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The Labour Supply Effects of the South African State Old Age Pension: Theory, Evidence and Implications

by
Alex Sienaert

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About the Author and Acknowledgments

Alexis Sienaert is DPhil candidate (Department of Economics, Oxford University) and SALDRU Research Affiliate. Comments are welcome: alexis.sienaert@economics.ox.ac.uk.
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Contact Details
Alexis Sienaert
Email Addy: alexis.sienaert@economics.ox.ac.uk

Orders may be directed to:
The Administrative Officer, SALDRU, University of Cape Town, Private Bag, Rondebosch, 7701,
Tel: (021) 650 5696, Fax: (021) 650 5697, Email: brenda.adams@uct.ac.za

The Labour Supply Effects of the South African State Old Age Pension: Theory, Evidence and Implications

Alex Sienaert*

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Abstract

This paper examines the impact of South Africa's state old age pension on the labour supply of working age members of pension-receiving households. A range of identification strategies are employed in an attempt to make full use of recent labour force survey data. Results suggest fairly modest, negative impacts on participation and employment on average, but a pronounced, positive migration impact. As such, they marry the results of Bertrand, Mullainathan and Miller (2003) and Posel, Fairburn and Lund (2006), using more recent (and nationally-representative) data. Concluding sections consider implications, and question whether gender-differentiated effects are grounds for rejecting the income-pooling hypothesis.

Keywords: Labour Supply, Social Security and Public Pensions, Intrahousehold Allocation

JEL Classifications: D13, H55, J13

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1 Introduction

Each month, over 2.2 million elderly South Africans draw a non-contributory state pension with an odd history. Instituted in 1928 to help address the "poor white" problem, the pension was first restricted to whites and "coloureds" without private pensions, then (in 1944) expanded to include blacks and Asians, but with discriminatory entitlement criteria and benefits. As apartheid crumbled in the 1980s, such discrimination became increasingly untenable. To achieve parity, the government faced a choice between reducing the value of the pension to white recipients or increasing it to non-whites. It emphasised the latter, most likely because this conferred political advantages during the negotiation period preceding the democratic transition, and was in line with a general tendency towards fiscal profligacy. By 1993, just before the first democratic elections in April 1994, and after large increases in access and benefits for black pensioners, parity was essentially achieved. In 1996, new legislation eliminated any vestige of discrimination.[1]

Thus, as a result of what has been called "a series of accidents" (Deaton 1997), post-apartheid South Africa inherited what by developing country standards is an unusually generous national pension scheme. A *very* unusually generous pension scheme—absorbing around 1.2% of GDP, with payouts (at 870 rand, or about 120 U.S. dollars, a month) averaging more than twice black median income per capita. Two other large-scale public transfer programmes exist and have grown rapidly in recent years, the disability and child support grants (870 rand per month to 1.4 million recipients, and 200 rand to 8 million recipients, respectively). But the old age pension's unique combination of coverage and value means that it remains the central pillar of South Africa's social welfare dispensation.[2]

Other inheritances from the apartheid era are less benign. Millions of South Africans remain economically marginalised. By the most conservative estimates, involuntary unemployment stands at over 26%, rising to close to 40% when the "discouraged" unemployed are counted. These levels of unemployment wreak an incalculable human toll and waste untold economic potential. Not surprisingly, job creation frequently ranks as South Africans' top concern in opinion surveys; in one, 73% of South Africans defined democracy itself as "jobs for everyone" (Afrobarometer 2000, Human Sciences Research Council 2006). Understanding and improving the country's labour market is unequivocally a top priority.

It is in this context that this paper examines the labour market effects of the old age pension (OAP). Does the relatively generous income support that the pension provides impact labour supply decisions and outcomes? If so, how, in what direction, and by how much? The answers to these questions illuminate the mechanisms by which public transfers are distributed after their acquisition by nominal recipients, and the incentives that might be at work in shaping labour market outcomes. As such, they have clear policy implications, fueling the normative debate over the efficacy and desirability of social welfare and labour market interventions.

These issues certainly resonate in South Africa, where there is an active discourse over welfare and labour policy reform in the context of widespread recognition of the need to raise employment. To the extent that the South African case is generalisable, they are also relevant to the increasing number of developing countries which are able to afford and implement income support measures of their own.

[1] For detailed accounts of the history of the pension, see Sagner (2000), Seekings (2003) and Seekings and Nattrass (2005).

[2] All figures as of December 2007. Source: South African Social Security Agency (2007) and own calculations.

1.1 Approach

The rest of this introduction describes key features of the OAP and South African labour market. This is followed by a literature review (Section 2) and theoretical discussion (Section 3) of the possible channels and directions of the OAP's labour supply effects. Subsequent sections are empirical, examining the OAP's associations with, and effects on, labour outcomes in a series of nationally-representative labour force surveys. A number of identification strategies are adopted—partial correlations in the most recent available survey that meets data requirements (Section 4), non-parametric discontinuity design (Section 5), and longitudinal analysis (Section 6). All have limitations, and the approach is essentially exploratory, aiming to deliver an accumulation of evidence based on fully exploiting the capabilities of the data. Concluding sections provide a summary of findings, and address some of their implications.

Since apartheid's appalling legacy currently makes it impossible to ignore race in economic analysis in South Africa, and for reasons discussed in Section 1.3, analysis is limited to black Africans only.[3]

1.2 Features of the State Pension

1.2.1 Pension Sharing

> *It is not wise to be on your own. If you have got money, pension money or whatsoever, you have to share it.* – 75-year old pensioner, quoted in Sagner and Mtati (1999).

A priori, one might be be skeptical about the likelihood of the OAP having substantial labour market effects. After all, the OAP is certainly not intended to be a labour market intervention, and its nominal target is the elderly, whose labour supply is of second-order importance to the country's aggregate labour endowment. In fact, the direct impact of the pension on the elderly is not the focus here. In 2004, just 7% of pensioners lived alone, while over 80% lived in households containing one or more 19–50 year-olds. Households containing pensioners are, in fact, larger than average. An extensive economics literature, reviewed in Section 2, establishes that the OAP plays a pivotal income support role for many families; in the absence of comprehensive social security (particularly for the long-term unemployed), the OAP has evolved into a significant income support system for the general poor, including adults across the working age range.[4]

Sociologists and political scientists agree; for example, Sagner and Mtati (1999) gather qualitative evidence of extensive sharing of pension income in Khayelitsha, Cape Town. They find that important social and cultural drivers of pension-sharing include kinship norms encouraging altruistic resource-sharing, and reciprocity-based motivations arising from the use of pension income to lessen the sense of dependency suffered by frail elderly who feel that their care needs are (or will be) an imposition on younger relatives.

1.2.2 Determinants of Take-up

The OAP is non-contributory and funded out of general taxation, and in this sense is a pure income transfer scheme. It is means-tested on income and assets, and so is explicitly targeted

[3] About 80% of households receiving the OAP classify themselves as black.

[4] Unemployment support is limited to a mandatory, contributory unemployment insurance fund for workers in formal employment, providing temporary support after job loss.

at poorer individuals. However, the test is applied only to prospective pensioners and their partners, not to total household income or assets if pensioners live with other relatives. Pension benefits are reduced in proportion to income as a pensioner's wealth (and that of their partner) approaches the maximum imposed by the means test, whereupon benefits fall to zero. However, the means-test is generous enough to be non-binding for the vast majority of prospective black recipients, who almost always qualify for the maximum pension amount.[5] Thus, while the OAP is certainly redistributive within the country as a whole, it is less so within the subset of black households. Eligibility rules do not stipulate that recipients should not work, so the pension imposes no implicit tax on labour for the vast majority of recipients (that is, provided that working does mean crossing the maximum income imposed by the means test). The criterion that does tend to bind is age, with women becoming eligible at age 60 and men at age 65.

These institutional features are very attractive from the point of view of estimating the pension's causal effects. For many black households, the pension can essentially be construed as an exogenous income transfer conditioned only on age. More generally, pension receipt is certainly not randomly distributed in the population, but it is based on explicit, systematic, and observable criteria. This would be a glib statement if some variation in pension take-up arose from differences in knowledge about its availability, rendering pension receipt endogenous if knowledge was correlated with relevant outcomes. It would also be inaccurate if there was stigma associated with pension receipt, reducing the appeal of the pension to households and perhaps causing some to self-select out of the scheme (see Sahn and Alderman (1996), for Sri Lanka). But because of the pension's long history and attractive size, knowledge about its availability is near-universal, and the fact that the means test is non-binding for a large majority of elderly black individuals makes receipt stigma less likely. Indeed, take-up rates amongst age-eligible individuals now approach 100%.

All of this said, participation in the scheme is not determined entirely by its nominal criteria. At the time of the surveys used here, pension administration rested with the local offices of nine provincial social welfare departments, introducing the potential for regional discretion in eligibility criteria enforcement.[6] There is evidence that the means test is not universally applied, particularly if applicants appear poor. This is one reason why almost everyone drawing a pension receives the maximum payout amount. There is also evidence of breaches of the age criterion, through lack of enforcement (anecdotal evidence suggests that the appearance of old age is often enough), cheating on the part of prospective recipients (by misleading administrators about their age), or through collusion between age-ineligible recipients and officials. Non-pecuniary transaction costs may also discourage some would-be recipients from drawing pension income; pensioners must either draw income from provision points on payment days (often involving long hours in outdoor queues), or appoint procurators to act on their behalf. Again, the high value of the pension and high take-up rates argue against this being a material problem for estimation, but it is certainly possible that some pensioners occasionally miss payments, or lose out on pension income altogether.

[5] In 2004, the key year of analysis used here, individual assets were limited to 280,800 rand (excluding the value of place of residence, if owned) and annual income to 19,128 rand. For married pensioners, the corresponding limits were 561,600 rand and 34,806.48 rand. The average rand/dollar exchange rate in 2004 was approximately 6.60.

[6] On 1 April 2006 a new, centralised South African Social Security Agency became responsible for grants and pension administration.

1.3 Labour Market Features

Evidence points to continued racial labour market segmentation in South Africa, arising for a variety of (not fully understood) reasons (Naudé and Serumaga-Zake 2001, Kingdon and Knight 2004a). This analysis abstracts from these issues by focusing on only black individuals, amongst whom the unemployment problem is concentrated; high average unemployment masks enormous differences in rates by race—official black unemployment was 31.3% in September 2004, compared to 5.4% for whites (Statistics South Africa 2005).

High structural unemployment, perhaps the labour market's most striking feature, challenges the applicability of standard notions of labour supply choice. A debate has raged over whether unemployment ought to be conceived as excluding ("narrow" unemployment) or including ("broad" unemployment) those without work who say they would accept a job if they were offered one, but have not recently been engaged in active job search.[7] This distinction is enormously important in South Africa—black unemployment was 17% higher by the latter definition in 2004.[8] Narrow unemployment is widely used (and has been South Africa's official measure since 1998), primarily because active job search is often assumed to constitute revealed preference for labour participation (while merely stating a desire to work might be cheap talk). But it is possible that this distinction breaks down under conditions of very high involuntary unemployment where, even if the desire to work is strong, giving up active job search could be a rational response to very low expected success probabilities and significant psychic and pecuniary search costs. Kingdon and Knight (2006) evaluate whether the non-searching unemployed ought to be considered participants. Finding that they are no richer or happier than the searching unemployed, and that their presence affects local wage rates, they conclude that they should. I follow the implications of their findings by defining labour force participation and unemployment broadly.

2 OAP Literature[9]

2.1 Poverty and Resource Allocation

In a seminal paper, Case and Deaton (1998) find that the OAP is strongly redistributive, and a major source of income support for poor children (because many live in three-generation households with pensioners). The impacts of pension and non-pension income on food expenditure are compared to determine whether pension income is treated differently to other income. Results suggest that it is not. However, gender is revealed to be an important determinant of household spending patterns, leading Case and Deaton (1998) to reject the perfect incoming pooling hypothesis, and thus the unitary household decision-making model, for the sampled households.[10]

Maitra and Ray (2003a) revisit the questions posed by Case and Deaton (1998), paying particular attention to the potential interplay between private transfers and the OAP. They find that private income has a large impact on poverty and household expenditure patterns, while OAP income has no discernable impact on expenditure patterns. Hence, they reject the income

[7] The typical reference period is four weeks.

[8] Own calculation based on the September 2004 Labour Force Survey.

[9] For an alternative, concise overview of OAP research themes and findings, see Burns, Keswell and Leibbrandt (2005).

[10] This, along with other household models, is reviewed in Section 3.

pooling hypothesis. In this they differ from Case and Deaton (1998), who also reject the unitary household model, but do so because expenditure patterns differ by the gender of income recipients, not because they find that OAP and other income are spent differently. Maitra and Ray (2003a) find that the OAP only partially crowds out private transfers for poor households, while for the non-poor private and public transfers are complements.

Jensen (2003) uses the OAP to examine whether public transfers crowd out private transfers. Large but "far from complete" crowding out is obtained—every 1 rand of pension income reduces private transfers by 0.25–0.3 rand. Some of Jensen's (2003) evidence conflicts with that presented by Posel et al. (2006), summarised below. There, the OAP is associated with positive, female migrant labour supply (and has no other significant effects on labour supply) while Jensen (2003) finds no evidence of the OAP increasing the number of migrants.

2.1.1 Child Welfare

Building on preliminary evidence from Case and Deaton (1998), Duflo (2000) examines the impact of the OAP on anthropometric child development indicators. Children (especially girls) see a significant improvement in health, but only if the OAP recipient is female. According to Duflo, these results "show that an exogenous increase in income can improve children's health in developing countries" (p.398).

Edmonds (2006) notes that future pension income is highly predictable and exploits this to test for the presence of liquidity constraints in households' child labour and schooling decisions—if households are forward-looking and not liquidity constrained, receipt of the OAP should not trigger a change in these variables. Child activities in households that are eligible for the OAP are compared to households that are nearly eligible (the premise being that these households have almost identical permanent incomes, but a temporary difference in income availability). Results suggest a large increase in schooling, and decrease in labour, for rural children. Edmonds (2006) concludes that the sampled rural households face liquidity constraints, an argument bolstered by the fact that significant child schooling and labour effects occur only when the first of two potential OAP recipients in the household becomes eligible.

2.2 Labour Supply

Bertrand et al. (2003) frame the OAP as a natural experiment enabling the testing of intrahousehold resource allocation in developing economies. To do this, the effects of OAP receipt on the labour supply of 16–50 year-old household members are investigated. Descriptive statistics on their (1993) data yield evidence of labour supply discontinuities at the point at which household members become age-eligible for the OAP. Instrumenting pension receipt by the number of age-eligible household members, and controlling for age, education, province, location (urban, rural and metropolitan), gender, household size, and household composition, the paper finds that OAP eligibility is associated with strong negative effects on hours worked and employment status. In particular, employment and conditional labour supply elasticities of pension income of -0.55 and -0.53 are obtained. The authors note that although these elasticities appear quite large, they are likely to partly reflect the low probability of job search success in South Africa, driving down the opportunity cost of leisure. Repeating the exercise with gender-disaggregated data, Bertrand et al. (2003) find that OAP eligibility in the household is associated with a greater reduction in male than female labour supply. In addition, female pensioners reduce labour supply

more than male pensioners. Like Case and Deaton (1998), the finding of gender-differentiated pension effects leads them to reject the family income pooling hypothesis.

Posel et al. (2006) suggest that Bertrand et al.'s (2003) results are flawed by an inappropriately restrictive definition of the household. By considering only individuals physically present in the place of residence for more than half a month prior to the survey, they argue, the study neglects the potential labour supply response of those who move for work, which in the South African context (involving an historical pattern of migrant labour and concentration of jobs in urban areas) is likely to be important (*cf.* Jensen (2003)). Posel et al. (2006) thus revisit Bertrand et al.'s (2003) study, using the same data and methodology, but considering a restricted sample of three-generation rural households, including non-resident members. In the aggregate, they find that OAP eligibility has no household labour supply effect. Disaggregating by gender, they find a significant and positive effect on (only) female labour supply. Summarising, they conclude that they find "no convincing evidence that the social pension creates disincentives for prime-age individuals to migrate to work or to find work" (p.852). And they reason that their positive, female migrant labour supply result stems from the OAP's influence in overcoming "income constraints to migration" (*ibid.*), and the newfound ability of pension-receiving grandmothers to look after their daughters' children. This conjecture is compatible with the findings of Duflo (2000), and Edmonds, Mammen and Miller (2005) (see below).

Lam, Leibbrandt and Ranchhod (2005) and Ranchhod (2006) examine the the labour supply of elderly, OAP-eligible adults. For the reasons outlined in Section 1.2.2, they argue that any labour supply effects must essentially be pure income effects. They find that labour participation rates decline steeply with age for both men and women over 50. Hazard rates for labour force exit peak at 40% and 35% for women and men at their respective OAP eligibility age thresholds, in line with OECD averages at pension-eligibility ages. Probit regressions indicate discrete reductions in labour supply (on the order of 5–10%) at pension eligibility ages.

2.3 Household Composition

There is evidence of flux in household formation in South Africa. Wittenberg and Collinson (2005) document significant reductions in average household size since 1995. Sagner (2000) presents fieldwork evidence from the Eastern Cape province of household fragmentation arising from the departure of members to seek employment, and the enduring effects of apartheid era residential restrictions. Klasen and Woolard (2000) argue that household formation is a central survival strategy for the unemployed.

Does the pension play a role in this regard? Klasen and Woolard (2000) find that state pensions "increase the likelihood of attracting unemployed persons to a household" (p.1), while "the linkages between pension and remittance income and search and employment prospects operate via changes in household formation, rather than directly via an increase in the reservation wage" (p.19). The possible role of the pension in encouraging migration has already been outlined (Posel et al. 2006), also suggesting that household composition may change with pension income. Assessing this, Edmonds et al. (2005) find that female pension eligibility is associated with an increase in the number of children aged 0–5, an increase in the number of women 18–23 (that is, around typical first motherhood age), and a decrease in the number of women 30–39 in households. At approximately 10% on average, the magnitudes of these changes are substantial. Edmonds et al. (2005) posit that the two women groups are substitutes in household production, but that the older group have a comparative advantage in work away from home (perhaps

arising from fewer child care obligations). In contrast to Jensen (2003), such household change arising from the OAP suggests a migrant labour response may be occurring, which would be in line with Posel et al.'s (2006) results.

Maitra and Ray (2003b) also challenge the conception of the household as exogenously given, and use 1990s panel data to assess whether resource inflows (including the OAP) change household composition. They find evidence that household composition is rather mutable, and that pension income leads to a reduction in working-age resident adults in the household (*contra* Klasen and Woolard (2000)). They speculate that "the expanding social pensions program in South Africa encourages working age adults to leave their elderly parents in the villages in search of jobs in the cities" (p.1046). Pursuing this theme, Maitra and Inder (2004) find that migration is indeed more likely when a household receives the OAP, noting that pensioner gender has different effects on prospective male and female migrants.

Two clear, potential sources of endogenous household change with respect to the OAP thus emerge. The first is that pension income results in working age family members migrating from the household, in order to seek employment or take-up pre-arranged job opportunities elsewhere. The second is that the pension acts as an attractor to non-resident family members, causing them to relocate into pension-receiving households to survive unemployment.

2.4 Literature Summary

The literature is in agreement that the OAP provides redistributive income support to a large number of poor households, that the value of pension income to these households is large relative to other sources of income, that there are tangible behavioural responses to this, and that the gender of the pension recipient matters. But there is disagreement about whether or not pension money is spent the same way as other income (Case and Deaton (1998) *versus* Maitra and Ray (2003a)). Regardless of the answer to this question, the fact that gender matters has led, via a rejection of the income pooling hypothesis, to a near consensus that the unitary model of household resource allocation is a poor description of recipient households.

The OAP may change families' living arrangements, but there is no agreement on how. It does seem, however, that there is a migration response, while migrant workers, whether their labour market status is independent of the OAP or itself partly a product of it, appear to cut back their transfers to the household with the arrival of the OAP (at least, according to Maitra and Ray (2003a), for very poor households).

The few studies devoted to the OAP's labour impact are divided—two find strong, negative labour supply effects, one suggests that there are positive effects, while Jensen (2003), investigating crowding out, finds no evidence that the surge in the OAP's value for black recipients between 1989 and 1993 changed labour supply at all.

3 Theory

3.1 Analytical Framework

Ultimately, individuals are the agents of interest when considering the effects of public transfers on labour outcomes. But the OAP is targeted at people at retirement age and any effects on individuals other than pensioners themselves must be mediated through their access to pensioners' OAP incomes, or by the derivative impact of pensioners' own uses of the OAP. The pension's effects, in other words, are channeled through households. There is thus a tension

when evaluating the effects of the OAP between analysis at the level of the individual (whose labour outcomes are of ultimate interest) and the household (because the household is both itself also a potentially interesting unit of analysis, and integral to understanding how a policy might affect those to whom it is not nominally directed).

Figure 1 provides a simple view of the way in which pension income might influence individual labour outcomes within the household. After an elderly household member receives pension income, decisions over to whom it is allocated, and how to use it, are made. This is likely to be linked to the availability of other (wage and non-wage) income. In parallel, the pension may induce people to depart or arrive, a dynamic which may both be dependent upon, and affect, intrahousehold resource allocation. The process of income allocation within the household is, at the same time, bound up with the labour market outcomes of its constituent individuals, which both drive income availability, and may be (partly) determined by it. The picture that emerges is of a potentially complex set of decisions and outcomes over the internal allocation of resources, composition of household members, and labour outcomes of those members. But as posited by the diagram, it is reasonable to assume that pension income is itself exogenous.[11]

Figure 1 identifies three distinct groups of household members whose labour market outcomes may be affected by the OAP:

i. Pensioners. This association is not automatically determined, because the pension's rules do not stipulate retirement;
ii. Individuals of working, pre-pension ("prime") age;
iii. Young (pre-working age) individuals, whose future labour outcomes may be affected by access to pension income in childhood.

The presumption here is that (ii.) is both of first-order importance, and amenable to rigorous assessment using available data.

3.2 Household Decision-making Models

> *In our family we live better, my brother maintains us and my mother gets the pension.* – Anonymous young woman, Limpopo Province, quoted in Mturi, Xaba and Sekokotla (2005)

How does the family manage the potentially complex interactions outlined above to arrive at (ii.), the outcome of interest? That is, how ought the process of decision-making within the household that leads to potential OAP effects on prime-age individuals be conceptualised? And what implications do competing conceptions have for expectations of the pension's effects?

3.2.1 Unitary Model and Implications

The canonical theory is the unitary model, encompassing a swathe of theories with the common feature that the household behaves as if it were maximising a single utility function (Bergstrom 1997). Such a framework is appropriate if all household members have identical preferences, if there is an "ethical consensus" in households that guides economic decision-making (Samuelson 1956), or if a single member's preferences rule.

[11] The exception occurs when the means test is enforced and pensioners' incomes are sufficient to make the test bind. As discussed in Section 1.2.2, however, this is the case for very few households and, even if enforced, the means test applies only to pensioners' (not other family members') incomes. I also discount the possibility that pensioners themselves join households as a result of labour outcomes and income allocations.

