Order Conditions

Alongside FOCs (3) and (5), the other FOCs of the Lagrangian program are below. The FOC with respect to effort (e_B) is:

$$\begin{aligned}&\int_{\mathscr{X}}\int_{\mathscr{Z}} u_A\left(y_A-\tau_A\left(x,z;\theta\right),h_B\right)dF_e\left(x\mid e_B,z\right)dG(z) \\ &\quad+\lambda\int_{\mathscr{X}}\int_{\mathscr{Z}} u_B\left(y_X(x;\theta)+y_Z(z;\theta)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)dF_{ee}\left(x\mid e_B,z\right)dG(z)-c_{11}(e_B,s_B,h_B) \\ &\quad=0.\end{aligned} \tag{17}$$

The FOC with respect to housework (h_B) is:

$$\int_{\mathscr{X}}\int_{\mathscr{Z}} u_{A2}\left(y_A-\tau_A\left(x,z;\theta\right),h_B\right)-\phi c_3(e_B,s_B,h_B)dF\left(x\mid e_B,z\right)dG(z)=\lambda c_{13}(e_B,s_B,h_B). \tag{18}$$

The FOC with respect to schooling (s_B) is:

$$\begin{aligned}&\int_{\mathscr{X}}\int_{\mathscr{Z}} \phi u_{B2}\left(y_X(x;\theta)+y_Z(z;\theta)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)y_F'(s_B;\theta)dF\left(x\mid e_B,z\right)dG(z)-\phi c_2(e_B,s_B,h_B) \\ &\quad+\lambda\int_{\mathscr{X}}\int_{\mathscr{Z}} u_{B2}\left(y_X(x;\theta)+y_Z(z;\theta)-m(z)+\tau_A\left(x,z;\theta\right),y_F(s_B;\theta)\right)y_F'(s_B;\theta)dF_e\left(x\mid e_B,z\right)dG(z) \\ &\quad-\lambda c_{12}(e_B,s_B,h_B)=0.\end{aligned} \tag{19}$$

The FOCs (3),(5), (17), (18), and (19) give a solution to the problem: $(e_B^*,s_B^*,h_B^*,\tau_A^*(s,z))$.

Appendix: Proof of Propositions 1 and 2

Proof of Proposition 1.

Proof. From (5) $\tau_A\left(x,z;\theta\right)$ is not constant. Assume towards a contradiction that $U_B\left(s_B^*,h_B^*,\tau_A^*\right)\leq U_B\left(s_B^*,h_B^*,E\left[\tau_A\right]\right)$. From the old adult's risk aversion

$$E\left[u_A\left(y_A-\tau_A^*\left(x,z;\theta\right),h_B^*\right)\right]<E\left[u_A\left(y_A-E\left[\tau_A\right],h_B^*\right)\right].$$

Hence:

$$\begin{aligned}&E\left[u_A\left(y_A-\tau_A^*\left(x,z;\theta\right),h_B\right)\right]+\phi U_B\left(s_B,h_B,\tau_A^*\right) \\ <\;&E\left[u_A\left(y_A-E\left[\tau_A\right],h_B\right)\right]+\phi U_B\left(s_B,h_B,E\left[\tau_A\right]\right),\end{aligned}$$

which contradicts the maximization (4). □

Proof of Proposition 2.

Proof. Let $\Psi : y_X(\mathscr{X}) \to \mathscr{X}$ be the function $\Psi = {y_X}^{-1}$. Hence, $x = \Psi(y_X)$. Analogously, let $\Gamma : y_Z(\mathscr{Z}) \to \mathscr{Z}$ be the function $\Gamma = y_Z^{-1}$. Hence, $z = \Gamma(y_Z)$. Now, write $\tau_A^*(x,z) = \tau_A^*(\Psi(y_X), \Gamma(y_Z)) = \tau_A^*(y_X, y_Z)$.[30]

Rewrite the FOC (5) as follows:

$$\frac{u_{A1}(y_A - \tau_A(y_X, y_Z), h_B)}{u_{B1}(y_X + y_Z - m(z) + \tau_A(y_X, y_Z), y_F(s_B))} = \phi + \lambda \frac{f_e(\Psi(y_X) \mid e_B, \Gamma(y_Z))}{f(\Psi(y_X) \mid e_B, \Gamma(y_Z))}. \tag{20}$$