The unitary model makes strong predictions about the impact of pension income.[12] For simplicity, assume that pension income is the only source of non-wage income in a household comprising a pensioner and a prime-age adult. Assume also that, for exogenous reasons, the pensioner is not in the labour force. In a unitary model in which time can be spent consuming leisure[13] or providing market labour, such a household faces the optimisation problem:

$$\underset{C,L}{\text{Max}}\, U(C,L) \text{ subject to } C + wL \leq P + wL_0 \tag{1}$$

where $U(C,L)$ is (quasi-concave) household utility, a function of aggregate consumption C and leisure L, w is the wage, P is pension income, and L_0 is the prime-age adult's time endowment. The budget constraint requires consumption and the (shadow) value of leisure to be no more than the value of the pension and maximum obtainable wage income. Kuhn-Tucker conditions yield a binding budget constraint and first-order conditions:

$$w = \frac{U_L(C^*,L^*)}{U_C(C^*,L^*)} \tag{2}$$

$$C^* + wL^* = P + wL_0 \tag{3}$$

The worker provides some labour (participates) at a point A as long as $w > \left(\frac{U_L}{U_C}\right)_A$. The minimum wage satisfying this condition is the reservation wage, $\bar{w}$. It is easy to show that $\frac{d\bar{w}}{dP} > 0$ if leisure is a normal good, and $\frac{d\bar{w}}{dP} < 0$ if leisure is inferior. More generally, if leisure is a normal (inferior) good, labour supply will decline (rise) with pension income. The result of this simple unitary household model with respect to pension income is thus exactly analogous to that of the standard, static neoclassical model of individual labour supply, in which the individual enjoys an exogenous increase in non-wage income. It will also generalise to households with multiple pensioners and working-age individuals, because the utilities and labour supplies of all individuals are subsumed in the aggregate (household) utility function and budget constraint.

The unitary model has a further, key implication. Adding an additional pensioner to our household so that it boasts two non-working pensioners with pension incomes P_1 and P_2 yields, from first-order conditions:

$$w = \frac{U_L(C^*,L^*)}{U_C(C^*,L^*)} \tag{4}$$

$$C^* + wL^* = P_1 + P_2 + wL_0 \tag{5}$$

With $P_1 = P_2$ it clearly makes no difference to the household's choice of the prime-age family member's optimal labour supply who the recipients of the pension are. Pensioner gender, for example, is irrelevant. Analagously, in the previous (single pensioner) specification outlined, the source of P makes no difference to $\bar{w}$. This is an example of income pooling, a general result of unitary household models that suggests that income sources are irrelevant to consumption and production allocations. As evidenced by Section 2, income pooling tends to be rejected empiri-

[12] The following exposition closely follows Cahuc and Zylberberg (2001).

[13] Where "leisure" describes any non-earning activity, a weakness discussed in Section 8.

cally, an important cause (along with unease about the aggregation of individual preference into a communal utility function) of skepticism about the model's validity (Bergstrom 1997, Cahuc and Zylberberg 2001).

3.3 Collective Models and Implications

Collective models revert to the more conventional paradigm of individual decision-making, while taking cognisance of the importance of individuals' relationships with other household members. To provide a simple example, I adapt the general specification provided in Cahuc and Zylberberg (2001), due to Chiappori (1988) and Chiappori (1992). Consider our earlier household comprising a working-age individual, now denoted y (young), and a pensioner, now denoted a (aged). Using Chiappori's (1988) proposition 1, and assuming that y retains all their wage income (though see Section 3.4, below), y's pareto efficient labour choice arises from the solution to the individual constrained optimisation problem:

$$\underset{C_y,L_y}{\text{Max}}\, U_y(C_y,L_y) \text{ subject to } C_y + wL_y \leq wL_0 + \phi_y \tag{6}$$

where ϕ is a "sharing rule" for pension income and $\phi_y + \phi_a = P$. Again, the model can be generalised straightforwardly to cater for more household members. Household labour supply, then, arises from individual optimisation programmes, each of which depends on individuals' shares of non-wage income. The key question becomes how, for any number of household members i, income shares ϕ_i are determined. Individuals might simply obtain equal shares, but it is more common to assume that shares arise from a bargaining process. This can be modeled explicitly (non-cooperative bargaining models), or using an axiomatic (cooperative bargaining) approach (almost always maintaining the assumption of pareto efficiency), such as applying the Nash Bargaining Solution.

In a typical collective model, then, and in sharp contrast to the unitary model, the identities of pensioners and workers are likely to be important in predicting pension effects. Returning the simple example of y and a, these will contribute through bargaining dynamics to ϕ_y, and hence to y's optimal labour supply decision. Two pensioner characteristics which may contribute to the allocation of pension income to the prime-age household member are:

- altruism, in the specific sense of how much the pensioner values y's utility relative to their own. The more other-regarding they are, the higher ϕ_y, all else equal; and
- how easily the pensioner may be coerced into giving up pension income or, equivalently, their degree of bargaining power. All else equal, the lower the pensioner's bargaining power, the higher ϕ_y.

Age may play a deep role in determining sharing rules, with cultural norms generating expectations about elderly household members' obligations to support younger relatives (a kind of norms-based altruism) and their relative standing—bargaining power—in the household (localised, qualitative evidence in Sagner and Mtati (1999) suggests some possibilities). Gender is also often considered a plausible source of variation in sharing rules. In particular, a common supposition is that women are more altruistic, and have lower bargaining power in the household, than men (and this may be equally true for the elderly). Section 7 examines the gender dimension in detail.

Working-age individual—y—characteristics may also clearly play a role in sharing rule determination. Judgements of the appropriate levels of income support to provide working-age relatives may depend on their ages (with younger individuals seeking first-time employment, for example, thought to merit more support). Under more sophisticated notions of individuals' activity sets than considered above, sharing rules may also be affected by the contribution of individuals to non-income earning but nonetheless valued activities (people performing household chores and raising children may receive larger transfers than those earning wage income). Very generally, perceptions of an individual's need for income seem likely to be an element of sharing rules. This raises the possibility that family members might be incentivised to "remain needy" (Kingdon and Knight 2004b). The OAP might induce voluntary unemployment amongst those for whom the utility gleaned from consumption based on OAP income, in conjunction with leisure, exceeds the utility from supplying labour, given the concomitant drop in access to OAP income and leisure.

Regardless of which factors dominate, the fundamental implication of collective decision-making models for an understanding of how the OAP might affect prime-age workers' labour outcomes is that the size of ϕ_y (or relevant model-specific determinant of working individuals' access to pension income) determines the magnitude of the pension's effect on optimal individual labour supply, and that this could depend on pensioners' and working-age individuals' characteristics. As long as $\frac{\partial \phi_y}{\partial P} > 0$, however, P will exert a standard income effect, yielding negative labour supply incentive effects if leisure is a normal good.

3.4 Retained Income

> *Children of today, they are more occupied with themselves. You know, as we are getting the pension, we have to pay for the accounts, but with their money they just buy their items.* – 74-year old pensioner, quoted in Sagner and Mtati (1999).

One possibility which the above models ignore is that the pension may relieve relatives of the burden of providing income support to elderly family members. Put another way, financial obligations may flow from prime-age family members to the elderly, not the reverse. If elderly householders rely on working relatives in this way, workers' retained incomes could rise in response to pension income. The unitary household model obscures this potential effect by treating individuals' labour supply decisions as an outcome of aggregate utility maximisation, and the collective model above obscures it by imagining that sharing rules apply only to non-wage income.

The essential feature of such a scenario is that the worker cares about the wellbeing of the prospective pensioner. One way to imagine its implications, therefore, is to revert to y's individual optimisation problem, where an additional constraint faced by y in maximising her own utility is the provision of some minimum (fixed) level of utility to a, $\bar{U_a}$. With $\bar{U_a}$ money-metric utility for simplicity, optimisation entails:

$$\underset{C_y, L_y}{\text{Max}}\, U_y(C_y, L_y) \text{ subject to } C_y + wL_y + \bar{U_a} \leq wL_0 \tag{7}$$

Introducing the pension, let $T = \bar{U_a} - P$ (where T is the worker's transfer. The worker seeks only to preserve $\bar{U_a}$, and so the pension crowds out their transfer one-to-one):

$$\underset{C_y,L_y}{\text{Max}}\, U_y(C_y,L_y) \text{ subject to } C_y + wL_y + \bar{U}_a - P \leq wL_0 \tag{8}$$

P is thus analogous to a negative ϕ_y in the collective model of Section 3.3; as in that model, it is easy to show that the usual income effects therefore apply—desired labour supply is decreasing in P if leisure is a normal good.

The worker's obligation to an elderly relative is modeled above as a requirement to guarantee a minimum level of utility. Another natural way to think of that obligation is as an implicit, *ad valorem* tax on wage income, so that the elderly member is supported by some fixed proportion of wages. This is reasonable if, for example, elderly wellbeing is partly reference-based. Stated more prosaically, if my elderly mother lives under the same roof, I may want to increase (or be unable to prevent increasing) her consumption as my earnings increase. In this case, pension income will attenuate the standard incentive effects of a wage tax.

Thus, if the pension reduces the financial burden imposed by the elderly on workers, this could increase or decrease desired labour supply, depending on whether that burden consists of a lump-sum transfer to the elderly or an *ad valorem* tax on workers' wages, and on whether the demand for leisure rises or falls with income. The same effects will apply if pensioners use their newfound pension income to support not just themselves, but other household members formerly reliant on workers' wage incomes; young children are an obvious possibility, adults who are unable to work are another.

3.5 Unemployment and Job Search

In the above static labour supply models, market clearing and perfect information mean that desired labour supply is always actualised. There are just two labour market states—non-participation and participation. But when there is significant involuntary unemployment, as in South Africa, a desire to work does not guarantee the opportunity to do so, and another state exists—involuntary unemployment. People in this category face a choice over how much effort, and how many resources, to devote to acquiring a job. It seems plausible to imagine that in doing so, prospective workers trade off the expected benefits and costs (pecuniary and pyschic), of job search. This suggests that job search "intensity" is a continuum (rather than a binary choice of search or non-search), which is the fundamental source of the confusion described in Section 1 over the appropriate distinction between unemployment and non-participation. If high involuntary unemployment suppresses the expected success rate of job search, and the costs of search are high, the appeal of job search will be low even if prospective workers would like to swap leisure for consumption.

A straightforward formalisation clarifies the potential impacts of the OAP on job search.[14] Assume that an unemployed individual expects employment to yield an exogenously-given wage w. As before, there is a reservation wage $\bar{w}$, which by standard result depends on non-wage income (denote this R, so $\bar{w} = \bar{w}(R)$, and with leisure a normal good, $\frac{\partial \bar{w}(R)}{\partial R} > 0$).

The individual thus accepts a job only if $w > \bar{w}(R)$. Denote by q the probability that a job offer satisfies this condition ($q(\bar{w}(R)) = \text{Prob}(w > \bar{w}(R))$, $q_{\bar{w}}(\bar{w}(R)) < 0$ and, by the chain rule, $q_R(\bar{w}(R)) < 0$). The wage expected from an accepted job is therefore $E(w|w > \bar{w}(R))$, which I denote w^e.

[14] For simplicity, and without loss of generality, I adopt a static rather than dynamic job search choice model.

The probability of obtaining a job offer, p, is a function of the level of search s, with diminishing marginal returns. Finally, the cost of search, c, is also a function of search level, increasing on the margin. The expected, net benefit of search is thus:

$$p(s)\{q(\bar{w}(R)).(w^e+R)+[1-q(\bar{w}(R))].R\}+[1-p(s)].R-c(s), \tag{9}$$

$$\text{with first order condition (foc): } p'(s)[q(\bar{w}(R)).w^e]=c'(s) \tag{10}$$

Optimal search, then, simply equates the benefit and cost of search at the margin, adjusted for the shift term $q(\bar{w}(R)).w^e$, which depends on w and $\bar{w}$ (itself dependent on R). It can be shown that $q(\cdot)w^e$ is a decreasing function of $\bar{w}(R)$.

The role of the pension depends upon how it enters into this calculation. I outline four plausible cases.

3.5.1 Case 1: Unconditional access to pension income

If the individual has access to some share of pension income (ϕ) regardless of their labour market status, pension income is a component of R, which has a negative impact on optimal job search through the negative relation between the reservation wage and $q(\cdot)w^e$. The intuition behind such a reservation wage effect is that access to additional non-wage income makes job search "less urgent", reducing optimal search intensity.

3.5.2 Case 2: Conditional access to pension income

As discussed in Section 3.3, a plausible alternative is that access to pension income is needs-based, so that an unemployed family member acquires a greater share of pension income than a worker. To expose the effect by evaluating its logical extreme, assume that access to a share of pension income is the only income obtained when unemployed, and that when employed the worker's share of pension income is zero. Then the net benefit expression 9, above, becomes (R is lost when a job is taken):

$$p(s)\{q(\bar{w}(R)).w^e+[1-q(\bar{w}(R))].R\}+[1-p(s)].R-c(s)\,, \tag{11}$$

$$\text{with foc: } p'(s)[q(\bar{w}(R)).(w^e-R)]=c'(s) \tag{12}$$

The only difference between this and first-order condition 10 is a change in the shift term from $q(\cdot)w^e$ to $q(\cdot)(w^e-R)$. By inspection, then, conditional access to pension income (such that pension income is reduced when the individual is employed) reduces optimal search intensity, and does so more than in the unconditional access case.

3.5.3 Case 3: Retained Income

Section 3.4 raises the possibility that the pension boosts workers' retained incomes (wages net of transfers to family members). This lifts the expected net benefit of working proportionately, whether workers' initial obligations take the form of a lump sum transfer to other family members, or an implicit tax on earnings. Adopt, for example, the latter, with t the family member "tax" on earnings. Then the relevant wage is net of this tax, and could be denoted $w_t=w(1-t)$,

with $\frac{\partial w_t}{\partial t} < 0$, and new terms $q_t(\cdot) = \text{Prob}(w_t > \bar{w}(R))$ and $E(w_t | w_t > \bar{w}(R)) = w_t^e$. The net benefit calculation is then:

$$p(s)\left\{q_t(\bar{w}(R)).(w_t^e + R) + \left[1 - q_t(\bar{w}(R))\right].R\right\} + [1 - p(s)].R - c(s)\,, \tag{13}$$

$$\text{with foc: } p'(s)\left[q_t(\bar{w}(R)).w_t^e\right] = c'(s) \tag{14}$$

So if the pension reduces t, the optimal job search level increases, since $q_t(\bar{w}(R))w_t^e$ is a negative function of t by previously-described relations.

3.5.4 Case 4: Liquidity-constrained Search

A final possibility is that the individual is initially liquidity constrained. She wishes to select optimal search effort according to condition 10, but cannot afford the resultant optimal search cost, so that $p'(s)[q(\bar{w}(R)).w^e] > c'(s)$. Access to pension income might loosen such a liquidity constraint, allowing a welfare-enhancing increase in search, closer to or at the optimum.

The pension might thus plausibly have negative (case 1 or 2), positive (case 3 or 4), or even neutral (if a combination of cases is at work), effects on job search.

3.6 Additional Effects

3.6.1 Latent Productivity

A large literature in development economics shows how limited opportunities for productivity-enhancing self-investment (such as adequate nutrition) may lock prospective workers in poverty traps. Given their low marginal products, such workers may earn wages that are too low to enable them to break out of a low-productivity, low-wage cycle. In a more extreme scenario, they may find themselves shut out of the labour market altogether, even in competitive general equilibrium (Dasgupta and Ray 1986). If OAP income enabled prospective or existing workers to improve their latent productivity, the OAP could break poverty traps by enabling labour market access or higher wages. This could manifest as a higher probability of employment for given levels of participation or search intensity.

Attitudes to risk might also be altered by the pension. If the pension, by providing an income buffer, boosted workers' appetites for risk and enabled them to absorb more stochastic output fluctuation, this could have positive consequences for workers' incomes (for example, by enabling piece-rate rather than fixed-wage contracts, or fixed-rent rather than share-cropping contracts in agriculture [though the latter has little importance in South Africa]). Labour migration—an especially costly and risky form of job search—may be importantly affected.

3.6.2 General Equilibrium Effects

The pension's scope (approximately 1.2% of GDP, and a major contributor to total income in small communities) may be big enough to generate aggregate effects. In a simple, closed economy Keynesian framework, it would constitute an exogenous income injection, lifting aggregate demand and boosting firms' output. Aggregate derived labour demand would rise in response, and with it equilibrium employment and wages. This would be especially true if the pension redistributed income to poorer households with above-average marginal propensities to consume. On the other hand, if perfect price flexibility was assumed, such demand increases would merely

raise prices. These effects might occur at a local or regional level, but this is macroeconomic, general equilibrium territory, depending crucially on assumptions ranging from price formation and flexibility, to the degree of economic openness, and how the pension is funded.

3.7 Theory Summary

Prime-age workers are affected by pension income through their relationships with pensioners, making household decision-making, and specifically resource allocation, central to predictions of the OAP's effects. In their simplest forms, both the unitary and collective models predict OAP effects on working-age household members that are analogous to pure income effects on individuals. Under the standard assumption of leisure as a normal good, the implication is that labour supply declines and participation (at the margin) falls.

If individual incentives are considered (in line with models of individual, or collective household, decision-making), pension income may relieve workers of the burden of supporting family members. This will have the same (income) effect as described above if the pension crowds out fixed lump sum transfers from workers to pensioners; if it reduces the rate of a continuous "tax" imposed on workers by dependents, it will boost (reduce) desired labour supply under conditions of dominant substitution (income) effects and leisure as a normal good. Job search is a key labour variable that might be affected by the pension, and a range of different effects are possible. Finally, the pension might boost prospective or current workers' potential marginal products, and alter aggregate labour demand in general equilibrium.

The above discussion clearly echoes the lack of consensus in the empirical OAP literature. Arguably, the lack of an unambiguous theoretical prior over the vector of the OAP's effects makes an exploratory, rather than strictly hypothesis-driven, empirical approach appropriate. This is the task of the analysis to follow. But along with the dictates of available data, this basic theory informs the choice of which labour market outcomes to analyse, guides regression specification, and facilitates interpretation of empirical results. Theoretical priors point to potential OAP effects on labour participation, the likelihood of employment (incorporating search effects), and labour supply conditional on employment.

4 Parametric Cross-section Evidence

4.1 Data

The data are taken from the South African Labour Force Surveys (LFS), produced by Statistics South Africa under International Labour Organisation guidelines. A nationally representative sample of approximately 30,000 households is surveyed every September, with a 20% sample replacement rate per wave. Supplementary labour-related data are gathered annually in March. Although the survey has been conducted since 2000, migrant data collection began only in September 2002, and an entirely new sample was surveyed in 2004. The survey yields standard demographic and household characteristic data, and rich information on individuals' labour situations. It is not, however, a detailed income and expenditure survey, and information on these aspects is very limited. Analysis in this section is conducted using the most recent available LFS containing the necessary data—of 85,663 black individuals in 21,847 households, surveyed in September 2004.[15]

[15] Subsequent full LFS surveys omit a crucial household information section, and migrant data.

The only direct question on OAP status in the LFS asks if one or more household members receive the OAP. To the extent that the pension's effects differ by recipient gender, and by the number of pension recipients, this neglects potentially valuable information. I therefore interact the survey variable capturing the presence of at least one recipient with the number of age-eligible men and age-eligible women in the household, to create indicators for the number of male and female recipients. The interaction ensures that households with age-eligible individuals but no recipients (perhaps because the prospective pensioners are amongst the very few who exceed the pension's income-eligibility threshold) are not wrongly recorded as receiving the pension. But the interaction does assume that, conditional on the household reporting OAP receipt, all age-eligible people in the household are in fact recipients; the features of the OAP described in Section 1.2.2 justify this approach.

4.2 Descriptive Statistics

Descriptive statistics confirm the significance of the OAP. 21% of households report the presence of one or more OAP recipients. In 2004, a single recipient's monthly OAP income at the payout maximum (740 rand) exceeded median monthly household expenditure (approximately 600 rand), suggesting that a household containing two recipients was more than twice as well off as the median black household, *ceteris paribus*. It is not surprising, therefore, that 85% of pension-receiving households describe "pensions and grants" as their most important income source; other government grants account for very little of this—only 36% of pension-receiving households also receive other grants, and far fewer households receiving only non-pension grants report that this is their main income source (39%).[16]

Figure 2 uses available expenditure data to compare the proportions of recipient and non-recipient households in eight monthly expenditure categories. All else equal, and assuming that pension income is counted as household expenditure, over 60% of pension-receiving households would be in the bottom expenditure category were it not for the pension, compared to just over 30% of non-recipient households.[17] Since pension-receiving households are larger on average (see Table 1), this understates individual poverty in these households. In accordance with estimates of the OAP's value to households using more detailed income and expenditure data (Case and Deaton 1998, Burns et al. 2005), the OAP appears to rescue a considerable portion of recipient households from extreme poverty (by any sensible definition, but here defined rather loosely as being in the lowest of eight household expenditure categories). However, a significant number of recipient households clearly have access to other income.

Table 1 displays household-level descriptive statistics, by reported OAP status and gender-specific age-eligibility.[18] The household unit is self-identified by survey respondents, and only resident family members are included (defined as those physically present in the place of residence for at least four nights a week on average, during the preceding month).

[16] Nor is this because many pension-receiving households contain no working age adults (so-called "hollow" households (Deaton 1997)). OAP households are larger than average (see Table 1), and the number falls only to 80% for households with at least two 16–50 year olds.

[17] Since the value of the pension is well over 400 rand (740 rand in 2004), the 13% of OAP households which report spending less than 400 rand per month must be misreporting expenditure, saving a considerable portion of their pension income (unlikely at such low expenditure levels), or transferring income to non-residents.

[18] Reported pension receipt by households containing no age eligible individuals is either the result of survey error, or captures households which evade the age criterion. Note that, while the OAP status categories displayed are designed to be exhaustive for completeness, discussion focuses on non-OAP households without age-eligible members, and OAP households with age-eligible members (which are the subject of regression analysis to follow).

Households in all recipient categories are bigger than non-recipient households, but the difference is most pronounced when pension recipients are women. This is attributable not only to the presence of pensioners themselves, but to higher numbers of individuals in all categories examined, with the exception of women aged 25–50 (markedly fewer where there are multiple pensioners). Asset and wealth indicators, while rough due to data constraints, do not suggest that recipient households are systematically worse off than non-recipients; the former are about as likely to report some form of savings, and more likely to own their homes. Recipient households' educational attainments, measured by the highest level of education obtained by anyone in the household, are marginally lower than those of non-recipients on average (approximately a half to a full year less). The 2004 LFS does not provide a clear indicator of rural or urban location, but only 6% of pension-receiving households live in one of South Africa's six major metropolitan areas, compared to 15% of non-receiving households (not shown).

Labour market-related variables paint a dreary picture for recipient households. Despite their larger overall size, they host somewhat fewer labour market participants, considerably fewer employed individuals, and more unemployed individuals. This pattern is reinforced by total household earnings and weekly hours worked, the means of which are both significantly lower in recipient households.

Because the definition of the household in the LFS is based on residence, migrants are excluded from the above figures. It is tempting to interpret non-residence a signal of weak family ties, and therefore grounds for exclusion. But, as pointed out in Section 2, this would likely be misleading (Posel et al. 2006). Migrants frequently play an integral role in the economic life households—the pattern of circular employment migration set up during Apartheid remains in place (Posel 2001), many migrants' nuclear families (partners and children) are present, and remittance flows from migrants are substantial relative to household expenditure (for example, 16% of households describe remittances as their main income source). In South Africa, migrants may not be part of the locationally-defined household, but they are typically very much part of the family. Table 2 therefore introduces migrant characteristics, and revisits a number of statistics (as far as the data allow) presented in Table 1, adjusted to include migrants.

24% of households count one or more non-resident migrants as members. Recipient households, particularly those with female pensioners, contain more migrants, and the probability that a recipient household contains migrants is 33%, compared to 21% for a non-recipient household. Migrant age data are unavailable, but if migrants are likely to be aged 25 to 50, then the dip in this age group observed in Table 1 is eliminated for pension-receiving households; this is plausible—according to Posel (2001), over 70% of migrants are in this age range.[19]

With the inclusion of migrants, the number of labour force participants in recipient and non-recipient households appears similar. The number of employed individuals remains lower, but only marginally (rather than around half a standard deviation below that of non-recipients, as before). These contrasts are suggestive evidence in support of Posel et al.'s (2006) claim that migration is an important aspect in which recipient households differ from non-recipients. Specifically, the increased number of migrants in recipient households provides a compelling explanation for the otherwise opaque decline in 25–50 year-old resident women (and less than proportional number of resident men of this age) in recipient households. If this interpretation is correct, ignoring migrant labour would cloud estimates of the OAP's labour effects.

[19]See especially Table 5 of Posel (2001). Posel's (2001) data pre-date those used here by 5 years, but it is reassuring to note that 1993 figures, also in Posel (2001), are very similar, suggesting that the age profile of migrants has been relatively stable in recent years.

Household size differences prevent easy comparisons of the raw numbers presented thus far. To address this, Table 2 concludes with selected variables in proportions. Since the focus in the analysis to come is on individuals aged 19 to 50, labour force participation, employment and unemployment rates are calculated for individuals in this cohort. The number of migrants is expressed as a proportion of a wider range—19 to 59 year olds (an assumption, but very likely a weak one). The results are similar to those described above. Lower resident labour force participation and employment, and higher unemployment, are not artifacts of household size differences. Mirroring the raw figures, households with (especially female) pensioners have a higher proportion of migrants. If these are included amongst labour force participants and the employed, the gap in labour force participation between recipient and non-recipients is almost eliminated, while employment remains lower in recipient households, but less so.

4.3 Regression Analysis: Individuals

4.3.1 Sample Examined

I define the "prime-age" potential workers under consideration as individuals aged nineteen to fifty. Nineteen is chosen as the lower bound because the vast majority of adolescents have completed their schooling by this age. The terminology follows Bertrand et al. (2003) who, however, define prime-age as 16 to 50. Legal minimum working age is 15, but most learners complete, or aim to complete, secondary education (typically at 17 or 18). Further, the determinants of school-aged adolescents' school to labour market transitions are likely to be different to those of adults who have permanently left school, child market labour is not a quantitatively important feature of the labour market, and drop-out rates are relatively low. Fifty is a rather restrictive upper age cut-off, but I follow Bertrand et al. (2003) in wishing to ensure that results do not reflect direct retirement anticipation effects. The prime-age cohort comprises 84% of broadly-defined labour force participants.

Pooled regressions are followed by separate regressions for prime-age men and women, to isolate any systematic differences in OAP and other effects by gender which pooling would obscure.

4.3.2 Outcomes Examined

The LFS provides information on a number of individual labour market outcomes:

- whether or not the individual is a labour market participant, under both the narrow and broad definitions;
- if participating, whether the individual is employed (provides any kind of paid work), or unemployed (under the narrow and broad definitions, with details on whether there is active job search);
- if participating and employed, the individual's working arrangements, and labour supply (hours worked).

As discussed in Section 3, access to pension income might affect all of these. Examination of hours worked, however, is complicated by data constraints. Data on migrants are more limited than that on resident workers, and in particular there is no information on hours worked. This is understandable since, by definition, migrants are typically not present to answer survey questions, and measurement error from secondary reporting would be a real concern even if data capture were more comprehensive. The survey does, however, identify migrants by asking "are

there members of this household who are considered migrant *workers* [emphasis added]?". It is thus certainly safe to consider migrants, as defined by the LFS, to be labour participants. Relying more heavily on the use of the term "worker", it is also reasonable to assume that migrants are employed. Binary indicators of participation and employment are therefore the most appealing measures of labour outcomes from the point of view of incorporating migrants. Examining labour participation provides an initial indication of whether the OAP has labour incentive effects. It is employment probability, however, which goes to the heart of the debate over the OAP's possible labour effects given the theoretical discussion of Section 3.

In principle, we might model individuals' labour outcomes as the result of a sequential process: first, the individual decides whether to participate in the labour market; second, conditional on participation, market employment is either obtained or not. However, in a high involuntary unemployment context, it is not clear that participation and job search incentives are neatly separable. Consequently, it is hard to think of exclusion restrictions that could be applied to tease out distinct partial correlations between variables of interest, and participation and (conditional) employment. One candidate is household composition. For example, young children might discourage adults with a comparative advantage in dependent care from participating, but not affect the employment probability of adults who do seek to provide market labour. But (amongst other possibilities) search intensity—and hence conditional employment—might well be affected, invalidating this approach. Given the sensitivity of sample selection models to specification, their use is arguably only compelling if the selection issue is both likely to be strong, and amenable to identification in the data; neither of these conditions is met here.

Consequently, I adopt a straightforward, two-pronged approach, examining indicators of labour participation (1 if participating, 0 otherwise) and unconditional employment (1 if employed, 0 otherwise), by probit regression.

4.3.3 Covariates

It is standard to think of three levels of labour outcome determinants: individual, household, and regional. I control for the first using age, age squared, gender, and educational attainment (allowing for discontinuous effects by using dummies for maximum educational attainment, with less than primary school completion the omitted category).[20]

The second—household-level characteristics—may determine individuals' access to labour market information networks, the opportunity cost of market labour (through, for example, the care needs of dependents), and the availability of other income through the wage or non-labour income of other household members. I control for these using a number of household composition variables, based on demographics rather than the labour market status of other household members to minimise the risk of simultaneity. There are controls for the presence of children under 5, children 6–15, individuals 16–18, 19–21, 22–24, men 25–50, women 25–50, and individuals older than 50. The number of individuals in a category is net of the individual under observation. The first five of these composition controls follow Bertrand et al. (2003), with the granular controls for people of early working age seeking to account for unsettled labour market outcomes in early working life. I also control for the number of migrants, taking this (for the moment) as exogenously determined.

[20] As well as capturing discrete increases in human capital acquired through formal education, this use of milestone educational attainment embeds the assumption that a significant part of the return to education stems from its ability-signalling role ("sheepskin" effects).

Finally, regional labour outcome determinants are potentially important if, for example, regional involuntary unemployment rates differ. I thus include eight provincial dummy variables (Gauteng, the interior province producing over a third of GDP, is omitted), a dummy variable for presence in a major metropolitan area, and (due to concern over the lack of information on truly rural *versus* urban status) a dummy variable for household location more than thirty minutes away from public transport (termed "isolated"). I also include a dummy variable for non-pension government grants in the household (mostly child support and disability grants). For analogous reasons to those outlined in Section 1.2.2 for the pension, treating these grants as exogenous is defensible, and they provide one way of controlling partly for other non-wage household income.

OAP receipt is captured using the interaction terms described in Section 4.1, to isolate potential differences in pension effects by recipient gender. However, because of the possibility that these variables mistakenly capture non-recipients, and since 8% of households which report receiving the OAP contain no age-eligible individuals, a simple dummy for OAP receipt is retained as a benchmark.

While the OAP can plausibly be considered exogenous, instrumental variables would be useful to address lurking endogeneity problems, including endogenous take-up, or endogenous means-test eligibility (Bertrand et al. 2003, Sahn and Alderman 1996). For example, elderly household members might be more likely to draw their pensions if working age relatives are out of work; or, if households with pre-existing characteristics resulting in poor labour market outcomes capture a disproportionate share of the pension, and these are inadequately controlled for, estimates of the OAP's effects would be biased downwards.

The obvious factor correlated with household OAP receipt but less likely to be correlated with such unobserved factors (themselves correlated with labour outcomes), and that employed in the existing literature on the OAP (Bertrand et al. 2003, Posel et al. 2006), is the number of age-eligible individuals in the household. Figure 3 demonstrates the close link between reported OAP receipt and age. Enforcement of the pension's age requirement is clearly real but imperfect. For households in which the oldest member is a 59 year-old woman, the take-up rate is 11%. This rockets to 70% for households whose oldest member is a 60 year-old woman (who has just crossed the age eligibility threshold), rising to 88% for households whose oldest member, if female, is 5 or more years past eligibility age. Male pension age enforcement appears less rigid, partly reflecting households with age-ineligible men whose younger, age-eligible spouses receive the OAP.

A plausible way to instrument the OAP is thus to use:

- the number of age-eligible women (60 and above);
- the number of age-eligible men (65 and above);
- the number of women aged 55–59;
- the number of men aged 60–64,

where the last two categories capture the correlation between OAP receipt and "cheating" age-ineligible recipients, and introduce more variation in predicted OAP. One potential source of endogeneity (an omitted variable problem) which these IVs cannot address is the possibility that the presence of elderly people in the household affects the labour market outcomes of younger household members in ways other than the influence of their pensions. This is addressed in Section 5.

4.3.4 Results: Labour Force Participation

Table 3, panel 1, reports results. In the pooled (across prime-age gender) specification of Column 1, OAP receipt is negatively associated with participation, and statistically significant at the 1% level. Instrumenting for pension receipt using an IV Probit (Column 2), the result is very similar; there is little sign that OAP receipt is endogenous. In the probit on pooled labour participation with male and female OAP interaction terms (Column 3), the presence of male and female pensioners are both negatively associated with labour participation, but female pensioner presence has a larger coefficient magnitude than male presence, and is statistically significant at the 1% level compared to 5% for male pensioners. Disaggregating by gender (Columns 4 and 5) suggests a strongly significant, negative association between female pensioners and the labour participation of both men and women, but male pension receipt is significant only in female labour supply. The magnitudes of marginal effects at the mean, ranging from 0 to 5%, are modest.

Other aspects of the regressions generally conform to conventional priors for the determinants of labour participation. Participation rises with age, but at a decreasing rate. Completed primary, secondary and tertiary education are all positively and significantly related to labour force participation. Married men (women) are more (less) likely to be participants. The presence of children under five raises slightly the likelihood of participation (though magnitude is very small). Older children under 16 have little association with participation. Other household composition variables are more difficult to interpret directly, but aim to control for the opportunity cost of market labour, and the potential presence of dependents or other wage earners.

Migrants reduce the likelihood of labour participation for both men and women (with strong statistical significance [1% level], but small mean marginal effects). Explanations include the possibility that migrants contribute materially to the household (reducing the need for work), or that they tend to be the members most disposed to participate, reducing the probability of participation for remaining residents (a selection effect). The significance of many of the province dummies points to the importance of location in determining market labour participation. Part of the substantial, negative association between "other" (non-OAP) government grants and participation is likely the result of this variable capturing the effect of disability through the state disability grant, and hence should not be interpreted as a pure grant income effect.[21]

4.3.5 Results: Employment

Panel 2 of Table 3 displays the results of employment regressions. Being in an OAP household reduces employment probability, but OAP interaction terms suggest that this is driven primarily by female OAP recipients. Magnitudes are substantial—in the pooled specification, the pension is associated with an 11% lower probability of employment, all else equal.

Employment probability rises with age, at a decreasing rate. The importance of education varies considerably by attainment level; higher education has the largest t-statistic and (positive) marginal effect of any regressor, while primary education is insignificant. Young children are positively related to the probability of male employment, and negatively related to that of

[21] The survey does not capture disability. Because this is an obviously important determinant of participation, I therefore include "other grants" as a control despite the fact that this probably conflates income and disability effects. Disability grant take-up has increased significantly in recent years, in part because of rising HIV/AIDS prevalence amongst the working age population (Nattrass 2003).

women. The more adult household members (across almost all categories) present in the household, the lower is the probability of employment. This might reflect a decline in the opportunity cost of leisure with other household wage income, or arise from the fact that larger households are more likely to be disadvantaged in the labour market in ways not captured by the other regressors. Employment probability also declines with the number of migrants. Being "isolated" from public transport has a positive assocation with employment. While this seems counter-intuitive, one explanation is that this captures above average employment amongst households that provide commercial farm labour.

4.4 Regression Analysis: Households

4.4.1 Motivation

> *...drawing a sharp line around a group of individuals and calling them a household does not make it so. There will be a variety of different kinds of ties within the household, and a variety of overlapping ties between individuals who are labelled in different households. Making sense of this is our challenge.* (Bardhan and Udry 1999)

> *They consider their real home as where they are coming from.* – Anonymous woman, Limpopo Province, referring to migrants. (Mturi et al. 2005)

Migration, household size, and household composition differences between pension receiving and non-receiving households are marked in the descriptive statistics of Section 4.2. In the regressions discussed above, these have been controlled for, but taken as exogenous determinants of labour outcomes. As outlined in Section 2, however, household composition and size may actively respond to pension income. In the survey, migrants are essentially treated as peripheral to households defined as groups of family members living in a single residence. Consequently, individual labour outcomes investigated in Table 3 are resident outcomes, partly dependent upon locationally-defined household characteristics and the number of migrants. But if non-residents are considered a part of the family, then treating their labour outcomes as fixed and evaluating only resident labour outcomes is rather uninformative (and, worse, potentially misleading). This is Posel et al.'s (2006) critique of Bertrand et al. (2003), at that time the only published paper addressing directly the OAP's labour supply effects.

Unfortunately, only limited information on migrants is provided by the LFS. Since there are no data on a number of controls used in the specifications of Section 4.3, these cannot straightforwardly be modified to include migrants by replacing the locational definition of the household with an extended one including non-residents (as Posel et al. (2006) do using their 1993 data). The only way to address the possibility of migrant labour responses to the OAP using the LFS is to move to a household-level analysis, adding migrants to measures of aggregate, household labour supply.

Household-level analysis has other attractions. Section 3 describes how the impact of the OAP on prime-age labour outcomes pre-supposes intrahousehold resource sharing, which may affect various subsets of working age individuals differently (for example, along gender or age lines). The individual level regressions performed above control for these factors, but there is a sense in which the effect of an income transfer on overall household labour supply and outcomes is an independently interesting question: how does *household* labour supply respond to an income transfer to elderly household members? A final, pragmatic, reason for shifting to

the household level is that the LFS has panel data potential, but only at the household level. The framework developed here thus also serves as a basis for Section 6, which exploits time variation for identification.

4.4.2 Methodology

Household-level specifications are first used to investigate whether the association between the OAP and migration displayed in the descriptive statistics of Table 2 is robust to the inclusion of other correlates. They show that it is. To determine the implication of this for the association between the OAP and household labour outcomes, household-level regressions under strict (resident-only) and expanded (residents and migrants) definitions of the household are compared. The same sequence of regression specifications (pooled, instrumental variable, and gender-disaggregated OAP measures) is used as in the individual regressions discussed above.

4.4.3 Outcomes examined

Household-level labour outcomes are nothing but aggregations of their constituent individuals' outcomes. I therefore remain faithful to the two measures of labour outcomes used thus far, labour force participation and employment. However, unlike at the individual level (where they take on binary values), these take on integer values at the household level. One way to deal with this is to retain the binary flavour of the individual level estimations by concentrating on minima (for example, the probability of at least one individual being employed). But this discards too much information. Instead, I express labour force participation, employment and migration as proportions:[22]

$$\begin{aligned}
\text{prime-age household labour participation} &= \frac{\text{participants (19–50)}}{\text{residents (19–50)}} \\
\text{prime-age household employment} &= \frac{\text{employed individuals (19–50)}}{\text{residents (19–50)}} \\
\text{proportion of migrants} &= \frac{\text{migrants}}{\text{residents (19–50)} + \text{migrants}}
\end{aligned}$$

4.4.4 Covariates

Aggregation to the household level entails the loss of one level of information in the regressions of Section 4.3—personal characteristics. I use the highest educational attainment of anyone in the household (primary, secondary or tertiary), including migrants, to control for the household's human capital endowment. I cannot control for age since migrant age is unobserved (but see Section 5).

The fact that migrant age is unobserved also makes it impossible to use the same set of household composition controls as in Section 4.3.[23] I therefore limit household composition controls in this section to:

[22] The appeal of these measures lies in their comparability with individual-level results, and logical expression of household-level labour outcomes (household participation and employment rates). While bounded dependent variables are not ideal, results using these specifications are extremely similar to those using raw numbers (including ordered probits [not shown]).

[23] Controls as per Section 4.3 could be used for resident-only specifications, but doing so would reduce comparability with regressions of migrant-inclusive household labour outcomes.

- the number of small children (aged 0 to 5);
- the number of older children (aged 6 to 18);
- total household size, including migrants.

Other regressors are as in Section 4.3.

4.4.5 Results: Migration

Table 4 reports results for migration. Positive, significant OAP–migrant associations obtain in the pooled specifications, and across all specifications when pensioners are women, but the OAP is not significant when pensioners are men.

In line with expectations that there is a general (though not exclusive, see Posel (2001)) tendency for migration to be a rural to urban phenomenon, location in a metropolitan area is associated with a reduced proportion of migrants, while location in provinces with the largest rural populations (especially the Eastern Cape and Kwazulu-Natal [KZN]) tends to have the strongest positive associations with migration. Dependent children, especially younger ones, are negatively associated with the proportion of adults who are away as migrants. But migration is increasing in total household size. Secondary school attainment in the household tends to correlate (weakly) with more migration, likely reflecting the superior ability of households with better educated members to penetrate (especially urban) labour markets. Small coefficient magnitudes, particularly for higher education, likely reflect some collinearity with location variables (better-educated households are likely to be in metropolitan areas and concentrated in provinces such as Gauteng), as well as a continuing pattern of low-skilled migrant labour (such as miners and domestic workers).

4.4.6 Results: Participation and Employment

The positive association between migration and the OAP makes it very likely that accounting for migrant labour when measuring household labour outcomes will affect results materially. Table 5 compares regressions of household labour force participation when migrants are excluded (panel 1) and included (panel 2).[24]

The signs and significance of most coefficients are robust to the specification of labour participation as excluding or including migrants. But there is a significant difference for OAP coefficient estimates. While the OAP is consistently negatively and significantly associated with labour force participation in the pooled OLS and 2SLS specifications of both panels, its magnitude is reduced universally.

Table 6 compares household-level employment under residential (panel 1) and migrant-inclusive (panel 2) definitions of employment.[25] The pattern for the OAP is similar to that of the participation regressions, but more pronounced. The OAP is associated with considerably lower residential household employment – -14% in the pooled OLS specification, with female pension receipt driving most of this (being associated with a 10% lower employment rate, twice the male pension at -5%). In residential specifications, furthermore, pension receipt is statistically significant across every gender combination. Total household employment paints a different picture. The magnitude of the OAP's employment effect for the pooled sample is -10% (around 4% weaker), male pension receipt has no statistically significant relationship with

[24] The specification of the latter is $\frac{\text{(participants (19–50) + migrants)}}{\text{(residents (19–50) + migrants)}}$.

[25] The specification of the latter is $\frac{\text{(employed residents (19–50) + migrants)}}{\text{(residents (19–50) + migrants)}}$.

employment under gender-disaggregation, while female pension receipt reduces both male and female employment, but only a little under half as much as under the residential definition.

4.4.7 Section Summary

Pension-receiving households are larger overall (though not in terms of working-age residents), contain less participating and employed residents, and contain more migrants, than their non-receiving counterparts. At the individual level, considering only residents, I evaluate the OAP's effects on the binary choice of broadly-defined labour force participation, and the binary outcome of employment. The OAP has significant, negative associations in most of these specifications, especially when the pensioner is a woman.

But the individual-level specifications consider only associations between the pension and the labour outcomes of resident prime-age family members. Investigating the significance of the pension when its possible effects on the labour outcomes of non-resident family members are incorporated necessitates a switch to the household-level. Under a residents-only definition of household labour participation and employment, these regressions agree broadly with those at the individual level. Including non-resident labour outcomes, however, significantly reduces the negative association of the pension with both participation and employment (and eliminates altogether the negative effect of male pension receipt in gender-specific employment specifications). Using recent data and a fresh modeling approach, the results of this section thus support Posel et al.'s (2006) claim that inference about the OAP's labour market effects is very sensitive to the way the household is defined. Survey data constraints tend to make a residential definition of the household more convenient than a broadly-defined one including non-residents (and the LFS is no exception). But this exaggerates the negative association between the OAP and labour supply, because there is a positive relationship between the pension and migration.

However, in contrast to Posel et al.'s (2006) results (based on a restricted sample from 1993 data), generally negative associations between pension receipt, labour participation and (particularly) employment hold even under an expanded definition of the household. Interpreting the finding that these negative, overall associations coexist with a positive relationship between the pension and migration is taken up in Section 8.

5 Non-parametric Discontinuity Evidence

The IV specifications of Section 4 produce OAP estimates that are close to their OLS counterparts, strengthening the case that the pension can be considered an exogenous income transfer once observable, systematic differences between pension-receiving and non-receiving households are controlled for. Nonetheless, analysis in Section 4 suffers from the classic evaluation problem—the inability to observe pension-receiving households in the absence of the pension. There are two particularly troubling sources of error.

5.1 The Age Problem

Pension receipt is correlated with the age of the oldest household members, and descriptive statistics demonstrate that the mean age of recipient households is higher. Consequently, one concern with the results of Section 4 is the possibility that pension coefficients conflate age and income effects (Bertrand et al. 2003). There are two obvious sources of direct age effects. First, households with older people may have systematically different age profiles, including that of

19 to 50 year-olds, across which labour outcomes are known to vary. Second, older people may affect the opportunity cost of work for younger family members by having care needs or (conversely) by assisting in the care of other dependents, notably children. If age effects are material, the numbers of age-eligible (or near age-eligible) household members are not valid instruments for the pension, and both the OLS and IV-based estimates of Section 4 are inconsistent.

To address the first possibility, age (and its square) are controlled for in the individual-level regressions of Section 4.3. These variables are highly significant. But the household-level regressions of Section 4.4 cannot account for the role of age across the spectrum of prime-age individuals, because migrant ages are unavailable. How significant is this omission? The difference in the mean age of resident 19–50 year-olds in non-OAP and OAP households is under 3 years, but to evaluate whether this masks important distributional differences, Figure 5 displays kernel estimates of the population age density, by population in and out of OAP households. Pension-receiving households have relatively fewer individuals aged 18 to 58, and this difference is quite marked for 40 to 50 year-olds. Part of this difference may be accounted for by the disproportionately higher number of migrants in OAP households, but only if enough migrants are in the 40–50 age range.

Recipient households, then, appear to have younger working age profiles. However, Figure 5 suggests that this is unlikely to generate downward bias in OAP estimates. Plotting predicted individual labour force participation rates from the pooled regression of Table 3, by age and OAP status, it displays the lower participation rate predicted throughout the prime-age range in OAP-receiving households. Figure 5 also displays mean predicted values from a regression including an age×OAP interaction term. The coefficient on this term is significant and negative (though small in magnitude); the difference in participation is slightly more marked for relatively older (35 and above) workers in this range (compatible with Bertrand et al.'s (2003) finding that the negative labour supply response to the pension is concentrated amongst older resident workers).[26] This suggests that household-level regressions might, if anything, underestimate average negative participation effects, if prime-age members of OAP households tend to be younger. The parametric evidence, then, is that potential workers in OAP households could well be younger, but there is no indication that this is the source of negative OAP associations in household-level regressions.[27]

Addressing the second source of direct age effects entails identifying separately the effect of the presence of the oldest members in the household and the effect of pension income. Collinearity between the age of the oldest individuals in the household and pension receipt (driven by the high take-up rate amongst age-eligible individuals) makes this a challenge.