Using the Implicit Function theorem to take the derivative of (20) with respect to y_X:

$$\begin{aligned} & \frac{u_{A11}(y_A - \tau_A^*(y_X, y_Z), h_B)\left[-\frac{\partial \tau_A^*(y_X, y_Z)}{\partial y_X}\right] u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))}{\left[u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))\right]^2} \\ & - \frac{u_{A1}(y_A - \tau_A^*(y_X, y_Z), h_B)\, u_{B11}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B; \theta))\left[1 + \frac{\partial \tau_A^*(y_X, y_Z)}{\partial y_X}\right]}{\left[u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))\right]^2} \\ = \quad & \lambda \frac{d}{d\Psi}\left[\frac{f_e(\Psi(y_X) \mid e_B, \Gamma(y_Z))}{f(\Psi(y_X) \mid e_B, \Gamma(y_Z))}\right] \frac{d\Psi(y_X)}{dy_X}. \end{aligned} \tag{21}$$

Analogously, taking the derivative of (20) with respect to y_Z:

$$\begin{aligned} & \frac{u_{A11}(y_A - \tau_A^*(y_X, y_Z), h_B)\left[-\frac{\partial \tau_A^*(y_X, y_Z)}{\partial y_Z}\right] u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))}{\left[u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))\right]^2} \\ & - \frac{u_{A1}(y_A - \tau_A^*(y_X, y_Z), h_B)\, u_{B11}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B; \theta))\left[1 + \frac{\partial \tau_A^*(y_X, y_Z)}{\partial y_Z}\right]}{\left[u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))\right]^2} \\ = \quad & \lambda \frac{d}{d\Gamma}\left[\frac{f_e(\Psi(y_X) \mid e_B, \Gamma(y_Z))}{f(\Psi(y_X) \mid e_B, \Gamma(y_Z))}\right] \frac{d\Gamma(y_Z)}{dy_Z}. \end{aligned} \tag{22}$$

Subtracting (22)-(21):

$$\begin{aligned} & \left[\frac{-u_{A11}(y_A - \tau_A^*(y_X, y_Z), h_B)\, u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z))}{\left[u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))\right]^2}\right. \\ & \left. - \frac{u_{A1}(y_A - \tau_A^*(y_X, y_Z))\, u_{B11}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z))}{\left[u_{B1}(y_X + y_Z - m(z) + \tau_A^*(y_X, y_Z), y_F(s_B))\right]^2}\right] \\ & \times \left[\frac{\partial \tau_A^*(y_X, y_Z)}{\partial y_Z} - \frac{\partial \tau_A^*(y_X, y_Z)}{\partial y_X}\right] \\ = \quad & \lambda \frac{d}{dx}\left[\frac{f_e(\Psi(y_X) \mid e_B, \Gamma(y_Z))}{f(\Psi(y_X) \mid e_B, \Gamma(y_Z))}\right] \frac{d\Gamma(y_Z)}{dy_Z} - \lambda \frac{d}{dz}\left[\frac{f_e(\Psi(y_Z) \mid e_B, \Gamma(y_u))}{f(\Psi(y_Z) \mid e_B, \Gamma(y_u))}\right] \frac{d\Psi(y_X)}{dy_X}, \end{aligned}$$

[30] To simplify notation, I write $\tau_A(y_X, y_Z)$ instead of $\tau_A(y_X, y_Z; \theta)$ and $y_F(s_B)$ instead of $y_F(s_B; \theta)$.

which can be rewritten as:

$$\begin{aligned}
&\left[\frac{\partial \tau_A^*(y_X,y_Z)}{\partial y_Z} - \frac{\partial \tau_A^*(y_X,y_Z)}{\partial y_X}\right] \\
= \quad & \lambda\Pi\left\{\frac{d}{dx}\left[\frac{f_e(\Psi(y_X)\,|\,e_B,\Gamma(y_Z))}{f(\Psi(y_X)\,|\,e_B,\Gamma(y_Z))}\right]\frac{d\Gamma(y_Z)}{dy_Z} - \frac{d}{d\Psi}\left[\frac{f_e(\Psi(y_X)\,|\,e_B,\Gamma(y_Z))}{f(\Psi(y_X)\,|\,e_B,\Gamma(y_Z))}\right]\frac{d\Psi(y_X)}{dy_X}\right\},
\end{aligned}$$