5.2 The Endogenous Household Formation Problem

Sections 2 and 4 describe how household composition might respond to the pension. Section 4 deals explicitly with one potential such effect, migration. But another—that pension-receiving households attract non-participating or unemployed members—is not addressed beyond controlling for household size and composition. The general reason for this is that modeling household formation explicitly using labour force survey data is not feasible. The particular problem

[26] Interaction term effects are similar in all individual-level regressions (not shown).

[27] This argument would be misleading if there was reason to believe that migrants tended to be towards the bottom of the prime-age range (recall that individual-level regressions exclude migrants). To the contrary, however, there is evidence (albeit not contemporaneous) that migrants tend to be a little older within this age range (Posel 2001).

for inference on the OAP's effects is that the age of the oldest household member can be expected to be a key determinant of household composition (for example, a woman old enough to be a grandmother is in some sense the "cause" of a three-generation household comprising her children and children's children), and this may in turn drive labour outcomes. But, again, the collinearity of pension receipt with oldest member age makes partialling out this effect problematic.

5.3 A Solution: Exploiting the Age-Eligibility Discontinuity

Figure 3 shows that the age eligibility rule plays a pivotal role in determining pension receipt. This discontinuity in the likelihood of receiving the OAP, occuring as men and women cross their respective age eligibility thresholds, provides an alternative way of examining the pension's effects.[28] The aim is to assess the importance of a potential age trend effect for previous results and undertake causal inference of the OAP's impact.

5.3.1 Methodology

To examine age-of-oldest trends and any OAP-associated discontinuities, it is appealing to impose minimal constraints on the data and observe how they behave around the discontinuity point, thus avoiding spurious results caused by model misspecification. For example, age trend effects may involve several slope changes (perhaps as the mix of dependent minor ages changes, or the elderly themselves develop care needs).

Since they base inference on smoothed data close to the age threshold, nonparametric methods demand a substantial sample size to yield adequate precision. Consequently, I pool waves to construct the largest possible sample obtainable from the LF surveys (that meets data requirements, notably migrant indicators). This pooled sample comprises the full 2002 and 2004 September LFS waves (which are independently-drawn samples), as well as the refreshed portion of the 2003 September wave (about 20% of sampled households).

As Figure 3 demonstrates, age is a looser indicator of OAP receipt for men than women. Since men are older when they qualify formally for the pension, administrators may be more inclined to bend the rules. Additionally, most men have younger spouses; as women turn 60, households whose oldest member is male register a switch to OAP status which may look like poor age-criterion enforcement for men under 65, but actually reflects the legitimate take-up of their age-eligible partners. Consequently, I restrict analysis in this section to the subsample of households in which the oldest member is a woman is aged 51 to 79, or the oldest man is under 65. This essentially eliminates any ambiguity over who in the household is responsible for a switch to pension status, and results in an assessment of the effects of first pension receipt only.[29] Of the total, pooled sample, 22% of all households, and 78% of households containing women over 50, fall into this category. In all, there are 11,142 households, with an average of 398 households at each oldest-woman age. As long as any underlying structural relationships

[28] Several existing papers adopt variants of this identification strategy (see Section 2). Duflo (2000) (child development outcomes using 1993 data) and Edmonds et al. (2005) (household formation using 1996 census data) are nonparametric implementations. Ranchhod's (2006) parametric (IV probit) evaluation of elderly labour supply effects is similar in spirit to the present method.

[29] A focus on female pensioners is supported by the results of Section 4, and those in the existing literature, which tend to suggest that female pension receipt has stronger effects. An upper limit of 79 is chosen to generate the longest possible OAP-eligible trend it is feasible to examine given sample sizes.

between the pension and evaluated outcomes are constant over the 2002 to 2004 period, this pooled sample should support consistent inference.

The causal effect of pension receipt is estimated as the discontinuity in the variable of interest at the take-up threshold, female pension-eligibility age (60). The premise is that in the absence of the OAP, the age of the oldest woman might impact the variable of interest, but that it would do so continuously, making any jump away from the trend at 60 attributable to the pension. Identification based on such a discontinuity should in principle be purged of potential household age profile and age-of-oldest effects (or, indeed, any systematic, unobserved heterogeneity that does not happen to also spike at the threshold). Conceptually, this "discontinuity design" approach is similar to the use of eligibility threshold age as an instrumental variable for the OAP. We rely on the notion that households nearby, but on opposite sides of, eligibility age are similar, except for pension status.

Examination is based on local linear regressions using triangle kernels, with bandwidths selected using the rule of thumb (RoT) method offered by Stata 10 (and checked by visual inspection). OAP impact estimates are local Wald estimates of the ratio of the jumps in the dependent variable of interest and the probability of receiving the OAP at female pension eligibility age. Such a "fuzzy" regression discontinuity design is appropriate given that pension take-up is not predicted perfectly by the age threshold, since it adjusts for less than full assignment to OAP "treatment" at 60. Estimates' standard errors are obtained by bootstrapping (with 1000 replications).[30]

Finite sample bias is a possible concern given the limited sample at hand. Consequently, I also consider semi-parametric specifications. For each observation (i), predicted values ($\hat{y}_i$) generated from the parametric specifications of Section 4 are subtracted from actual dependent outcome values (y_i), so that the local linear regression model becomes:

$$y_i - \hat{y}_i \quad = \quad f(\text{oldest female age}) + \epsilon_i \tag{15}$$

where $f(\cdot)$ is the relevant local linear regression estimate of the oldest-female-age–outcome association, and ϵ is a random error. This implementation, then, considers the relationship of interest for each observation, net of the effect of observable correlates (assumed to enter additively). This approach corresponds conceptually to that of Section 4.4, with the ("flexible") addition of a trend age-of-oldest-member effect (there an omitted variable), and OAP identification based on any trend discontinuity at 60.

5.3.2 Outcomes Examined

A non-parametric approach is well-suited to examining whether labour outcome variables display age-of-oldest trend effects, and whether the pension induces household composition changes, which may impact the integrity of labour effect estimates. Consequently, OAP impacts on overall household size (including migrant members), small children (under 6), older children and adolescents (aged 6 to 18), and prime-age members (19 to 50) are examined. Semi-parametric models for these outcomes remove household location (provincial, and distance from public transport), and non-OAP public transfer receipt, partial correlations.

Labour outcomes examined are those of Section 4.4, including migrants: the proportion

[30] Implementation draws on Imbens and Lemieux (2007) and the "rd" Stata package (Nichols 2007).

of prime-age members who are migrants, labour participants and employed, disaggregated by gender.[31]

5.3.3 Results

Figure 6 illustrates the OAP assignment probability calculation (which generates the Wald estimate denominator). Figures 7 to 10 display smoothed (local linear regression) estimates of fully non-parametric "age of oldest"–outcome relationships, allowing for a discontinuity at 60, and using preferred (rule of thumb) bandwidths. For the raw data, see Appendix A (which displays means and 95% confidence intervals). Coefficient estimates of OAP impacts and their bootstrapped standard errors are presented in Table 7. Non- and semi-parametric estimates (denoted NP and SP, respectively) are presented alongside, by the preferred RoT bandwidth, and with this bandwidth halved and doubled to indicate robustness to the mechanics of the smoothing process.

Mean household size trends upwards (very weakly) with oldest-female age. Other outcomes examined display little evidence of consistent trends. There is a slight, though apparently systematic, decline in the number of young children for households in which the oldest women are over 70. If anything, we might expect this to liberate care-givers to supply market labour, so this seems unlikely to be a source of downward bias in other OAP estimates.

The OAP assignment threshold has no statistically significant impact on total household size, the number of older children and adolescents, or the number of prime-age members. There are marked differences in non- and semi-parametric coefficients for most household composition measures; a plausible explanation is that provincial location matters both for pension take-up and mean household size (through location-specific, cultural family size and living arrangement norms, and variation in pension administration). But all conventional confidence intervals include zero. However, there is a robust association between the OAP and more small children (5 and under).

Labour-related variables also show little sensitivity to the discontinuity. There are no bandwidth- and specification-robust responses to the OAP threshold, except for the female labour participation rate, which is consistently, significantly reduced across specifications.

5.4 Discussion

Results do not support the notion that households containing pensioners experience an influx of working-age individuals.[32] Rather, the reason recipient households tend to be larger than non-recipient households is more likely that their age profiles are different—gradual, demographically-driven change, rather than the OAP. This has positive implications for the integrity of the specifications of Section 4, which account for migrant responses, but not the possibility that individuals predisposed to having poor labour market outcomes select into pension-receiving households.

Incorporating migrant labour supply, and in contrast to the results of Section 4, discontinuity-based estimates suggest that the OAP is participation and employment neutral for the overall sample, with discernable effects on only female participation. Inspecting the raw data (Appendix

[31] Household- rather than individual-level analysis is motivated by the need for migrant-inclusive controls in semi-parametric evaluations.

[32] Note that this compares well with the results of Edmonds et al. (2005), using a much larger sample from the 1996 national census, which allows many composition categories to be examined.

A) suggests that local Wald estimates obtain from a genuine step-change in female participation at the threshold. However, a number of factors qualify these discontinuity-based results.

Identification is based on a comparison of households in which women are close to eligibility age, so estimates cannot necessarily be generalised to households with considerably younger, or older, oldest female members. That is, the identifying assumption that households on either side of the threshold are similar may not be compelling for a considerable proportion of total eligible and ineligible households. Even if external validity along this dimension is adequate, only the impact of first female pension receipt has been examined, using a sample that is not fully reflective of the ultimate population of interest: all pension-receiving households, including those with male-only pensioners.

Pension receipt is highly predictable (household members are likely to know when a prospective recipient will become age-eligible, and recipients are not likely to delay acquiring the pension once they become age-eligible). This could result in behavioural adjustment prior to age-eligibility. In addition, households may take time to adjust to pension income, resulting in significant lags before the pension's effects become visible. Either case will weaken the link between observed OAP assignment at 60 and effects of interest, compromising discontinuity-based identification. Evidence that households are liquidity constrained (Edmonds 2006) may seem to mitigate the risk of anticipation effects. But the raw outcome data (Appendix A) is at least suggestive of step-changes in a number of key variables (notably female migration) two to three years prior to sixty. Since there is no corresponding jump in OAP assignment probability (see Figure 14) at these ages, this is not likely to reflect significant age criterion evasion. Anticipation effects cannot easily be accounted for in a discontinuity framework.

The stochastic nature of observed pension receipt around eligibility age introduces other risks. If women below eligibility age are able to claim successfully that they are 60 and consequently draw OAP income, then the assumption that recipients and non-recipients are similar around the acquisition threshold except for the OAP may be questionable. For example, households containing women who *claim to be* 60 may be behaviourally different to those containing women who report that they are 59 (more motivated, inventive, informed, or socially connected), or more desperate for pension income (perhaps because of inferior *ex ante* labour outcomes). The direction of the bias induced by such "manipulation of the forcing variable" (Imbens and Lemieux 2007) is unclear, *a priori*. Following Imbens and Lemieux's (2007) suggestion, Figure 11 plots frequencies of the age of the oldest women in households; a discontinuity in the density would support a suspicion that there is manipulation (though this is detectable only if women mis-report their ages to surveyors as well as pension administrators). There is indeed a spike in the number of women aged 60 compared to surrounding ages. However, there are similar jumps in the data at 52 and 62, where there is no reason to think that women are incentivised to misreport their ages. And, to the extent that women in their late 50s are claiming to be 60, this may also merely be due to rounding which, if also affecting pension receipt, seems unlikely to be associated with a selection problem and, if not affecting pension receipt, is compensated for by the use of a "fuzzy" discontinuity design that treats assignment probability at reported ages as imperfect.

Most importantly, the size of the sample is probably at or below the minimum required for compelling nonparametric inference, particularly since OAP assignment at the age threshold is imperfect. Using female labour participation as an example, Figure 12 tests for vulnerability to type 1 errors by imagining OAP assignment at 55 and 65; there is no indication that this is behind the statistically significant female labour participation result. Nonetheless, given the limited

sample size, the data may simply be too noisy for identification by non-parametric discontinuity design. Several outcome variables, notably the employment and participation variables which are of central interest, appear rather choppy across older women ages (figures in Appendix A).

The above challenges for discontinuity-based inference using the LFS are severe enough to significantly qualify results. As such, the contribution of these estimates is essentially two-fold. First, there is no evidence that there are significant age-of-oldest trends which may confound parametric estimates.[33] Second, while we cannot be confident that discontinuity estimates effectively capture holistically the full behavioural effects of the OAP, there is no evidence in the LF surveys of dramatic prime-age labour supply responses to the oldest women in the household becoming age-eligible for the OAP.

A final source of identification using the LF surveys of the pension's effects—variation across time—remains, to which I now turn.

6 Longitudinal Evidence

Although designed as a rotating panel, the LF surveys have problems which limit their longitudinal analysis capabilities. Crucially, although household identifier codes are consistent across waves, individual identifiers are not. Consequently, a panel can be constructed at only the household level. While limiting, this is not a fatal flaw since, as described in Section 4, household-level evaluation is necessary in any case for the incorporation of migrant labour, and evaluating aggregate changes in the labour outcomes of prime-age household members is of direct interest given that the intervention is mediated through other household members.

Migrant data collection in the LFS began only in 2002, and an entirely new sample was surveyed in 2004. With preceding analysis having pointed to the fundamental importance of migrants, this means that just two waves (2002 and 2003), are available.[34] Since these waves are in consecutive years, anticipation effects and incomplete adjustment pose a risk. In particular, with a maximum of only twelve months (and potentially as little as one month) to adjust to the pension for a given change in pension status in the data, incomplete adjustment at the time of the survey is a possible, serious limitation. Nonetheless, panel techniques provide an opportunity to add to the evidence from previous sections, and provide firmer grounds for causal interpretations of statistical associations between the pension and variables of interest.

I construct a balanced, household level panel, comprising observations on households in 2002 and 2003, for a total of 12,212 unique households, observed twice. Table 8 displays the frequency of observations on households by OAP status; OAP gains and losses are common enough to make time a feasible source of variation.

To maintain comparability with previous results, the same labour outcome measures are examined: migrant-inclusive household labour force participation and employment.

6.1 Difference in Differences

First-differencing the household-level specifications of Section 4.4 removes all time-invariant heterogenity. However, analysis in first differences requires some alteration of the regressors

[33] This claim can be made with some confidence, since it is based on both a non-parametric examination of bivariate relationships, and a more restrictive semi-parametric implementation with covariate controls (results not shown, but results are very similar).

[34] The alternative is to ignore migrants, expanding the set of available waves to three (2001–2003). But this is likely to paint a misleading picture of the OAP's effects unless selection into non-migration is very carefully addressed.

used in Section 4.4's regressions in levels. One reason for including provincial location is to capture regional variation in involuntary unemployment. This time-varying factor is nested in a time-invariant location variable (province). However, changes in local unemployment rates—stemming, for example, from exogenous changes in labour demand coupled with wage rigidity—could drive observed variation in household employment rates across time, and are potentially related to OAP status given regional administration differences. Thus, regressions in first differences control for the provincial, broad unemployment rate (calculated from the relevant LFS sample); changes in this rate between 2002 and 2003 range from -2.1% (Gauteng) to 3.2% (Northern Cape).

Table 9 reports labour participation and employment regression results. Considering participation (panel 1), the OAP has a statistically significant, negative effect of 3% on participation in the aggregate. Disaggregations suggest that male pension receipt is insignificant, while female pension receipt is statistically significant in (only) male participation (-4%, at the 1% level, all else equal).

Turning to other variables, provincial unemployment rate changes have significant effects on changes in participation, driven by negative associations with female (but not male) participation. A change in the number of small children (5 and under) has a modest, negative impact on labour force participation, while changes in the number older children (6 to 15) have a positive impact for men (perhaps because financial considerations dominate for these children, and not for younger ones, in the tug of war between needing to earn income to support children and having sufficient time to look after them). A change in non-pension government grants receipt affects participation materially negatively (again, this is likely to be caused at least partly by the labour market withdrawal of disability grant qualifiers).

For employment (panel 2), a change in pension receipt is a statistically significant contributor to a decline in employment in the pooled sample. Male pension receipt, however, is consistently insignificant; the effect of the pension in the aggregate is thus in large part a product of the influence of female pension receipt. Generalising, then, female pension receipt appears to be a significant driver of prime-age family member labour outcomes, while the male pension does not, when identified exclusively by time variation.

Changes in the number of young children affect female employment negatively (in contrast to no relationship with participation). Women who stop working to care for children may not consider themselves permanently out of the labour market, so that their reduced employment is not reflected as reduced (broadly-defined) participation in the data. The negative coefficient on a change in maximum educational attainment in the household is likely to reflect high youth unemployment, as older (19 and above) first-time labour force entrants—whose attainment is typically higher than that of their parents, and who account for the bulk of educational attainment change across the samples—struggle to find employment.

6.2 Additional Levels Controls

The above regressions in pure first-differences are not able to account for much of the observed variation in labour outcomes (adjusted R-squareds and joint covariate significance tests are poor). A richer, alternative specification includes controls in levels for systematic differences between OAP recipient ("treatment") and non-recipient ("control") households, taking the form:

$$y_{ht} = \alpha + x'_{ht}\beta_1 + z'_h\beta_2 + \delta_1 D_h + \delta_2 T + \delta_3 (D_h \times T) + \epsilon_{ht}$$

where h is a household, t is a period dummy, x is a vector of time-varying household controls, z is a vector of state fixed effects, and T is a dummy variable taking on a value of 1 for 2003 and 0 otherwise (i.e. a year fixed effect). D indicates OAP treatment group membership, taking on a value of 0 for households which do not report receiving the OAP in either period, and 1 for households which begin receiving OAP income between the 2002 and 2003 surveys. Identification, then, is based on a comparison between non-OAP households, and first-time OAP recipient households (whether pensioners are male or female), in contrast to the more general time variation (in overall household OAP status, and numbers of male and female recipients, including losses) exploited by the analysis of Section 6.1. The OAP "treatment" effect is given by δ_3.

Regressions of this form are again run for labour force participation and employment. As these are specified in levels, it is possible to use the same covariates as in the cross-section regressions of Section 4.4, with the exception of the metro location dummy (which is not available in these waves). Estimations by OAP recipient gender are not undertaken, given the likely imprecision of results from subdividing a treatment group that is already rather small, both in absolute terms and relative to the control group (separate regressions are, however, run for working age men and women).

Table 10 reports the results of labour force participation and employment regressions. OAP treatment has no statistically significant bearing on the proportion of labour force participants, but does reduce the proportion of prime-age household members (including migrants) who are employed. Prime-age gender-disaggregation indicates the magnitude of the effect for women is large (-11%), while the coefficient on male employment narrowly misses statistical significance at the conventional, 10% cut-off (its p-value is 0.13).

6.3 Discussion

With only two waves available, the amount of variation across time in the data is clearly limited. Anticipation effects can be ruled out only if households are myopic, forward-looking but nonetheless find it optimal not to alter behaviour before pension receipt, or severely liquidity-constrained. In the discontinuity analysis (Section 5), there are some indications of anticipation effects, but identification in the present section is based on switches in actual OAP status (not discontinuities at eligibility age) and so may not be similarly affected. Incomplete adjustment is perhaps more difficult to dismiss, particularly if liquidity constraints make anticipatory adjustment impossible. This may be particularly true of migrant labour—relocation is costly and complicated, and prospective migrants may need more time to make arrangements to depart in response to pension income than is observed in consecutive, annual surveys. It is also possible that prospective migrants temporarily drop out of employment (though not necessarily self-reported labour force participation) in order to relocate. If this were the case, incomplete adjustment would bias the estimated, employment effect downwards.

An additional concern is the parallel trend assumption underpinning estimation. This assumption is at its most convincing when the treatment and control groups are quite similar prior to treatment (Ravallion 2005). The extent to which this is true in the current case is questionable; while comparative descriptive statistics for the treatment and control groups are not

shown, previous descriptive statistics (Table 1), suggest that recipient households are different to non-recipients in some aspects.

More generally, Kingdon and Knight (2005) note that South African "labour market data display some inexplicable large fluctuations" (p.2) across years, and suggest that caution needs to be exercised in making "categorical statements about labour market changes over time" (*ibid.*). The differencing approach used here, however, ought to address concerns about idiosyncratic differences between LFS waves, if it is accepted that these are likely to affect readings for all households (OAP recipient or not) in the same way.

The contribution of the longitudinal analysis, then, is briefly as follows: the significant OAP associations found in Section 4 do not have intrinsic causal interpretations, and may arise from unaccounted-for heterogeneity correlated with both pension receipt and labour outcomes. Section 5 seeks to identify pension effects using eligibility threshold discontinuities, and is particularly useful for examining the role of any age trends, but has major limitations for causal inference of average OAP effects. By removing time-invariant heterogeneity, differencing contributes by providing a strong case for causality from the OAP to outcomes of interest. Caveats, however, include anticipation and incomplete adjustment effects, and the validity of the parallel trend assumption. Nevertheless, results bolster those in Section 4, suggesting that there are tangible, negative labour supply responses to the pension on average, concentrated in employment probability.

7 Gender

Gender, as noted in Section 2, is a central theme of the OAP literature. In particular, pensions drawn by women are often found to have larger effects than those received by men. Household expenditure allocations differ according to whether resident pensioners are men or women (Case and Deaton 1998); grandmothers' pensions boost child development indicators much more significantly than grandfathers' (Duflo 2000); female pension receipt reduces prime-age labour supply more than male (Bertrand et al. 2003); positive associations between migration and pension income are most pronounced when pensioners are female (Posel et al. 2006). The empirical results presented above are no exception to the pattern. This section examines why.

7.1 More Female Pensioners?

Households are much more likely to receive the pension through an age-eligible woman than a man. The first reason for this is programme design. Women become eligible for the pension 5 years earlier than men so, with age enforcement, female pensions account for all pensions in households whose oldest member is younger than 65 (25% of all pension-receiving households). The second (and most important) reason is demography. Women's life expectancies are higher than men's, so as households age, fewer households contain elderly men. Men comprise 56% of the oldest members of households whose oldest member is under 55, dropping to 48% for households whose oldest member is 55 to 65 years old, and 33% for households with 70 year-olds or above. The combination of the lower female age threshold, and diverging mortality rates by gender, means that 80% of pension-receiving households contain age-eligible females, compared to 29% containing age-eligible males.[35]

[35] All figures from the 2004 LFS.

In consequence, estimator precision is likely to be higher for female pensions than male, since there are more observations of the former. While this will tend to increase the standard errors of male pension coefficients, it will not alter point estimates. Since male point estimates are consistently smaller than female pension estimates, this cannot be the dominant cause of the gender differential, which is as much about coefficient magnitude as statistical significance.

Another consequence, however, is that women account for first-time pension receipt far more than men. Of the 569 switches to OAP receipt observed in the LFS panel constructed for Section 6, 63% are associated with women becoming age-eligible, and 23% with men becoming age-eligible. If pension income has diminishing marginal effects, first pension receipt will have a bigger influence than subsequent additions in pension income, and much of this is associated with women. Relatedly, women are more likely to to be the sole pension recipients in households than men, again reducing the impact of male pension receipt if there are diminishing marginal effects. I evaluate the importance of this possible cause of weaker male pension significance informally by re-running the regressions of Sections 4 and 6 on a restricted sample excluding households with age-eligible females (not shown). These do indeed tend to report stronger male pension significance, but significance in terms of conventional level cut-offs remains qualitatively similar to displayed results.

7.2 Altruism and Bargaining Power Differences

The fact that gender matters is a blow to the plausibility of the unitary model of household decision-making for pension-receiving households because that model predicts perfect income pooling. To take a particularly pertinent case, the finding of significantly different coefficients on pension income by gender in estimations of individual participation by Bertrand et al. (2003) can be interpreted as a rejection of the conditions for optimal labour supply under an aggregate, household utility function (outlined in Section 3.2.1). The significance of gender has thus led to a consensus in the empirical OAP literature that the unitary household model does not describe pension-receiving households.

Section 3.3 also describes how, in collective household-decision models, pensioner characteristics could drive the pension's effects, through differences in ϕ, the sharing rule. Gender is highlighted as a potential source of variation in sharing rules. A natural interpretation of the empirical finding of gender-differentiated pension effects is therefore that some kind of collective decision-making model (not the unitary model) is appropriate, and that differences in altruism or bargaining power between male and female pensioners are at work. This is firmly in line with the broader consensus that the unitary model is a frequently inapplicable model of household decision-making, and that cash transfers tagged to women tend to be more fungible, and spent in more "desirable" ways.[36]

7.3 The Annuity Value of the Pension

The standard household decision-making theories reviewed briefly in Section 3 are static—labour supply decisions are made on a period-by-period basis. While this is a straightforward and illuminating way to model labour supply, it ignores the possibility that individuals and households plan ahead; if pension-receiving households optimise within a time period, why should they not optimise across time too?

[36] This is an influential view. See, for example, Department for International Development (2005).

Forward-looking behaviour with respect to the pension introduces a difference between male and female pension receipt that has not been considered by the literature. Men and women receive the same monthly pension payments, P. But the total stream of pension income that men and women can expect on average—$\sum_{t=1}^{T} P_t$, where t is a time period—is different. The typical woman begins receiving the pension 5 years earlier than the typical man, and lives longer. These factors have been noted as explanations for the fact that there are more female than male pensioners, but they also mean that if the pension is thought of as an annuity (a stream of fixed payments over a period of time), the average total value of the female pension is higher than the male pension.

How much higher? Figure 13, a population pyramid by gender for the population over 50 in the 2004 LFS, demonstrates the relationship between gender and ageing. Survival rate differences are clearly substantial, with more women in all pensionable age categories. Best mortality rate estimates, based on the most recent (2001) National Census, indicate that black life expectancy at 60 is 15 years for men and 18 years for women.[37] This implies that, at their respective eligibility ages, female pensioners can expect to receive the OAP for 18 years, and males for 10 years. The consequences of this expected duration difference for the expected present value of lifetime pension receipt can be quantified using the standard formula for the present value of an ordinary annuity:

$$P \times \frac{1}{r}\left(1 - \frac{1}{(1+r)^T}\right) \tag{16}$$

where r is the discount rate and T the number of time periods. Using the above duration expectancies, abstracting from inflation and changes in the real value of the pension ($P = 740 \times 12$, its annualised monthly value in 2004, the key year of analysis), and using a discount rate of 7%, the approximate expected present value of the pension is 62,400 rand for men and 89,300 rand for women.[38] The calculation is rough (treating real pension value as certain and fixed across time, using the real interest rate to measure subjective time discounting, and substituting $E(T)$ for T), but illustrates the magnitude of the 44% difference in rand terms.

If individuals and households adopt a multiple-period approach to optimal labour supply choice, this could have significant consequences for the predicted effect of the pension. For an illustrative example[39], assume temporally separable utility (so that total utility is the aggregation across time of independent instantaneous utilities), and the ability to smooth consumption over time by saving at constant interest rate, r. Following the consensus view in the literature that a collective household decision-making model is appropriate, revert to the simple model of Section 3.3, with a household comprising a prime-age individual y and pensioner a. Across t time periods spanning periods 1 to T, y's intertemporal optimisation problem is:[40]

[37] Estimates provided by Professor Rob Dorrington of the Centre for Actuarial Research, University of Cape Town. See also Dorrington, Moultrie and Timæus (2004).

[38] The discount rate is a conservative estimate based on the nominal prime lending rate (10.5%) less the consumer price inflation rate (3.9%) in 2004.

[39] Following Cahuc and Zylberberg's (2001) exposition of intertemporal labour choice.

[40] With the budget constraint obtained by iterating an accumulation equation for assets, A: $A_{ty} = (1+r)A_{t-1,y} + w_{ty}(1-L_{ty}) - C_{ty} + \phi_{ty}$.

$$\underset{C_y, L_y, t}{\text{Max}} \sum_{t=1}^{T} U_{ty}(C_{ty}, L_{ty}) \text{ subject to} \tag{17}$$

$$\sum_{t=1}^{T} \left[(1+r)^{-t}(C_{ty} + w_{ty}L_{ty})\right] = \sum_{t=1}^{T} \left[(1+r)^{-t}(w_t + \phi_{ty})\right] \tag{18}$$

The RHS of the above "global" budget constraint is the discounted present value of all income across time, including ϕ_y—y's share of pension income. It is a standard result that, if leisure is a normal good, lifetime labour supply declines with a rise in lifetime wealth, a component of which is pension income. Specifically for our purposes, optimal labour supply will respond (through the budget constraint) to:

$$\sum_{t=1}^{T} \left[(1+r)^{-t}\phi_{ty}\right] \tag{19}$$

This is just the present value of some share ϕ_y of the total pension, such that $\sum_{t=1}^{T} P_t = \sum_{t=1}^{T} \left(\phi_{ty} + \phi_{ta}\right)$ (the lifetime equivalent of $P = \phi_{ty} + \phi_{ta}$ from Section 3.3). But the annuity calculation above has shown that this is higher on average for the female pension than the male. Thus, for exactly the same sharing rule over male and female pension income, the higher annuity value of the female pension will generate larger labour supply effects than the male pension.

An analogous exposition would demonstrate the possibility of gender-differentiated pension effects in a unitary household model. That is, such effects could also arise from maximisation of an aggregate household utility function, resulting in perfect income pooling, when households are forward-looking with respect to pension income and labour supply decisions.

Annuity value differences might also lie behind differentiated retained income and job search impacts when these are forward-looking.

7.4 Section Summary

The finding that male and female pension effects are different has strong implications if it is accepted that it does not arise for purely econometric reasons (in the sense that inference about the male pension is clouded by the more pervasive presence of the female pension in the data). Specifically, the result has been interpreted as supportive of collective decision-making models in which sharing rules differ by gender. This section suggests an alternative. It is plausible that households are forward-looking, and that there is (rough) knowledge about life expectancy. Given this, the simple intertemporal analogues of static individual and household labour supply optimisation models provide a *prima facie* reason to expect different pension effects by recipient gender, without recourse to differences in sharing rules, or even the need to reject the unitary household model.

Of course, the extent of forward-lookingness in the context of poverty, liquidity constraints and uncertainty is open to debate. Doubts about the applicability of the unitary household-model are now near-universal, and the collective approach to modeling household decision-making is evidently a fruitful one. In this context, there are good reasons to think that bargaining power (and possibly altruism) does vary by gender, both generally and with specific

respect to OAP households.[41] Perhaps most importantly, the above discussion addresses only the different effects of the pension by recipient gender, when different effects by the gender of the ultimate subjects of interest—prime-age individuals—are also found. These may also arise for reasons unrelated to the determination of ϕ, but do not provide any support for the notion that the key factor driving gender effects is the difference in the pension's annuity value.

All of this said, the fact that the expected annuity value of the pension differs by around 44% by recipient gender is striking. This qualifies the literature's interpretation of gender-differentiated OAP effects as constituting an unequivocal rejection of the income pooling hypothesis.

8 Conclusions

> *The recipients of these grants end up supporting far more people than the grants were intended for.* – Social Development Minister Zola Skweyiya (on pensions and other state welfare grants), September 2005
>
> *More welfare grants would cause some to stop working . . . and so?* – Article headline, Business Day newspaper, February 2006

Viewed as an old-age support cash transfer, the OAP has significant unintended consequences. In particular, this paper finds that it is associated with statistically significant declines in labour force participation and employment probabilities, amongst prime-age individuals in pension-receiving households. These effects are much larger and more robust for employment than broadly-defined participation, and occur mainly when pension recipients are women. Migration probability, on the other hand, is positively affected by the pension. In general, the labour outcomes of both prime-age men and women are responsive, but the magnitudes of these coefficients are not fully consistent across specifications (that is, while female pension receipt is unambiguously more important than male receipt, a similarly clear pattern about the distribution of pension effects by the gender of prime-age household members does not emerge). How should these findings be interpreted? What do they imply?

8.1 The Household

8.1.1 Household Decision-Making

The most basic observation is that pension income affects the outcomes of non-recipients. This accords with strong, existing economic and sociological evidence of pension-sharing in South Africa, and with the general prior that resources are shared within households. The responsiveness of non-targeted household members to cash transfers makes it clear that understanding intrahousehold resource allocation is vital if the consequences and efficacy of policy (especially the "who benefits?" question) are to be evaluated holistically in South Africa.

Gender-differentiated pension effects have been interpreted as a rejection of unitary household decision-making, instead indicating that collective decision-making with gender differences in altruism or bargaining power is the appropriate paradigm. Section 7 casts some doubt on the

[41] It seems unlikely, for example, that the disproportionately strong effect of female pension income on child development outcomes found by Duflo (2000) arises solely from households' smoothing of female *versus* male annuity income.

use of gender-differentiated labour supply responses to the pension to make this argument, at least without further research.

8.1.2 Households in Survey Analysis

Contra Klasen and Woolard (2000), but broadly in line with Maitra and Ray (2003b) and Edmonds et al. (2005), I find no significant evidence that pension-receiving households attract an influx of working age individuals. Rather, the clear household composition response to public transfer income is the migration of residents who, in the view of survey respondents, remain household members. Defining the household broadly to cater for migrant labour as an element of aggregate, family labour supply, is therefore critical. More generally, migration responses indicate that the "household" is a more fragile construct than often supposed, and that policy may have the unintended consequence of affecting household composition. Survey-based analysis is sensitive to the definition of the household, and needs to handle the possibility of endogenous household formation, and changing household size and structure over time, with care.

8.2 Welfare Effects

Evidence that the pension induces labour supply responses does not imply that it imposes efficiency costs by distorting labour choices; optimisation demands variation in labour choice as budget constraints and opportunity costs change, and deadweight losses arise only if transfers drive an artificial wedge between marginal rates of substitution between choice variables (which lump sum transfers do not do). Indeed, basic optimal income tax theory suggests that with perfect information, lump-sum transfers from high to low productivity, low income households maximise social welfare without imposing efficiency costs. Without claiming that the OAP is a pure lump sum transfer (it is imperfectly targeted, and funded out of general taxation, subject to the usual distortions), the fact is that labour supply reducations are not an indication that the OAP is inimical to maximising social welfare.

If policymakers' aim is to maximise pensioner welfare, the fact that the labour supply of working age household members is affected by the pension is clearly of immediate concern (since it implies that non-pensioners capture part of the grant, reducing the benefit of the income transfer to pensioners, unless they are perfectly altruistic). If the OAP is intended to provide more general income support to the poor, the normative implications of negative labour outcome effects depend upon policymakers' goals. Given the lack of evidence that pension-receiving households attract indigent relatives, it is safe to conclude that individuals in households receiving the OAP are unambiguously better off. Pensioners receive an income transfer that, for most, is effectively conditional on only their age; thus, except if pension income crowds out more than 100% of their pre-pension, intrahousehold resource allocation (surely unlikely), they must be better off. For prime-age individuals, all else equal, nothing about additional non-wage household income prejudices their ability to participate and find employment. The fact that employment (and perhaps participation) probabilities show some declines, therefore, suggests that the pension enables a switch out of undesirable states (costly job search, unpleasant employment).

One competing, non-welfarist goal might be to maximise household consumption. If policymakers' are "consumptionist" in this way, the negative labour responses found here reduce

the efficacy of the OAP. How much? The following calculations are indicative:[42]

- Parametric cross-section and longitudinal estimates suggest a decline in total household labour participation (including migration) of perhaps 3% with the pension. With 2.16 prime-age individuals on average in OAP-receiving households, this implies an average reduction in participants of 0.06. Prime-age employment probability, conditional on participation, in the total sample is 0.53, and monthly earnings for the employed average 1,833.96 rand so the expected loss in household income is 63 rand, or 8% of pension income (based on 1.1 pensioners in the average OAP household, and maximum monthly pension payouts of 740 rand per month).
- Parametric cross-section and longitudinal estimates suggest a decline in total household prime-age employment (including migration) of around 8%. With other figures as above, this implies an expected total earnings loss of 318 rand, or 39% of total pension income.

On average, the OAP thus crowds out a non-trivial amount of private income; to a consumption-maximising policymaker, the labour supply effects of the OAP reduce its efficacy by close to two-fifths at the mean. But it is far from clear that consumption-maximisation is a compelling public policy goal.

8.3 Labour Supply Effects

Increasing employment is perhaps the most pressing policy concern in South Africa. This is compatible with a welfare maximisation paradigm if the positive effects of high employment increase long-run social welfare under a more sophisticated measure than a simple, static trade-off between consumption and leisure. How inimical are the OAP effects found here to employment-maximisation? Elasticity estimates suggest the strength of the OAP's labour supply effects, though LFS data constraints make the following calculations indicative only. The (point) prime-age labour force participation and conditional employment elasticities, η_p and η_e, of pension income in a representative household are:

$$\begin{aligned}\eta_p &= \frac{\Delta \text{ participation}}{\Delta \text{ income}} \times \frac{\text{income}}{\text{participation}} \\ &= \frac{-0.03}{811} \times \frac{750}{0.85} \\ &= -0.03\end{aligned}$$

$$\begin{aligned}\eta_e &= \frac{\Delta \text{ employment}}{\Delta \text{ income}} \times \frac{\text{income}}{\text{employment}} \\ &= \frac{-0.08}{811} \times \frac{750}{0.56} \\ &= -0.13\end{aligned}$$

with income estimated at 750 rand (median, total reported earned and transfer income), and using mean household prime-age participation and employment rates for non-OAP households.[43]

[42] Calculations in this and Section 8.3 are based on the 2004 LFS.

[43] Given that the LFS captures scant information on either household expenditure or income, these calculations cannot be anything other than strictly indicative. Note too that calculation of individual elasticities is precluded by

Both labour participation and employment look distinctly inelastic, and are much smaller than those obtained by Bertrand et al. (2003), who find (for individual residents, calculated by assuming equal pension shares in the household) an η_e of -0.55.

These elasticities, of course, provide no indication of aggregate employment effects, which cannot be quantified on the basis of the micro-level analysis conducted here. Ultimately, however, unambiguously high involuntary unemployment suggests that the constraint to raising employment is not slack labour supply. Unless this changes, even a long-run oriented, social welfare-maximising policymaker who prioritises employment has little reason to be seriously concerned about the pension's labour supply effects.

All of this said, the OAP does have negative associations with labour outcomes. Broadly-defined labour participation probability tests for reservation wage effects, made visible by voluntary drop-out from the labour market. Employment probability embeds any labour participation effects, as well as job search impacts. Since drops in employment probability are larger and more robust than participation, results point in particular to reductions in job search intensity. A number of factors should inform consideration of the implications of this finding.

8.3.1 Non-market Labour

Non-market production is not captured in the LFS, which recognises production of goods for sale, and informal sector activity as labour supply, but excludes the labour of individuals whose time is devoted to the production of household public goods (such as child-rearing and chores). This treatment is correct insofar as measurable labour product is of prime interest, but does mean that the labour *versus* leisure conception of time allocation, introduced in Section 3, is simplistic. If the pension encourages more non-market labour within households, the results exaggerate the extent to which pension income induces individuals to take more leisure.

8.3.2 Stronger Employment than Participation Effects

If the pension induced a strong increase in the desire for leisure, raising the reservation wage, many individuals should report that they have dropped out of the labour market; while some do, the probability of them doing so appears rather low (participation effects are small at best, and sensitive to identification strategy). Why, in other words, does access to pension income appear to affect employment more than the participation decision? A straightforward explanation is that that the pension tends to have only limited disincentive effects for work in general (the desire to supply labour at a given wage), but makes job search and acquisition less desperately urgent. Reduced job search intensity then leads to a fall in the probability of employment, all else equal, on the order of 10% at most. Speculating, it is possible that much of this fall is attributable to declines in the probability with which the very poor participate in subsistence, informal sector activity, perhaps because the pension helps buy them the time and resources to hold on for better opportunities. This is especially plausible in the light of some evidence of high barriers to informal sector entry (Kingdon and Knight 2004b), and of minimal prospects of transitioning from informal work, to more beneficial formal sector work (Banerjee, Galiani, Levinsohn and Woolard 2006).

An alternative possibility, also consistent with larger employment than participation effects, is that access to pension income is governed not only by need, but by the perceptions of the

our ignorance of individuals' shares of pension income.

household members controlling the pension that the individual is doing what they can to reduce that need. Such an individual—who in fact does not want to work—might be incentivised to report that they want to work, but (clandestinely) limit search effort in order to retain access to the pension while not suffering labour disutility.[44]

One unattractive feature of this idea is its reliance on gullible pensioners. But it is also inconsistent with another, strong empirical finding: the positive migration response to the pension. This is hard to explain if the pension has a powerful, attenuating effect on desired participation, but is consistent with the first explanation if the pension plays two roles in job search determination; it may tend to generally reduce search intensity by providing an alternative survival strategy, but encourage another kind of search altogether—that subject to the most severe liquidity constraints: migration for employment (as discussed in Section 3.5).

8.3.3 Implications of Migration as Successful Search

> *...you find a friend and then start looking for work and find it after three or four months. Then you start coming home.* – Anonymous young man, on time spent as a migrant, KwaZulu-Natal Province, quoted in Mturi et al. (2005)

Given that the pension has a positive job search effect through migration, estimates of its negative employment probability effect could be exaggerated. The prime-age individuals most likely to migrate may be those with the highest latent earnings potential (the brightest, healthiest, and least risk-averse). As discussed, evidence suggests that most initially retain strong ties to their households of origin, but successful migrants may eventually establish households of their own in their place of (migrant) residency. Over time, this would generate a selection problem; the pension could stimulate some job search, including migration, but in so doing lead to household fragmentation that causes this effect to disappear from the data. Many whose positive employment status owe something to the pension would appear to live in non-pension receiving households, while individuals observed to be living in pension-receiving households would be a non-random sub-sample of the working age population, with a pre-disposition to poor labour outcomes that is difficult to control for.

While this paper finds robust evidence of a negative, net employment probability effect, then, there is evidence of at least one positive job search effect—migration for work—and it must be acknowledged that a selection problem (impossible to address without suitable, individual-level panel data) may be inflating the estimates obtained.

[44] Discussed in Kingdon and Knight (2004b) and Section 3.5.

TABLE 1: HOUSEHOLD DESCRIPTIVE STATISTICS, EXCLUDING MIGRANTS: MEANS (STD. DEVIATIONS IN PARENTHESES)

OAP Receipt Recorded:	**No**		**Yes**			
Age-Eligible Members:	**None**	**1 or More**	**None**	**Male(s) Only**	**Female(s) Only**	**Both**
Composition						
Residents	3.56	4.76	5.38	4.35	5.05	6.10
	(2.45)	(2.79)	(3.15)	(2.76)	(2.85)	(3.26)
Children under 5	0.44	0.55	0.62	0.44	0.55	0.65
	(0.73)	(0.80)	(0.93)	(0.75)	(0.84)	(0.94)
Children 6 to 15	0.89	1.12	1.33	0.92	1.34	1.42
	(1.19)	(1.36)	(1.39)	(1.17)	(1.38)	(1.47)
Members 16 to 18	0.27	0.33	0.44	0.30	0.39	0.38
	(0.53)	(0.55)	(0.70)	(0.57)	(0.63)	(0.67)
Adults 19 to 21	0.25	0.28	0.41	0.32	0.29	0.31
	(0.50)	(0.54)	(0.63)	(0.59)	(0.56)	(0.58)
Adults 22 to 24	0.21	0.21	0.32	0.20	0.24	0.23
	(0.46)	(0.43)	(0.53)	(0.44)	(0.50)	(0.52)
Men 25 to 50	0.54	0.44	0.51	0.29	0.47	0.49
	(0.62)	(0.70)	(0.75)	(0.56)	(0.71)	(0.76)
Women 25 to 50	0.69	0.53	0.69	0.54	0.57	0.53
	(0.63)	(0.72)	(0.83)	(0.71)	(0.74)	(0.75)
Adults 51 up	0.27	1.31	1.04	1.35	1.18	2.10
	(0.54)	(0.48)	(0.70)	(0.52)	(0.45)	(0.32)
Mean age	27.38	37.34	30.12	43.20	35.71	41.53
	(10.59)	(15.07)	(12.03)	(17.74)	(14.39)	(14.73)
Assets						
Proportion owning home	0.72	0.84	0.90	0.95	0.96	0.96
	(0.45)	(0.37)	(0.29)	(0.22)	(0.21)	(0.19)
Proportion owning TV	0.47	0.49	0.46	0.43	0.42	0.47
	(0.50)	(0.50)	(0.50)	(0.50)	(0.49)	(0.50)
Proportion with savings	0.54	0.55	0.57	0.55	0.58	0.58
	(0.50)	(0.50)	(0.50)	(0.50)	(0.49)	(0.49)
Highest education (yrs.)	10.45	9.95	9.94	9.12	9.88	9.98
	(3.66)	(4.39)	(3.54)	(4.63)	(3.85)	(3.90)
Labour and employment						
Labour force participants	1.57	1.68	1.62	1.17	1.31	1.35
	(1.08)	(1.34)	(1.49)	(1.27)	(1.30)	(1.48)
Employed (no.)	0.88	0.81	0.48	0.43	0.44	0.44
	(0.78)	(0.86)	(0.73)	(0.77)	(0.75)	(0.73)
Unemployed (no.)	0.69	0.88	1.14	0.74	0.87	0.91
	(0.95)	(1.18)	(1.34)	(1.01)	(1.09)	(1.28)
Total earnings	1714.96	1168.54	514.57	476.47	501.75	462.84
	(3606.94)	(3110.24)	(1368.74)	(2014.06)	(1505.96)	(1360.55)
Total hours worked	39.55	34.58	19.39	16.35	17.89	16.87
	(38.21)	(39.58)	(33.92)	(30.34)	(33.28)	(31.26)
Observations	16741	422	377	617	2990	700

Total earnings are in rand per month. Total hours worked are weekly hours of market labour. Earnings and hours apply to all household residents.