where

$\Pi \equiv \frac{\left[u_{B1}\left(y_X+y_Z-m(z)+\tau_A^*(y_X,y_Z),y_F(s_B)\right)\right]^2}{-u_{A11}\left(y_A-\tau_A^*(y_X,y_Z)\right)u_{B1}\left(y_X+y_Z-m(z)+\tau_A^*(y_X,y_Z)\right)-u_{A1}\left(y_A-\tau_A^*(y_X,y_Z)\right)u_{B11}\left(y_X+y_Z-m(z)+\tau_A^*(y_X,y_Z)\right)} > 0$, where the strict inequality comes from the strict concavity of the utility functions u_A and u_B.

Since by assumption $\frac{d\Psi(y_X)}{dy_X} > 0$, $\frac{d\Gamma(y_Z)}{dy_Z} > 0$, $\frac{d}{dz}\left[\frac{f_e(x|e_B,z)}{f(x|e_B,z)}\right] \leq 0$, $\frac{d}{dx}\left[\frac{f_e(x|e_B,z)}{f(x|e_B,z)}\right] > 0$ and $m'(z) \leq 0$, I have $\left[\frac{\partial \tau_A^*(y_X,y_Z)}{\partial y_Z} - \frac{\partial \tau_A^*(y_X,y_Z)}{\partial y_X}\right] < 0$, which completes the proof. □

Appendix: Sample Design

The CAPS sample was designed as a stratified two-stage sample targeting a pre-defined number of young adults in each of the three population groups (Africans, Coloureds and Whites). The first stage was selection of sample clusters and the Enumeration Areas from the 1996 census were used as the basic sampling unit in this selection. The Enumeration Area sample was stratified by the population group composition: each Enumeration Area was identified as African, Coloured, or White according to a plurality of the household heads' population group. Among African Enumeration Areas (the group of Enumeration Areas with predominantly African household heads), 98% of households are African. Among Coloured Enumeration Areas, 96% of households are Coloured. White Enumeration Areas are less homogenous and only 87% of households living in these units are actually White (10% are Coloureds and 3% are Africans). Hence, White Enumeration Areas also generated a considerable number of Coloured households.

The second stage was the selection of households within each cluster. The objective was set to select 25 households per Enumeration Area. Enumeration Areas with fewer than 25 households were linked to larger neighboring Enumeration Areas to produce primary sampling units with at least 25 households. This linking of Enumeration Areas to generate primary sampling units with at least 25 households was executed prior to selection of primary sampling units for the sample.

Appendix: Reasons for Non-Response

Table A1 shows the reasons for non-responses in Wave 4: not available (often a soft refusal), deceased, refused, moved, institutionalized (jail, hospital or rehabilitation center), and no contact. Moves are broken down into the four categories: 1) moved within Cape Town: the interviewer contacted someone who knew the respondent had moved from his/her previous address and stayed within Cape Town, but this person was unable to provide contact information leading to a successful interview; 2) moved within South Africa: the interviewer contacted someone who knew that the young adult had moved out of Cape Town and within South Africa; 3) moved abroad: the interviewer contacted someone who knew that the young adult had moved to another country; 4)

Table A1: Reasons for Non-Response for Wave 4, by Race (%)

	African	Coloured	White	Total
Not Available	5.6	20.9	24.5	15.4
Refused	11.9	26.0	37.8	23.2
Deceased	7.6	3.2	0.6	4.3
Moved within Cape Town	3.8	1.0	0.3	2.0
Moved within South Africa	30.8	10.0	6.9	18.0
Moved Abroad	0.2	2.9	9.5	3.5
Moved No Details	32.4	27.7	17.3	27.0
Institutionalised	2.2	2.9	0.0	1.8
Mentally Unfit/Disabled	0.5	0.7	0.3	0.5
No Contact	5.1	4.6	2.9	4.3

moved without details: the interviewer contacted someone who knew the respondent had moved, but no further details could be provided. There was no attempt to re-interview members of the panel who had moved outside of Cape Town in Waves 2a, 2b and 3. Wave 4 followed a sample of young adults who had moved to the Eastern Cape province. The most frequent reason for non-response in the last wave is that respondents moved to an unknown destination. This reason is particularly relevant for Africans and is a result of difficulty tracking people who live in more informal areas. According to Table A1, Whites frequently refuse to participate in the survey. Hard and soft refusals are also important for Coloureds.