TABLE 2: HOUSEHOLD DESCRIPTIVE STATISTICS, INCLUDING MIGRANTS: MEANS (STD. DEVIATIONS IN PARENTHESES)

OAP Receipt Recorded:	**No**		**Yes**			
Age-Eligible Members:	**None**	**1 or More**	**None**	**Male(s) Only**	**Female(s) Only**	**Both**
Migrants						
Migrants	0.29	0.44	0.43	0.54	0.60	0.69
	(0.68)	(0.90)	(0.91)	(1.07)	(1.03)	(1.18)
Female migrants	0.10	0.16	0.19	0.19	0.23	0.29
	(0.37)	(0.48)	(0.54)	(0.55)	(0.59)	(0.69)
Male migrants	0.19	0.28	0.24	0.35	0.37	0.40
	(0.49)	(0.64)	(0.63)	(0.77)	(0.73)	(0.79)
Transfer per migrant (/yr.)	4022.50	2528.00	2501.66	1734.26	2044.82	2296.21
	(7425.89)	(3471.04)	(3501.33)	(2772.82)	(3706.81)	(8114.38)
HH composition and labour						
HH Size	3.85	5.20	5.81	4.89	5.66	6.78
	(2.65)	(3.02)	(3.40)	(3.12)	(3.11)	(3.57)
19-50s & migrants	1.98	1.90	2.36	1.89	2.18	2.23
	(1.26)	(1.62)	(1.79)	(1.72)	(1.69)	(1.93)
Labour participants	1.86	2.12	2.05	1.70	1.91	2.03
	(1.21)	(1.48)	(1.77)	(1.69)	(1.59)	(1.82)
Employed (no.)	1.17	1.24	0.91	0.97	1.04	1.13
	(0.93)	(1.12)	(1.22)	(1.37)	(1.25)	(1.39)
Resident rates (prop. of 19-50 yr.-olds)						
Total labour participation	0.81	0.74	0.67	0.65	0.71	0.69
	(0.33)	(0.37)	(0.38)	(0.41)	(0.38)	(0.39)
Male labour participation	0.85	0.74	0.69	0.72	0.71	0.70
	(0.33)	(0.40)	(0.42)	(0.42)	(0.41)	(0.42)
Female labour participation	0.78	0.74	0.65	0.64	0.72	0.68
	(0.38)	(0.41)	(0.42)	(0.44)	(0.41)	(0.42)
Total employed	0.49	0.26	0.20	0.18	0.21	0.17
	(0.43)	(0.38)	(0.34)	(0.32)	(0.34)	(0.31)
Male employed	0.57	0.29	0.21	0.22	0.23	0.19
	(0.47)	(0.43)	(0.38)	(0.39)	(0.39)	(0.36)
Female employed	0.39	0.23	0.16	0.17	0.20	0.16
	(0.46)	(0.40)	(0.34)	(0.34)	(0.37)	(0.33)
Total unemployed	0.33	0.48	0.47	0.47	0.50	0.52
	(0.39)	(0.42)	(0.40)	(0.42)	(0.42)	(0.42)
Male unemployed	0.28	0.45	0.48	0.50	0.48	0.51
	(0.43)	(0.46)	(0.45)	(0.47)	(0.46)	(0.45)
Female unemployed	0.39	0.50	0.49	0.47	0.52	0.52
	(0.46)	(0.47)	(0.44)	(0.46)	(0.46)	(0.45)
Rates including migrants						
Migrants	0.10	0.18	0.10	0.19	0.24	0.27
	(0.21)	(0.31)	(0.19)	(0.29)	(0.33)	(0.36)
Labour participants	0.83	0.77	0.52	0.66	0.76	0.78
	(0.28)	(0.32)	(0.33)	(0.36)	(0.32)	(0.32)
Employed	0.57	0.42	0.26	0.34	0.40	0.40
	(0.38)	(0.39)	(0.30)	(0.36)	(0.38)	(0.39)
Observations	16741	422	377	617	2990	700

TABLE 3: PROBIT REGRESSIONS: INDIVIDUAL LABOUR PARTICIPATION AND EMPLOYMENT

	1. Participation					2. Employment				
	Pooled	IV Probit	OAP Interact	Men	Women	Pooled	IV Probit	OAP Interact	Men	Women
Age	0.097**	0.080**	0.097**	0.091**	0.098**	0.088**	0.085**	0.087**	0.106**	0.076**
Age squared	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**
Female (d)	−0.059**	−0.060**	−0.059**			−0.136**	−0.140**	−0.136**		
Primary ed. (d)	0.052**	0.048**	0.052**	0.040**	0.058**	0.014	0.014	0.014	0.018	0.010
Partial secondary ed. (d)	0.015**	0.029**	0.015**	−0.028**	0.049**	−0.000	0.004	0.000	−0.034**	0.025**
Secondary ed. (d)	0.122**	0.112**	0.122**	0.075**	0.153**	0.083**	0.085**	0.084**	0.042**	0.112**
Higher ed. (d)	0.149**	0.136**	0.149**	0.088**	0.188**	0.348**	0.346**	0.349**	0.238**	0.407**
Married/Partner (d)	−0.016*	−0.014*	−0.015*	0.078**	−0.071**	0.046**	0.047**	0.048**	0.219**	−0.043**
Kids <5 yrs.	0.019**	0.016**	0.019**	0.024**	0.014**	0.002	0.001	0.001	0.035**	−0.017**
Kids 6-15	−0.004*	−0.002	−0.005*	−0.003	−0.003	−0.020**	−0.020**	−0.021**	−0.019**	−0.019**
People 16-18	−0.014**	−0.014**	−0.014**	−0.013**	−0.011*	−0.026**	−0.026**	−0.026**	−0.021*	−0.027**
People 19-21	0.009*	0.010**	0.009+	0.009	0.009	−0.023**	−0.024**	−0.023**	−0.036**	−0.019**
People 22-24	0.012*	0.011*	0.012*	0.021**	0.004	−0.002	−0.001	−0.001	−0.000	−0.010
Men 25-50	−0.005	−0.005+	−0.005	0.002	0.005	−0.066**	−0.068**	−0.067**	−0.062**	−0.041**
Women 25-50	0.014**	0.014**	0.014**	0.000	0.009+	−0.021**	−0.020**	−0.021**	−0.054**	−0.020**
People >50	−0.008+	−0.011**	−0.011*	−0.022**	0.005	−0.074**	−0.077**	−0.084**	−0.127**	−0.046**
Migrants	−0.022**	−0.020**	−0.023**	−0.020**	−0.021**	−0.051**	−0.052**	−0.052**	−0.065**	−0.034**
Metro area (d)	−0.001	0.003	−0.000	0.007	−0.006	−0.007	−0.006	−0.007	−0.015	−0.001
E Cape prov. (d)	−0.074**	−0.075**	−0.076**	−0.059**	−0.080**	−0.026*	−0.028*	−0.028*	−0.053**	−0.000
F State prov. (d)	−0.019	−0.017	−0.020	−0.023	−0.010	−0.001	0.001	−0.002	0.002	−0.001
KZN prov. (d)	−0.064**	−0.064**	−0.066**	−0.053**	−0.065**	−0.015	−0.016	−0.018+	−0.057**	0.019
Limp. prov (d)	−0.006	−0.006	−0.007	−0.029+	0.019	−0.034**	−0.033*	−0.036**	−0.052*	−0.016
Mpum. prov. (d)	−0.010	−0.006	−0.011	−0.019	0.003	0.048**	0.053**	0.047**	0.066**	0.042*
N Cape prov. (d)	−0.027	−0.027+	−0.028	−0.000	−0.045+	0.011	0.011	0.009	0.064*	−0.026
N West prov. (d)	−0.055**	−0.052**	−0.056**	−0.032*	−0.068**	−0.072**	−0.074**	−0.072**	−0.083**	−0.057**
W Cape prov. (d)	−0.013	−0.024	−0.014	−0.009	−0.020	0.040*	0.040*	0.039*	0.019	0.050*
Isolated (d)	0.005	0.002	0.006	0.007	0.004	0.022+	0.023*	0.021+	0.043*	0.005
Other grants (d)	−0.088**	−0.090**	−0.088**	−0.114**	−0.066**	−0.128**	−0.136**	−0.127**	−0.157**	−0.104**
OAP (d)	−0.051**	−0.046**				−0.106**	−0.116**			
Male OAP			−0.023*	0.004	−0.051**			−0.032+	−0.009	−0.050*
Female OAP			−0.034**	−0.042**	−0.033**			−0.083**	−0.105**	−0.066**
N	36242	34288	36242	16373	19869	36242	34288	36242	16373	19869
Pseudo-R^2	0.15	0.12	0.15	0.23	0.11	0.21	0.19	0.21	0.25	0.17
Wald test statistic	4546.2	3987.9	4524.1	2587.0	2019.2	6409.9	8734.8	6421.4	3628.3	2987.9
Log Likelihood	-16272	-14942	-16284	-6144	-9878	-19128	-18728	-19158	-8506	-10341

Coefficients report marginal effects at the mean. Std. errors (not shown) are corrected for within-household correlation. +, *, ** denote significance at 0.10, 0.05 and 0.01 levels. Constant included but not displayed. d indicates dummy variable.

TABLE 4: REGRESSIONS: MIGRATION

	Pooled	2SLS	Interact	Male Migrants	Female Migrants
Metro area	−0.070**	−0.069**	−0.070**	−0.101**	−0.053**
	(0.006)	(0.006)	(0.006)	(0.009)	(0.006)
E Cape prov.	0.137**	0.136**	0.137**	0.163**	0.128**
	(0.010)	(0.009)	(0.010)	(0.014)	(0.009)
F State prov.	0.025**	0.024**	0.025**	0.014	0.035**
	(0.008)	(0.008)	(0.008)	(0.012)	(0.008)
KZN prov.	0.075**	0.074**	0.075**	0.117**	0.049**
	(0.006)	(0.006)	(0.006)	(0.011)	(0.006)
Limp. prov	0.176**	0.175**	0.176**	0.258**	0.115**
	(0.010)	(0.010)	(0.010)	(0.015)	(0.010)
Mpum. prov.	0.052**	0.052**	0.052**	0.060**	0.044**
	(0.009)	(0.009)	(0.009)	(0.014)	(0.010)
N Cape prov.	0.001	0.001	0.002	−0.017	0.010
	(0.010)	(0.010)	(0.010)	(0.015)	(0.012)
N West prov.	0.061**	0.061**	0.062**	0.069**	0.064**
	(0.008)	(0.008)	(0.008)	(0.012)	(0.009)
W Cape prov.	−0.018**	−0.018**	−0.018**	−0.032**	−0.011+
	(0.006)	(0.006)	(0.006)	(0.009)	(0.006)
Isolated	0.010	0.010	0.010	0.027*	−0.001
	(0.008)	(0.008)	(0.008)	(0.013)	(0.009)
Kids <5	−0.055**	−0.053**	−0.055**	−0.019**	−0.060**
	(0.003)	(0.003)	(0.003)	(0.006)	(0.004)
Kids 6-18	−0.023**	−0.021**	−0.023**	0.009*	−0.031**
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
HH size (inc. migrants)	0.036**	0.035**	0.036**	0.024**	0.031**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Primary educ.	−0.002	−0.002	−0.001	0.003	−0.008
	(0.008)	(0.008)	(0.008)	(0.013)	(0.010)
Some secondary educ.	−0.004	−0.004	−0.004	−0.006	−0.001
	(0.005)	(0.005)	(0.005)	(0.009)	(0.007)
Secondary educ.	0.011+	0.012*	0.012+	0.016+	0.009
	(0.006)	(0.006)	(0.006)	(0.010)	(0.008)
Higher educ.	0.004	0.005	0.004	0.005	0.018+
	(0.009)	(0.009)	(0.009)	(0.013)	(0.010)
Other grants	−0.017**	−0.016**	−0.017**	0.023**	−0.036**
	(0.005)	(0.005)	(0.005)	(0.008)	(0.005)
OAP	0.041**	0.056**			
	(0.007)	(0.008)			
Male OAP			0.008	0.013	0.021
			(0.011)	(0.016)	(0.013)
Female OAP			0.046**	0.029**	0.045**
			(0.007)	(0.010)	(0.008)
N	19945	19945	19945	15023	15502
Adj. R^2	0.16	0.16	0.16	0.15	0.09
F test statistic	140.6	140.9	134.5	119.4	60.4

OLS regressions unless otherwise noted. Std. errors are adjusted for within-cluster correlation. +, *, ** denote significance at 0.10, 0.05 and 0.01 levels. Constant included but not displayed.

TABLE 5: REGRESSIONS: HOUSEHOLD LABOUR PARTICIPATION

	1. Resident HH					2. Full HH (Residents & Migrants)				
	Pooled	2SLS	Interact	Men	Women	Pooled	2SLS	Interact	Men	Women
Metro area	0.001	0.002	0.002	0.021^{+}	−0.001	−0.020**	−0.020**	−0.020	−0.006	−0.016
E Cape prov.	−0.097**	−0.098**	−0.099**	−0.088**	−0.090**	−0.054**	−0.055**	−0.056**	−0.047**	−0.050**
F State prov.	−0.033*	−0.034**	−0.034*	−0.032*	−0.015	−0.034**	−0.034**	−0.035*	−0.039**	−0.011
KZN prov.	−0.079**	−0.080**	−0.081**	−0.069**	−0.076**	−0.055**	−0.056**	−0.057**	−0.042**	−0.066**
Limp. prov	−0.048**	−0.049**	−0.050**	−0.065**	−0.013	−0.003	−0.004	−0.005	0.000	0.013
Mpum. prov.	−0.027^{+}	−0.028**	−0.028^{+}	−0.020	−0.008	−0.019*	−0.019*	−0.020	−0.018	−0.001
N Cape prov.	−0.031^{+}	−0.032*	−0.032^{+}	−0.009	−0.042	−0.035*	−0.035*	−0.035^{+}	−0.020	−0.043
N West prov.	−0.064**	−0.065**	−0.065**	−0.040**	−0.060**	−0.053**	−0.053**	−0.054**	−0.033**	−0.048**
W Cape prov.	−0.023	−0.023^{+}	−0.024	−0.016	−0.026	−0.029*	−0.029*	−0.029^{+}	−0.025^{+}	−0.031
Isolated	0.003	0.002	0.003	0.006	−0.006	0.007	0.007	0.007	0.016^{+}	−0.006
Kids <5	0.050**	0.052**	0.052**	0.078**	0.032**	0.027**	0.028**	0.029**	0.052**	0.012*
Kids 6-18	0.021**	0.022**	0.022**	0.018**	0.022**	0.009**	0.010**	0.010**	0.014**	0.011**
HH size (inc. migrants)	−0.028**	−0.029**	−0.029**	−0.030**	−0.025**	−0.012**	−0.014**	−0.014**	−0.016**	−0.013**
Primary educ.	0.024^{+}	0.024*	0.023^{+}	0.011	0.025	0.018^{+}	0.018^{+}	0.017	0.007	0.024
Some secondary educ.	−0.016*	−0.017*	−0.017*	−0.037**	0.009	−0.016*	−0.016*	−0.016*	−0.030**	0.009
Secondary educ.	0.043**	0.043**	0.043**	0.021*	0.071**	0.038**	0.039**	0.039**	0.020**	0.069**
Higher educ.	0.075**	0.076**	0.076**	0.029*	0.115**	0.059**	0.060**	0.060**	0.020*	0.107**
Other grants	−0.095**	−0.095**	−0.094**	−0.111**	−0.064**	−0.091**	−0.090**	−0.089**	−0.081**	−0.070**
OAP	−0.054**	−0.044**				−0.042**	−0.030**			
Male OAP			−0.034*	−0.013	−0.049**			−0.029*	−0.010	−0.035*
Female OAP			−0.030**	−0.049**	−0.007			−0.019**	−0.036**	0.006
N	19109	19109	19109	12625	14525	19945	19945	19945	15023	15502
Adj. R^2	0.08	0.08	0.07	0.08	0.04	0.05	0.05	0.05	0.04	0.03
F test statistic	71.79	91.12	66.55	52.49	28.21	64.38	63.13	46.96	30.62	24.14

OLS regression unless otherwise noted. Std. errors (not shown) are adjusted for within-cluster correlation. $^{+}$, *, ** denote significance at 0.10, 0.05 and 0.01 levels. Constant included but not displayed. Sample size differences arise from undefined values when dep. var. denominators are 0.

TABLE 6: REGRESSIONS: HOUSEHOLD EMPLOYMENT

	1. Resident HH					2. Full HH (Residents & Migrants)				
	Pooled	2SLS	Interact	Men	Women	Pooled	2SLS	Interact	Men	Women
Metro area	−0.012	−0.012	−0.010	−0.002	0.002	−0.060**	−0.060**	−0.059**	−0.066**	−0.035+
E Cape prov.	−0.061**	−0.061**	−0.064**	−0.112**	0.009	0.029*	0.029*	0.026	−0.017	0.092**
F State prov.	−0.035*	−0.034*	−0.037+	−0.043+	−0.004	−0.027*	−0.027*	−0.029	−0.050*	0.012
KZN prov.	−0.049**	−0.049**	−0.053**	−0.105**	0.015	−0.000	−0.000	−0.003	−0.039*	0.041*
Limp. prov	−0.077**	−0.076**	−0.079**	−0.102**	−0.018	0.052**	0.051**	0.049**	0.057**	0.062**
Mpum. prov.	−0.006	−0.006	−0.007	−0.000	0.033	0.017	0.017	0.016	0.008	0.054*
N Cape prov.	−0.013	−0.013	−0.015	0.011	−0.023	−0.021	−0.021	−0.022	−0.008	−0.026
N West prov.	−0.089**	−0.089**	−0.091**	−0.112**	−0.044*	−0.048**	−0.048**	−0.049**	−0.074**	−0.002
W Cape prov.	0.014	0.014	0.013	−0.003	0.024	−0.000	−0.000	−0.001	−0.024	0.014
Isolated	0.028**	0.028**	0.028*	0.038*	−0.000	0.034**	0.034**	0.034**	0.052**	−0.003
Kids <5	0.058**	0.058**	0.062**	0.154**	0.015**	0.015**	0.016**	0.018**	0.105**	−0.029**
Kids 6-18	0.051**	0.050**	0.054**	0.076**	0.049**	0.027**	0.028**	0.030**	0.059**	0.023**
HH size (inc. migrants)	−0.067**	−0.066**	−0.070**	−0.090**	−0.054**	−0.034**	−0.035**	−0.037**	−0.055**	−0.027**
Primary educ.	−0.029*	−0.029*	−0.031*	−0.031	−0.021	−0.028*	−0.028*	−0.030*	−0.030+	−0.024
Some secondary educ.	−0.063**	−0.063**	−0.064**	−0.083**	−0.032*	−0.062**	−0.062**	−0.062**	−0.076**	−0.031*
Secondary educ.	−0.013	−0.014	−0.013	−0.024+	0.021	−0.004	−0.004	−0.003	−0.013	0.028*
Higher educ.	0.148**	0.148**	0.151**	0.099**	0.214**	0.123**	0.123**	0.126**	0.073**	0.205**
Other grants	−0.142**	−0.142**	−0.140**	−0.132**	−0.118**	−0.142**	−0.142**	−0.140**	−0.096**	−0.133**
OAP	−0.135**	−0.143**				−0.098**	−0.093**			
Male OAP			−0.047**	−0.036+	−0.042**			−0.038**	−0.016	−0.019
Female OAP			−0.104**	−0.125**	−0.072**			−0.063**	−0.080**	−0.031**
N	19109	19109	19109	12625	14525	19945	19945	19945	15023	15502
Adj. R^2	0.21	0.21	0.21	0.20	0.13	0.12	0.12	0.12	0.08	0.09
F test statistic	311.08	307.77	199.12	162.61	100.23	164.04	160.18	109.02	58.56	81.66

OLS regression unless otherwise noted. Std. errors (not shown) are adjusted for within-cluster correlation. +, *, ** denote significance at 0.10, 0.05 and 0.01 levels. Constant included but not displayed. Sample size differences arise from undefined values when dep. var. denominators are 0.

TABLE 7: NON-PARAMETRIC [NP] AND SEMI-PARAMETRIC [SP] OAP IMPACT ESTIMATES: LOCAL WALD ESTIMATES (STANDARD ERRORS IN PARENTHESES)

Bandwidth	**RoT**		**RoT×0.5**		**RoT×2**	
Model	**NP**	**SP**	**NP**	**SP**	**NP**	**SP**
HH size & composition						
HH size	0.635	1.123	0.295	0.678^{+}	−0.003	0.448
	(0.764)	(0.703)	(0.431)	(0.412)	(0.467)	(0.461)
Children <6	0.433*	0.566**	0.215^{+}	0.323**	0.104	0.224^{+}
	(0.202)	(0.197)	(0.123)	(0.111)	(0.136)	(0.122)
Residents	0.254	0.415	0.138	0.247	0.129	0.258
	(0.345)	(0.346)	(0.211)	(0.212)	(0.236)	(0.230)
Residents 19-50 & migrants	−0.133	0.049	−0.022	0.134	−0.268	−0.076
	(0.417)	(0.425)	(0.249)	(0.243)	(0.276)	(0.263)
Migration						
Pooled	0.020	0.042	0.022	0.032	−0.026	−0.019
	(0.094)	(0.084)	(0.056)	(0.049)	(0.061)	(0.053)
Male	0.060	0.121	0.065	0.115^{+}	0.016	0.060
	(0.129)	(0.123)	(0.077)	(0.073)	(0.079)	(0.076)
Female	−0.029	−0.024	−0.020	−0.028	−0.064	−0.072
	(0.101)	(0.095)	(0.058)	(0.055)	(0.062)	(0.059)
Participation						
Pooled	−0.019	−0.045	−0.007	−0.020	−0.034	−0.050
	(0.078)	(0.078)	(0.046)	(0.045)	(0.051)	(0.050)
Male	0.108	0.090	0.120*	0.116*	0.062	0.058
	(0.100)	(0.098)	(0.057)	(0.057)	(0.062)	(0.064)
Female	−0.160^{+}	−0.175^{+}	−0.126*	−0.136*	−0.135*	−0.150*
	(0.096)	(0.097)	(0.058)	(0.058)	(0.061)	(0.062)
Employment						
Pooled	0.093	0.085	0.056	0.046	−0.015	−0.033
	(0.105)	(0.095)	(0.063)	(0.057)	(0.067)	(0.063)
Male	0.196	0.203	0.155^{+}	0.167^{+}	0.096	0.103
	(0.139)	(0.138)	(0.083)	(0.079)	(0.088)	(0.083)
Female	−0.019	−0.022	−0.018	−0.037	−0.082	−0.106
	(0.124)	(0.127)	(0.072)	(0.074)	(0.076)	(0.077)
N (total pooled sub-sample)		11142				

$^{+}$, *, ** denote significance at 10%, 5% and 1% levels.

TABLE 8: OAP STATUS: 2002–2003 (NUMBER OF HOUSEHOLDS)

	Unchanged		Change	
	Neither	Both	Gained	Lost
HH OAP	8,970	2,167	569	506
OAP men	11,239	544	226	203
OAP women	9,627	1,655	479	451

Balanced panel. HH OAP refers to whether or not the household receives any OAP income (regardless of source). Changes in OAP men and women refer to changes in the number of age-eligible household members, in conjunction with HH OAP status (e.g. the loss of a man who was age-eligible for the OAP in 2002, in a household which reported receiving the pension in 2002).

TABLE 9: OLS REGRESSIONS IN FIRST-DIFFERENCES: HOUSEHOLD LABOUR PARTICIPATION AND EMPLOYMENT

	1. Participation				2. Employment			
	Pooled	Interact	Men	Women	Pooled	Interact	Men	Women
Provincial unemp.	−0.417*	−0.421*	0.042	−0.706*	−0.664**	−0.667**	0.292	−1.349**
	(0.208)	(0.201)	(0.241)	(0.319)	(0.251)	(0.251)	(0.342)	(0.352)
Kids<5	−0.014**	−0.014**	0.004	−0.011	−0.033**	−0.033**	0.007	−0.031**
	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)	(0.008)	(0.008)
Kids 6–18	0.015**	0.015**	0.020**	0.007	0.008+	0.008+	0.013*	0.007
	(0.003)	(0.003)	(0.005)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)
Max. HH education (yrs.)	−0.003*	−0.003*	−0.002+	−0.005+	−0.015**	−0.015**	−0.014**	−0.019**
	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Other grants	−0.042**	−0.041**	−0.041**	−0.021*	−0.050**	−0.047**	−0.016	−0.022+
	(0.008)	(0.008)	(0.010)	(0.011)	(0.009)	(0.009)	(0.013)	(0.011)
OAP in HH	−0.029*				−0.078**			
	(0.013)				(0.015)			
Male OAP recipients		0.018	−0.011	0.010		−0.021	−0.008	−0.033
		(0.021)	(0.028)	(0.030)		(0.026)	(0.039)	(0.033)
Female OAP recipients		−0.017	−0.043**	0.000		−0.057**	−0.056*	−0.050*
		(0.013)	(0.016)	(0.021)		(0.016)	(0.022)	(0.021)
N	10628	10628	7384	7271	10628	10628	7384	7271
Adj. R^2	0.01	0.01	0.01	0.00	0.02	0.02	0.01	0.01
F test statistic	11.92	9.99	6.03	2.55	32.10	25.20	7.31	12.31

All dependent variables and regressors in first-differences. Std. errors adjust for within-household correlation across periods. +, *, ** denote significance at 0.10, 0.05 and 0.01 levels.