Appendix: Tables

Table A2: Household Characteristics in 2002, by Race

	African	Coloured	White	Total
Median work income per capita	312.50	633.33	2008.33	500.00
No. of eligible members	0.12	0.26	0.28	0.20
Prob(eligible in HH)	0.11	0.21	0.19	0.17
No. of members with pension	0.10	0.21	0.05	0.14
Prob(pension in HH)	0.10	0.17	0.03	0.12
Prob(Pension/Eligible)	0.79	0.75	0.15	0.64
Mean HH age	26.42	29.21	36.51	29.07
HH size	4.20	4.80	3.20	4.31
Num of obs	2274	2200	772	5255

Table A3: Unemployment Rates in South Africa (%)

	Unemployment Narrow Definition	Unemployment Broad Definition	Participation Rate	Absorption Rate
2002	30.4	41.9	56.9	39.6
2003	28.0	41.8	54.8	39.5
2004	26.2	41.0	53.8	39.7
2005	26.7	38.8	56.5	41.4
2006	25.5	37.3	57.3	42.7

Notes: The source is the Labour Force Survey data from Statistical Releases of Statistics South Africa. The narrow definition of unemployment applies the criterion of active job-search with a reference period of four weeks. The broad definition of unemployment applies only the criterion of wanting work, which implies that discouraged work-seekers are included. Participation rate is the sum of employed and narrowly defined unemployed individuals divided by the working age population (15-64 years). Absorption rate is the percentage of the working age population with jobs.

Table A4: Characteristics of African and Coloured Young Adults, 2002-2006 - I

	Mean	Std. Dev.	Min	Max
Individual Characteristics				
Female	0.55	0.50	0	1
Age	19.67	2.89	14	27
Family Characteristics				
Mother Alive	0.92	0.27	0	1
Father Alive	0.78	0.41	0	1
Age of Living Mothers	45.73	7.17	24	80
Age of Living Fathers	49.48	8.09	17	94
Grandmothers Alive	0.66	0.71	0	2
Grandfathers Alive	0.30	0.55	0	2
Age of Living Grandmothers	70.19	9.30	42	109
Age of Living Grandfathers	71.16	9.11	36	104
Eligible Grandmothers	0.45	0.65	0	2
Eligible Grandfathers	0.15	0.40	0	2
No. of HH Members	5.68	2.56	1	23
Per Capita HH Income in 2002	728.63	2176.03	0	55000.00

Table A5: Characteristics of African and Coloured Young Adults, 2002-2006 - II

	Mean	Std. Dev.	Min	Max
Work and Time Allocation				
Hours Worked Previous Week	12.42	20.41	0	100
Months Worked Previous Year	3.10	4.62	0	12
Worked Previous Week	0.31	0.46	0	1
Labor Force Participation	0.39	0.49	0	1
Annual Earnings	2747.64	5876.27	0	32622.75
Student Status	0.43	0.50	0	1
Hours Doing Homework	3.34	6.12	0	108
Hours Cleaning the House	8.48	7.70	0	105
Hours Caring for Clothes	7.51	8.87	0	70
Hours Caring for Adults	1.45	7.18	0	112
Hours Caring for Children	7.38	16.18	0	112
Hours Preparing Meals	7.97	8.10	0	105
Hours Shopping for the Household	6.19	9.08	0	105
Hours Repairing and Mantaining Household Goods	1.99	4.46	0	49
Hours Collecting Grants and Paying Bills	1.81	5.42	0	56
Health Measures				
Poor Health	0.07	0.25	0	1
Serious Ilness	0.06	0.23	0	1
Health Problem	0.06	0.24	0	1
Transfer Measures				
Received Transfer	0.80	0.40	0	1
Co-residence	0.77	0.42	0	1
Transfer Outside HH	0.18	0.38	0	1
Amount Outside HH	843.04	2742.05	0	60000