TABLE 10: OLS DIFFERENCE IN DIFFERENCES REGRESSIONS: HOUSEHOLD LABOUR PARTICIPATION AND EMPLOYMENT

	1. Participation			2. Employment		
	Pooled	Men	Women	Pooled	Men	Women
Isolated	−0.008	0.016^{+}	−0.038*	0.055**	0.079**	0.026
	(0.009)	(0.010)	(0.016)	(0.012)	(0.015)	(0.018)
Kids<5	0.032**	0.071**	0.002	0.042**	0.145**	−0.033**
	(0.004)	(0.005)	(0.006)	(0.005)	(0.007)	(0.007)
Kids 6–18	0.019**	0.027**	0.012**	0.055**	0.081**	0.037**
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
HH size	−0.026**	−0.029**	−0.020**	−0.064**	−0.080**	−0.041**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Primary educ.	0.002	−0.005	0.020	−0.036*	−0.019	−0.050*
	(0.010)	(0.010)	(0.019)	(0.014)	(0.018)	(0.023)
Some secondary educ.	−0.022**	−0.044**	0.027*	−0.094**	−0.090**	−0.058**
	(0.007)	(0.007)	(0.013)	(0.010)	(0.012)	(0.016)
Secondary educ.	0.016*	−0.017*	0.075**	−0.059**	−0.071**	0.009
	(0.007)	(0.007)	(0.013)	(0.011)	(0.013)	(0.016)
Higher educ.	0.031**	−0.011	0.099**	0.111**	0.046*	0.243**
	(0.011)	(0.013)	(0.017)	(0.016)	(0.022)	(0.024)
Other grants	−0.081**	−0.087**	−0.052**	−0.145**	−0.135**	−0.104**
	(0.007)	(0.009)	(0.009)	(0.008)	(0.012)	(0.010)
Time (2003=1)	0.009**	0.005	0.008	0.006	0.008	0.002
	(0.003)	(0.004)	(0.005)	(0.004)	(0.006)	(0.006)
OAP	−0.013	−0.024	−0.009	−0.026	−0.071**	0.025
	(0.013)	(0.016)	(0.019)	(0.017)	(0.023)	(0.023)
OAP × time	−0.017	−0.004	−0.018	−0.074**	−0.043	−0.110**
	(0.017)	(0.021)	(0.025)	(0.021)	(0.028)	(0.028)
Province controls	Yes	Yes	Yes	Yes	Yes	Yes
N	17859	13896	13459	17859	13896	13459
Adj. R^2	0.06	0.05	0.03	0.14	0.11	0.08
F test statistic	46.70	30.53	19.66	120.97	76.43	59.38

"OAP" is a dummy variable equal to 1 if the HH acquires OAP income between surveys, and 0 if the HH does not receive OAP income in either survey. Std. errors adjust for within-household correlation across periods. $^{+}$, *, ** denote significance at 0.10, 0.05 and 0.01 levels.

FIG. 1: FROM PENSION RECEIPT TO INDIVIDUAL OUTCOMES IN THE HOUSEHOLD

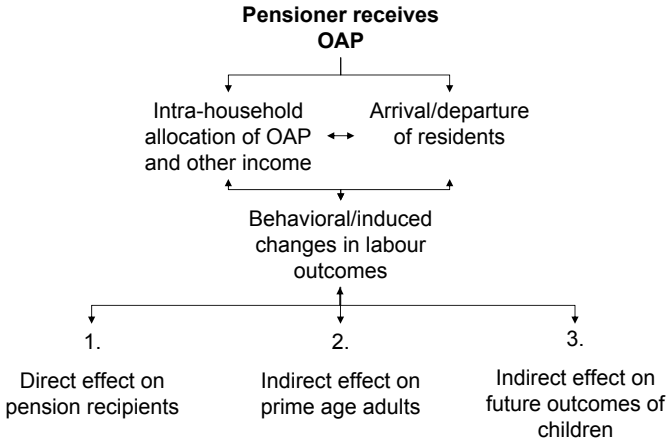
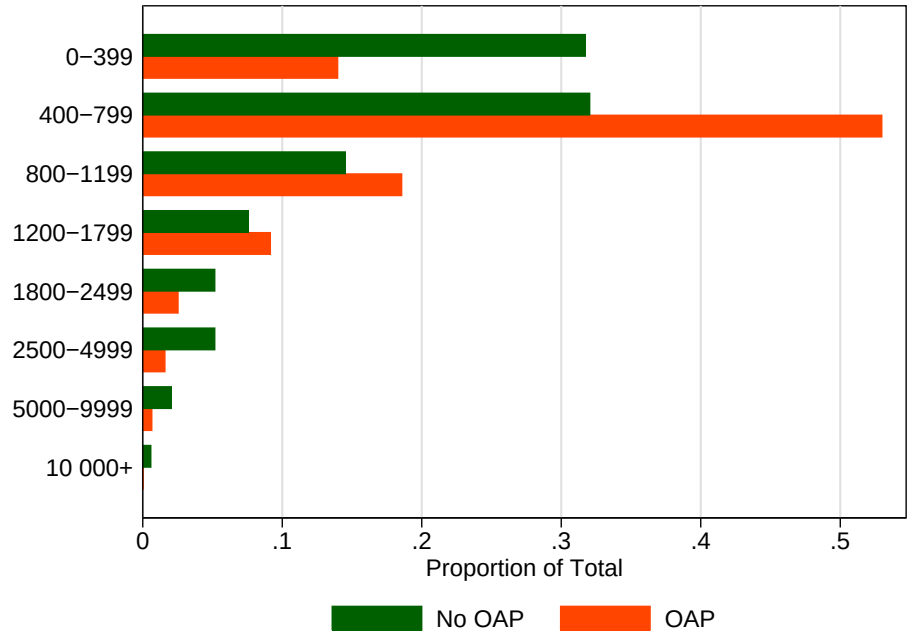
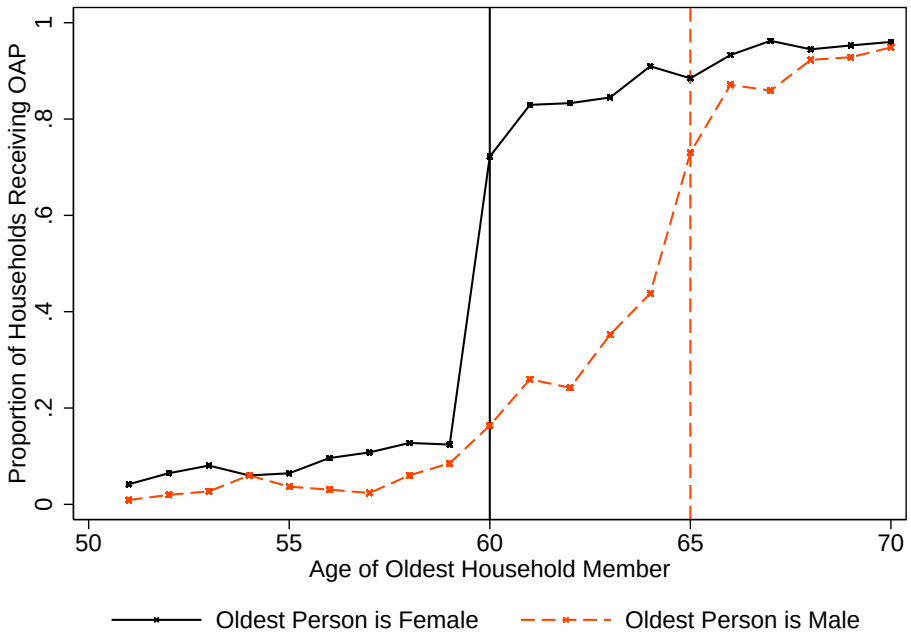


FIG. 2: HH EXPENDITURE BY OAP STATUS



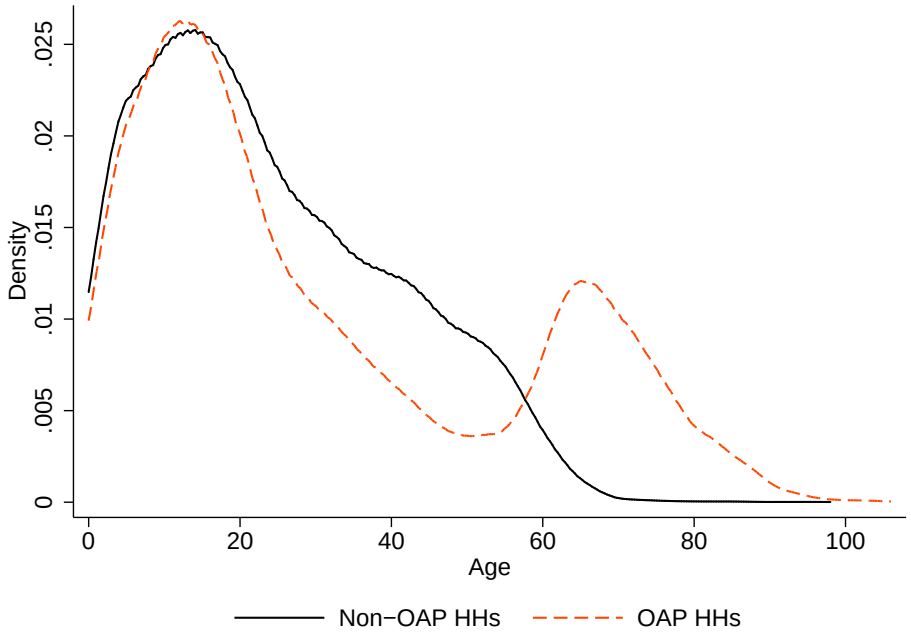
Rand per month. Expenditure categories from survey.

FIG. 3: PROPORTION OF HHS RECEIVING OAP, BY AGE AND GENDER OF OLDEST RESIDENT



Reference lines indicate OAP age eligibility.

FIG. 4: ESTIMATED POPULATION AGE DENSITIES BY OAP STATUS



Epanechnikov kernel estimates. Bandwidth: 2.5.

FIG. 5: MEAN PREDICTED LABOUR PARTICIPATION RATES (POOLED SPECIFICATION, TABLE 3.), INCLUDING AGE×OAP TERM

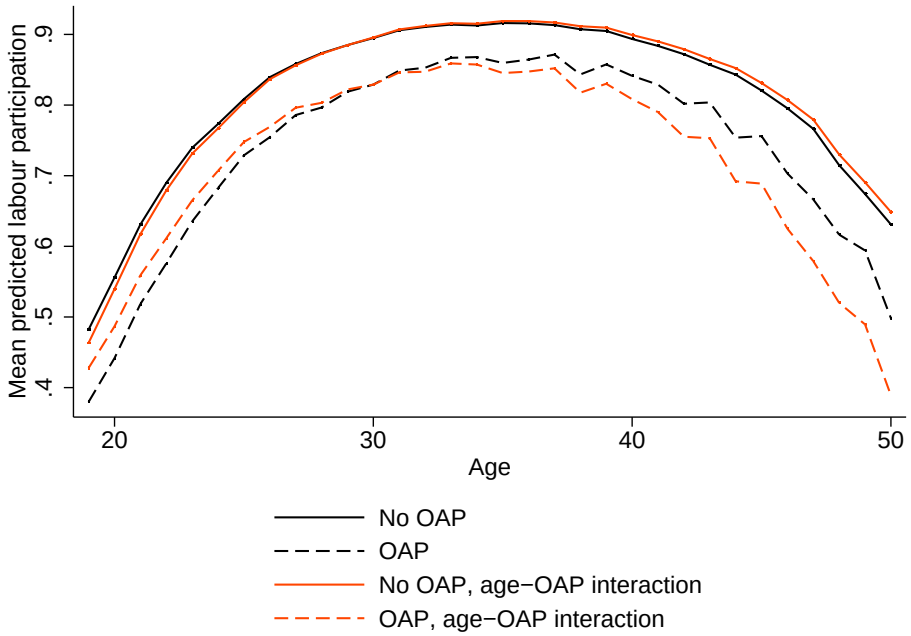
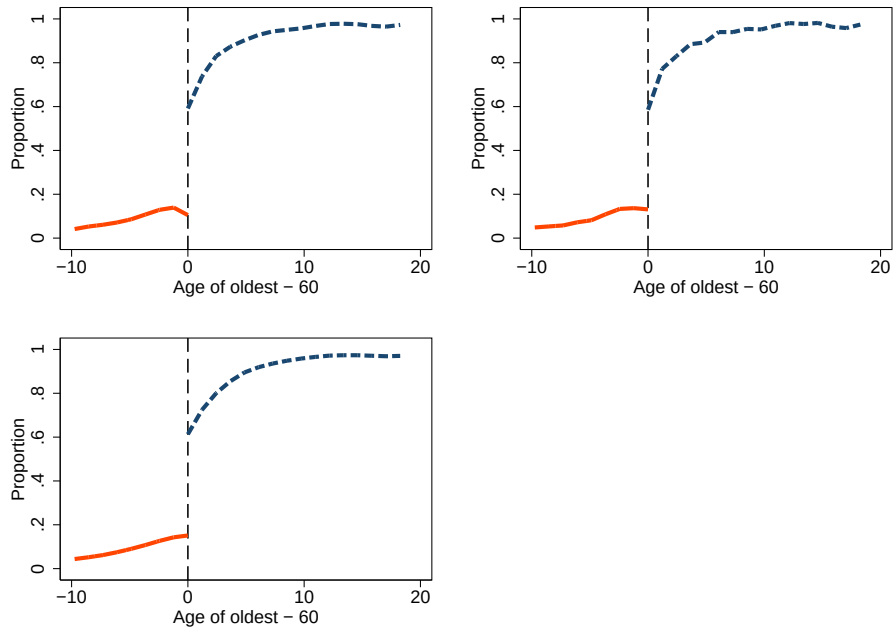


FIG. 6: INDICATIVE OAP ASSIGNMENT PROBABILITY



Clockwise from top left: RoT bandwidth, RoT×0.5, RoT×2. Taken from household size calculation; assignment probability estimates vary slightly by outcome variable, due to small sample size changes.

FIG. 7: LOCAL LINEAR REGRESSIONS: HH SIZE AND COMPOSITION

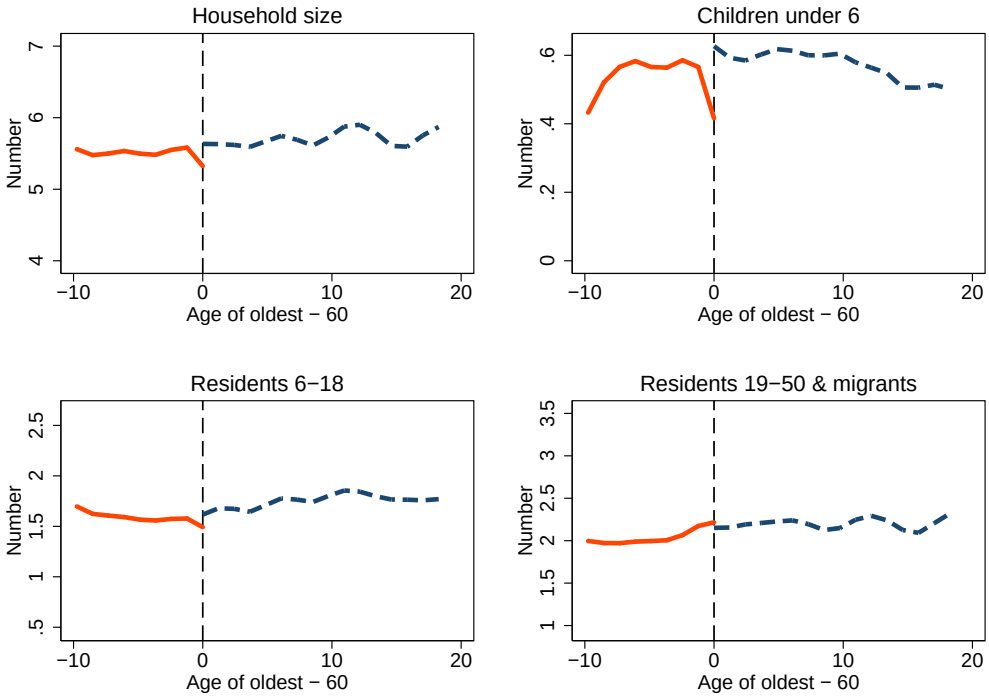


FIG. 8: LOCAL LINEAR REGRESSIONS: MIGRATION

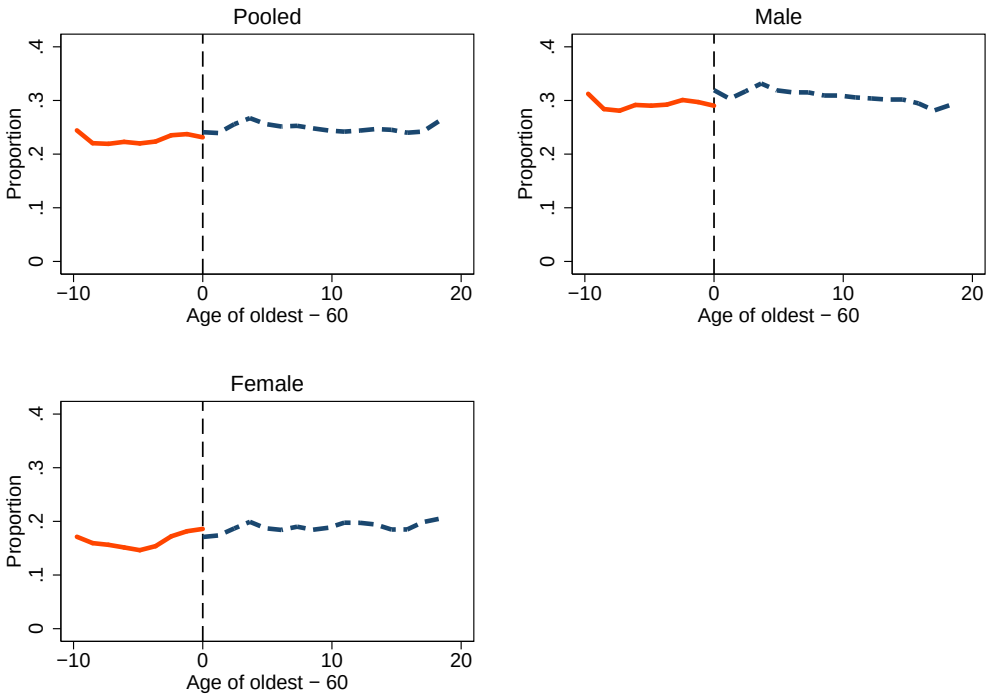


FIG. 9: LOCAL LINEAR REGRESSIONS: LABOUR PARTICIPATION

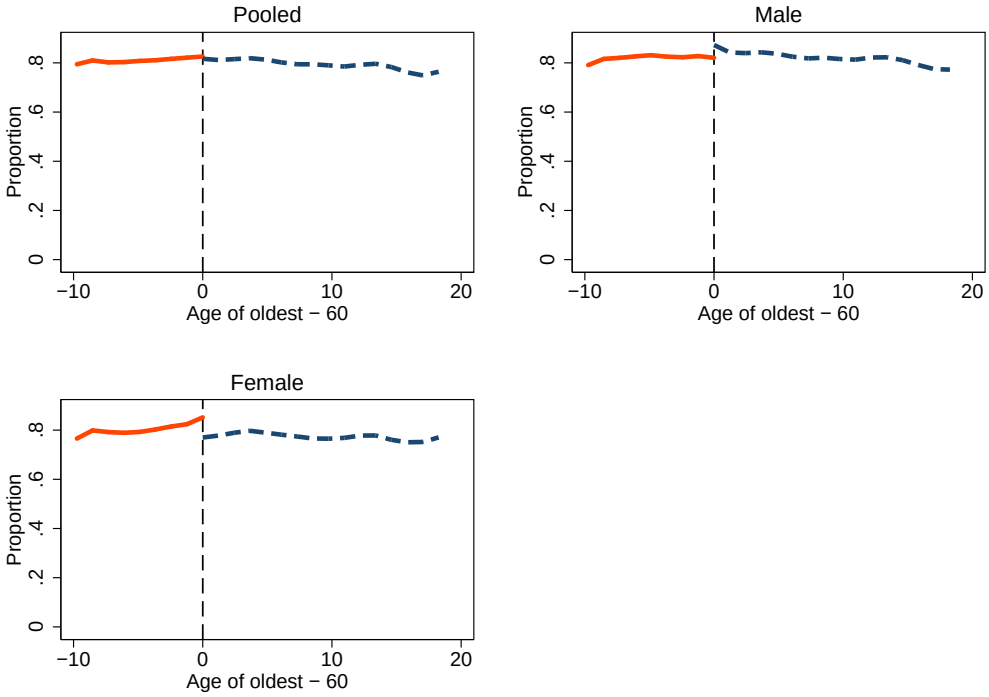


FIG. 10: LOCAL LINEAR REGRESSIONS: EMPLOYMENT

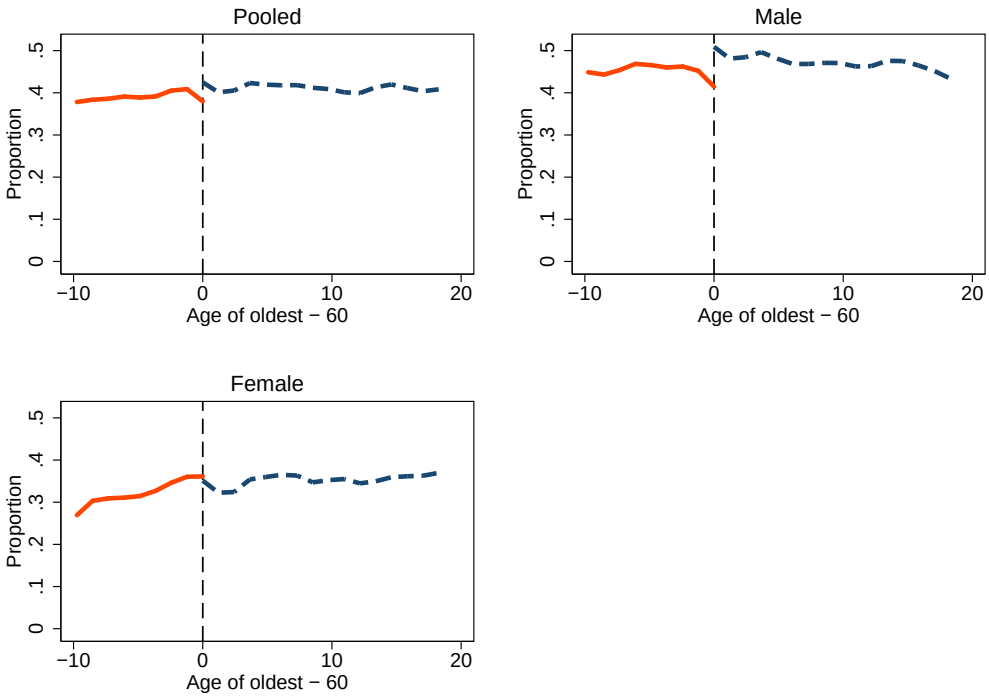


FIG. 11: AGE OF OLDEST WOMEN: FREQUENCIES

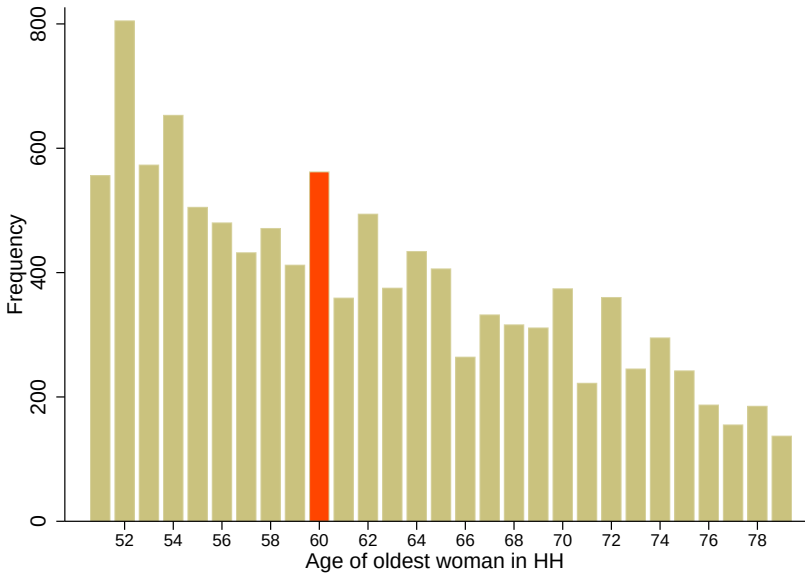
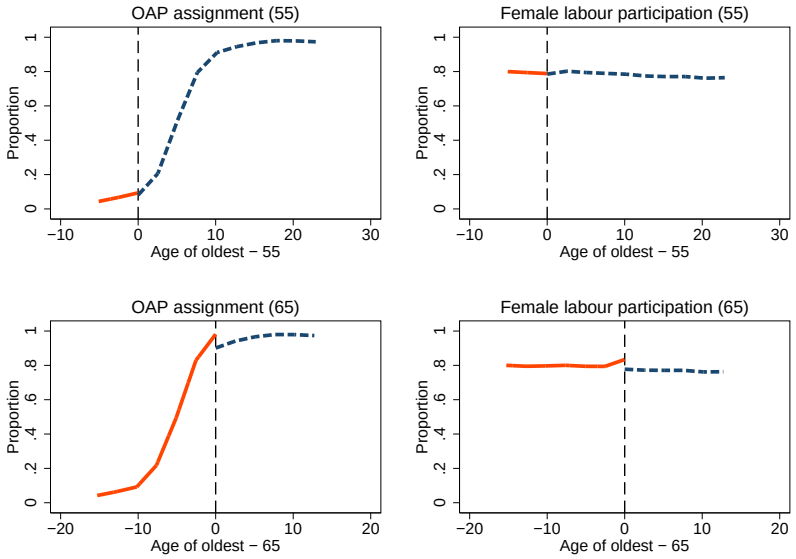
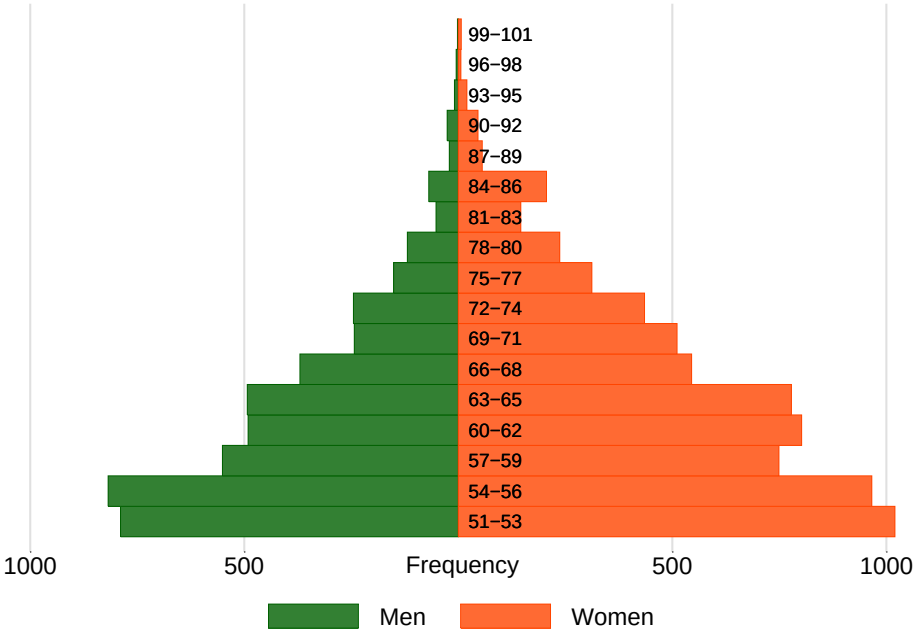


FIG. 12: HYPOTHETICAL DISCONTINUITY TESTS: FEMALE LABOUR PARTICIPATION WITH OAP ASSIGNMENT AT 55 AND 65



RoT bandwidths. No local Wald estimates significant.

FIG. 13: POPULATION PYRAMID: POPULATION ABOVE 50 BY AGE



Source: 2004 LFS. 3-year age bins.

References

Afrobarometer, "Views of Democracy in South Africa and the Region – Trends and Comparisons," Institute for Democracy in South Africa (IDASA), Afrobarometer Working Paper 8 2000. Available at http://www.afrobarometer.org/abseries.html.

Banerjee, Abhijit, Sebastian Galiani, Jim Levinsohn, and Ingrid Woolard, "Why Has Unemployment Risen in the New South Africa?," Center for International Development (Harvard University) Working Paper No. 134 October 2006.

Bardhan, Pranab and Christopher Udry, *Development Microeconomics*, Oxford University Press, 1999.

Bergstrom, Theodore, "A Survey of Theories of the Family," in Mark Rosenzweig and Oded Stark, eds., *Handbook of Population and Family Economics*, Vol. 1A Elsevier Amsterdam 1997, pp. 22–74.

Bertrand, Marianne, Sendhil Mullainathan, and Douglas Miller, "Public Policy and Extended Families: Evidence from Pensions in South Africa," *The World Bank Economic Review*, 2003, *17* (1), 27–50.

Burns, Justine, Malcolm Keswell, and Murray Leibbrandt, "Social Assistance, Gender and the Aged in South Africa," *Journal of Feminist Economics*, 2005, *11* (2), 103–115.

Cahuc, Pierre and André Zylberberg, *Labor Economics*, 1 ed., Cambridge, Massachusetts: MIT Press, 2001.

Case, Anne and Angus Deaton, "Large Cash Transfers to the Elderly in South Africa," *The Economic Journal*, 1998, *108*, 1330–1361.

Chiappori, Pierre-André, "Rational Household Labor Supply," *Journal of Political Economy*, 1988, *56* (1), 63–89.

____ , "Collective Labor Supply and Welfare," *Journal of Political Economy*, 1992, *100*, 437–467.

Dasgupta, Partha and Debraj Ray, "Inequality as a Determinant of Malnutrition and Unemployment: Theory," *The Economic Journal*, December 1986, *96* (384), 1011–1034.

Deaton, Angus, *The Analysis of Household Surveys – A Microeconomic Approach to Development Policy*, Baltimore: Johns Hopkins University Press, 1997.

Department for International Development, "Social transfers and Chronic Poverty: Emerging Evidence and the Challenge Ahead," Practise Paper, UK Department for International Development October 2005. London.

Dorrington, Rob, Tom Moultrie, and Ian Timæus, "Estimation of Mortality Using the South African Census 2001 Data," Centre for Actuarial Research (CARe) Monograph No. 11 2004. Cape Town.

Duflo, Esther, "Child Health and Household Resources in South Africa: Evidence from the Old Age Pension Program," *The American Economic Review*, 2000, *90* (2), 393–398.

Edmonds, Eric, "Child Labor and Schooling Responses to Anticipated Income in South Africa," *Journal of Development Economics*, December 2006, *81* (2).

____ , Kristin Mammen, and Douglas Miller, "Rearranging the Family? Income Support and Elderly Living Arrangements in a Low Income Country," *Journal of Human Resources*, 2005.

Human Sciences Research Council, "South African Social Attitudes: Changing Times, Diverse Voices," Human Sciences Research Council February 2006. Available at http://www.hsrcpress.ac.za.

Imbens, Guido and Thomas Lemieux, "Regression Discontinuity Designs: a Guide to Practice," *Journal of Econometrics*, 2007, *5* (1), 615–635.

Jensen, Robert, "Do Public Transfers Displace the Value of Private Transfers? Evidence from South Africa," *Journal of Public Economics*, 2003, *88*, 89–112.

Kingdon, Geeta and John Knight, "Race and the Incidence of Unemployment in South Africa," *Review of Development Economics*, May 2004, *8* (3), 198–222.

____ and ____ , "Unemployment in South Africa: The Nature of the Beast," *World Development*, March 2004, *32* (3), 391–408.

____ and ____ , "Unemployment in South Africa 1995-2003: Causes, Problems and Policies," Centre for the Study of African Economies Working Paper GPRG-WPS-010 January 2005. Oxford.

____ and ____ , "The Measurement of Unemployment when Unemployment is High," *Labour Economics*, 2006, *13*, 291–315.

Klasen, Stephan and Ingrid Woolard, "Surviving Unemployment without State Support: Unemployment and Household Formation in South Africa," Institute for the Study of Labor, Discussion Paper 237 December 2000.

Lam, David, Murray Leibbrandt, and Vimal Ranchhod, "Labor Force Withdrawal of the Elderly in South Africa," Discussion Paper, University of Cape Town, Department of Economics June 2005.

Maitra, Pushkar and Brett Inder, "Social Pensions, Migration and Household Composition: Evidence from South Africa," April 2004. Preliminary Working Paper, Department of Economics, Monash University.

____ and Ranjan Ray, "The Effect of Transfers on Household Expenditure Patterns and Poverty in South Africa," *Journal of Development Economics*, 2003, *71*, 23–49.

____ and ____ , "Resource Inflows and Household Composition: Evidence from South African Panel Data," *Journal of International Development*, 2003, *15*, 1037–1047.

Mturi, Akim, Thokozani Xaba, and Dorothy Sekokotla, "Assessment of Circumstances Facing Contemporary Families in South Africa," Working Paper, University of KwaZulu-Natal, School of Development Studies February 2005.

Nattrass, Nicoli, *The Moral Economy of AIDS in South Africa*, Cambridge: Cambridge Africa Collection, November 2003.

Naudé, Willem and Philip Serumaga-Zake, "An Analysis of the Determinants of Labour Force Participation and Unemployment in South Africa'S North-West Province," *Development Southern Africa*, September 2001, *18* (3), 261–278.

Nichols, Austin, "RD: Stata Module for Regression Discontinuity Estimation," 2007. Available at http://ideas.repec.org/c/boc/bocode/s456888.html.

Posel, Dorrit, "Intra-Family Transfers and Income-Pooling: a Study of Remittances in KwaZulu-Natal," *South African Journal of Economics*, September 2001, *69* (3), 501–528.

____ **, James A. Fairburn, and Frances Lund**, "Labour Migration and Households: A Reconsideration of the Effects of the Social Pension on Labour Supply in South Africa," *Economic Modelling*, September 2006, *23* (5), 836–853.

Ranchhod, Vimal, "The Effect of the South African Old Age Pension on Labour Supply of the Elderly," *South African Journal of Economics*, December 2006, *74* (4), 725–744.

Ravallion, Martin, "Evaluating Anti-Poverty Programs," World Bank Working Paper 3625 June 2005. Washington D.C.

Sagner, Andreas, "Ageing and Social Policy in South Africa: Historical Perspectives with Particular Reference to the Eastern Cape," *Journal of Southern African Studies*, 2000, *26* (3).

____ **and Raymond Mtati**, "Politics of Pension Sharing in Urban South Africa," *Ageing and Society*, 1999, pp. 393–416.

Sahn, David and Harold Alderman, "The Effect of Food Subsidies on Labour Supply in Sri Lanka," *Economic Development and Cultural Change*, 1996, *45* (1), 125–145.

Samuelson, Paul, "Social Indifference Curves," *Quarterly Journal of Economics*, 1956, *70* (1), 1–22.

Seekings, Jeremy, "World War II and the Reconstruction of the South African Welfare State," Paper presented at "South Africa in the 1940s: Worlds of Possibilities" workshop September 2003. Queen's University, Kingston, Canada. Available at http://www.queensu.ca/sarc/Conferences/1940s/Seekings.htm.

____ **and Nicoli Nattrass**, "Welfare Policy Reform: South Africa in a Comparative Perspective," November 2005.

South African Social Security Agency, "Grants Information and Statistical Reports, available at: http://www.sassa.gov.za," Website, South African Social Security Agency 2007.

Statistics South Africa, "Labour force survey, September 2004," Statistical Release P0210 March 2005.

Wittenberg, Martin and Mark Collinson, "Restructuring of Households in Rural South Africa: Reflections on Average Household Size in the Agincourt Sub-District 1992–2003," Working Paper, University of Cape Town Department of Economics May 2005.

A Unsmoothed Discontinuity Data (Means and 95% Confidence Intervals)

FIG. 14: OAP ASSIGNMENT

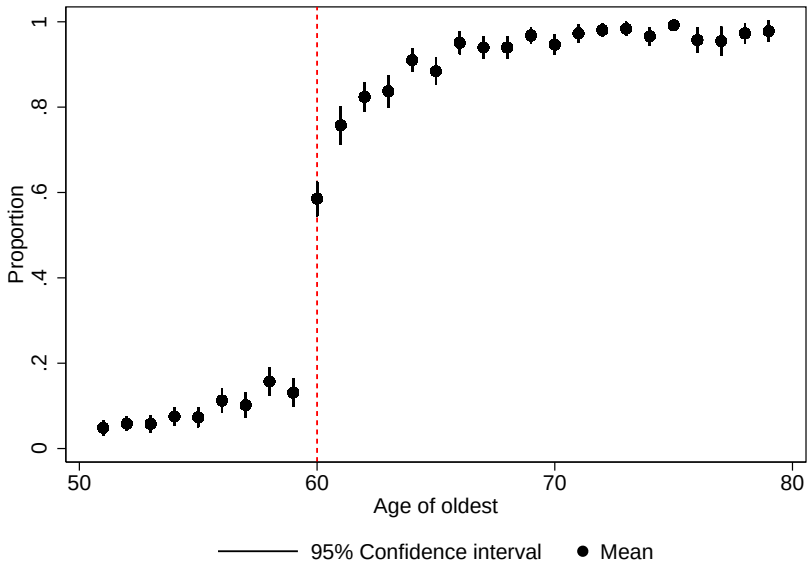


FIG. 15: HH SIZE AND COMPOSITION

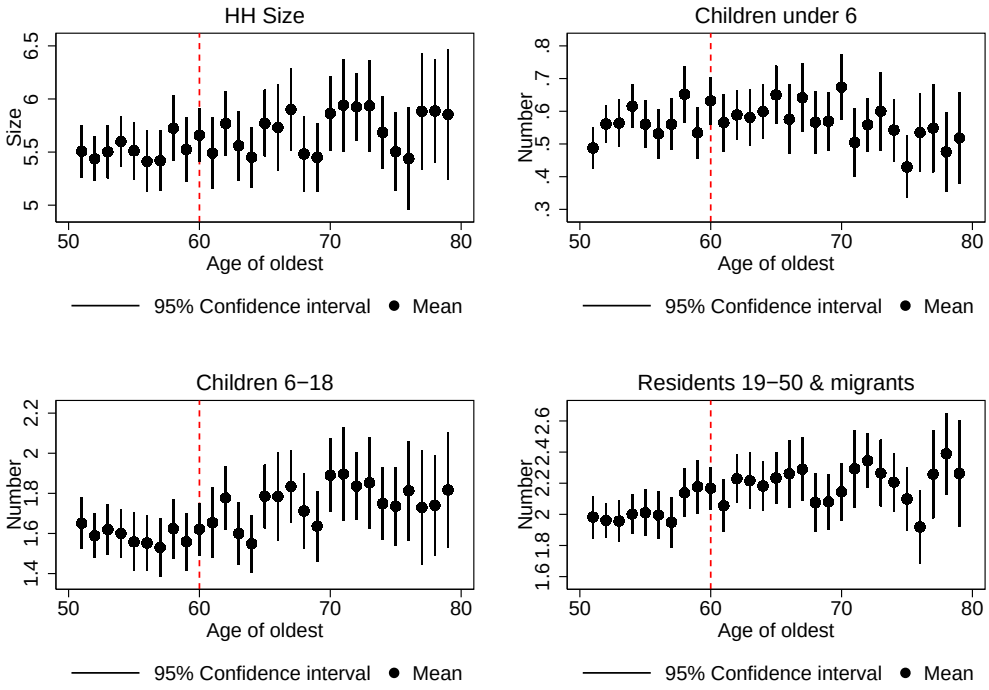


FIG. 16: MIGRATION (CLOCKWISE FROM TOP LEFT: POOLED, MALE, FEMALE)

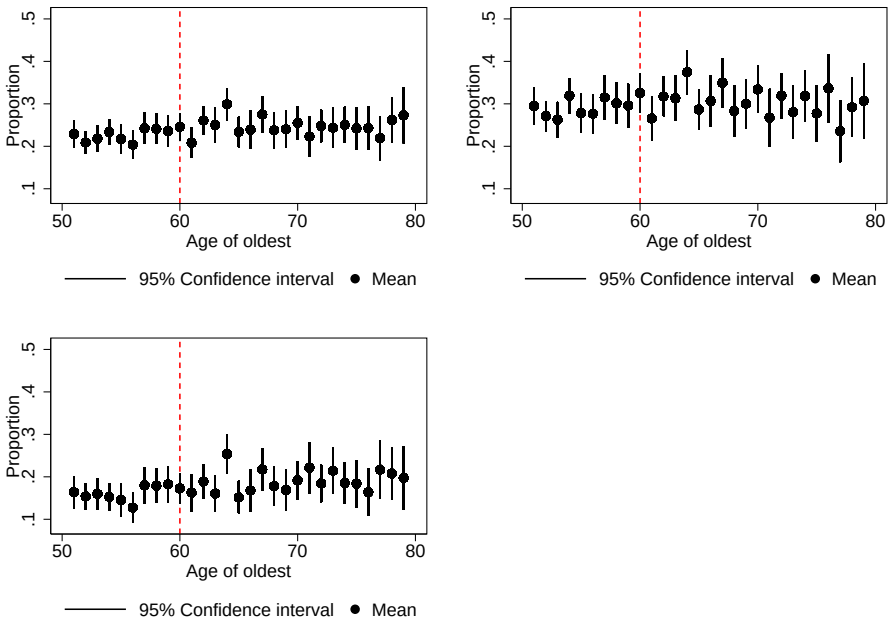


FIG. 17: LABOUR PARTICIPATION (CLOCKWISE FROM TOP LEFT: POOLED, MALE, FEMALE)

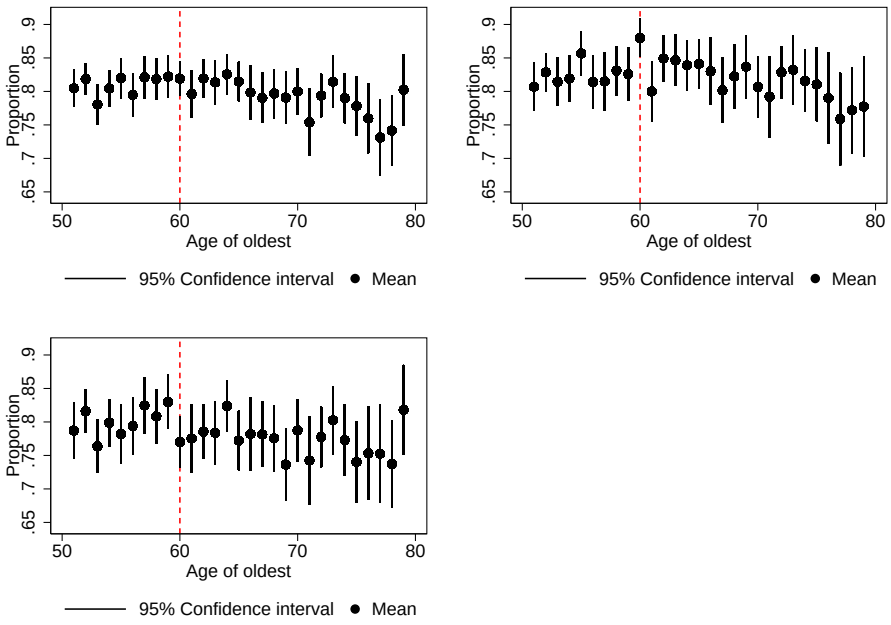
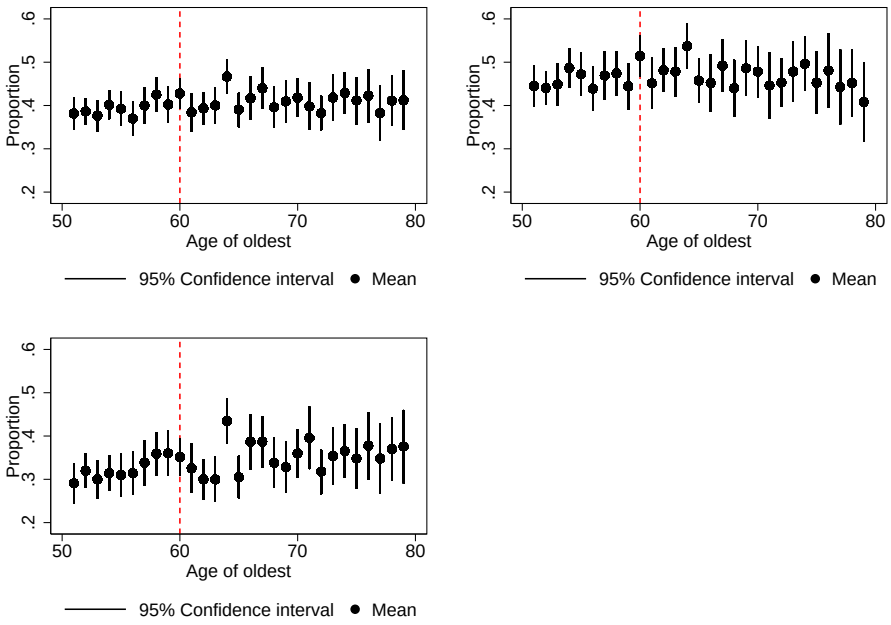


FIG. 18: EMPLOYMENT (CLOCKWISE FROM TOP LEFT: POOLED, MALE, FEMALE)



The Southern Africa Labour and Development Research Unit

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.

Southern Africa Labour and Development Research Unit
School of Economics
University of Cape Town
Private Bag, Rondebosch, 7701
Cape Town, South Africa

Tel: +27 (0) 21 650 5696
Fax: +27 (0) 21 650 5697

Email: brenda.adams@.uct.ac.za
Web: www.saldru.uct.ac.za