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Does the early release of retirement savings prolong labour market participation for workers approaching retirement? Evidence from Australia's 'Transition to Retirement Income Streams' program

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Abstract

Australia's Transition to Retirement Income Streams (TRIS) program aims to prolong participation for older workers (age 55 to 65 years) by offering early access to a worker's compulsory retirement savings (superannuation). Using a difference-in-difference design, our results suggest a small labour supply response which increases after the program's initial years. The size of the effects appear consistent with the program adoption profile which was low initially. For this reason, the results should be viewed as a lower bound on the true effects. We find individuals with higher incomes are more likely to adopt TRIS. At least half of program participants appear to be employing strategies to minimise tax, a behavioural response which seems at odds with the program's intent.

JEL Codes: J19, J26, H2, I38
Keywords: Labor supply, impact evaluation, mature age workers, retirement savings, transition to retirement

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1 Introduction

Governments around the world are encouraging older citizens to remain in the labour market for longer to combat the economic and fiscal challenges posed by ageing populations. Relatively static retirement ages combined with lengthening life expectancies have resulted in larger shares of the population utilising publicly funded pensions, health and aged care services that older citizens commonly rely upon. Governments have typically responded by increasing the qualifying ages for social security benefits and by offering targeted incentives to remain in the workforce.

Increasing the qualifying ages of benefits has been found to be an effective way to increase labour supply rates for older workers[1], while targeted incentives are often found to have little impact[2]. This paper contributes to the international literature by examining Australia's Transition to Retirement Income Streams (TRIS)[3]; a program which offers a novel approach to incentivising labour supply for older workers.

TRIS was introduced on 1 July 2005 and continues to be available at the time of writing. TRIS intends to combat the apparent concern of workers retiring prematurely just to access their superannuation savings. Prior to TRIS, a worker had to be aged 65 years or over to access their retirement savings while remaining in the labour market. TRIS offers limited early access to a worker's compulsory retirement savings (superannuation) for those in the 55 to 65 year age range. Policy makers envisaged that TRIS could be used to supplement the salaries for those who reduce their working hours as they 'transitioned to retirement'. TRIS is taxed at marginal income tax rates minus a 15 percent tax offset. From 1 July 2007 superannuation withdrawals, including TRIS, became tax free for workers over the age of 60 years. This change further incentivised

[1] Mastrobuoni (2009), Staubli and Zweimller (2013), Hanel and Riphahn (2012), Vestad (2013), and Atalay and Barrett (2015) examine these effects in the United States, Austria, Switzerland, Norway and Australia respectively.

[2] See Disney et al. (2010), Ramnath (2013), Feng (2014) and Laun (2017).

[3] Also known as Transition to Retirement (TTR) provisions.

program participation for this age group. An unintended response is to employ TRIS in conjunction with other tax system provisions to minimise tax. Productivity Commission (2015) indicated that it is difficult to precisely ascertain the purpose for which people are using TRIS and, in particular, the extent to which TRIS is encouraging people to remain in the labour market for longer versus simply as a mechanism to minimise tax. These are the key questions this paper examines.

We consider the program in the context of a life cycle model which has two confounding effects that are relevant for labour supply predictions. The 'income effect' typically reduces the retirement age given income and savings goals can be achieved earlier than they would have otherwise in the absence of the program. Contrarily, the 'substitution effect' predicts that people may choose to work longer in response to higher income and savings to increase lifetime consumption. Our intuition suggests that the substitution effect will be stronger given the income effect from TRIS participation may appear small in the context of total lifetime earnings.

We empirically estimate the labour supply and earnings response using administrative data from the Australian Taxation Office (ATO). We use a difference-in-difference (D-i-D) design to measure an 'intent to treat' effect by comparing the changes in participation and earnings in the program's initial years by exploiting the qualifying age threshold (55 years). Similarly, following a policy change from 1 July 2007 which introduced tax free superannuation withdrawals for people aged over 60 years, we repeat this analysis to examine the additional 'tax free' effect for this age group. The causal effects we report are local treatment effects for the 'treatment' age groups only.

We find no employment response in the program's first year, a small positive effect in the program's second year for males only (1.0 percent), and apparent larger effects in subsequent years for both males (1.4 percent) and females (1.1 percent). The magnitude of the effects appear consistent with program adoption rates which were low initially. We

suspect the slow adoption of TRIS is partly explained by a lack of program awareness and other frictions that dampen adoption. Adopting TRIS requires action on the individual's behalf; including research, possible financial advice and setting up a TRIS pension account with one's superannuation fund. Individuals on higher incomes are more likely to use and materially benefit from TRIS.

Modest deviations from the common trends assumption in other years weaken the causal interpretation of the D-i-D estimates. In these years, we provide explanations for other known fiscal, macroeconomic and demographic changes. Further, the consistency between the program adoption rates and the causal estimates provide some confidence that we are detecting the program effects.

We contribute to the international literature on tax system design for older workers approaching retirement. We adapt a life cycle model to consider the effect of program and empirically estimate the labour supply response. Further, we provide previously unavailable insight on program adoption.

2 Background

2.1 Superannuation in Australia

Australia's universal superannuation scheme was introduced in the early 1990s with the goal to provide income in retirement while reducing the reliance on the age pension. For the majority of people, superannuation is held in industry and retail funds which are regulated by the Australian Prudential Regulation Authority (APRA). There is, however, an increasing share of people who elect to use self-managed superannuation funds (SMSFs) to allow greater flexibility and control over the management of their retirement

income[4]. The rules and governance arrangements are complex and have changed over time. In general, employer superannuation contributions, along with superannuation earnings within the fund, are taxed concessionally at a flat rate of 15 percent. Employers are generally required to make superannuation contributions on an employee's behalf at the Superannuation Guarantee contribution rate, though some employers voluntarily elect to pay more. The Superannuation Guarantee rate is currently 9.5 percent of an employee's ordinary time earnings.

Currently, superannuation is only partially funding retirement for individuals leaving the labour market. This is because most retirees tend to have lower superannuation balances due to the fact they have only received compulsory employer contributions for part of their working lives, and at comparatively low rates throughout the Superannuation Guarantee's introductory years. This means that many retirees will continue to rely heavily on the age pension for some time until the superannuation system matures.

The concessional tax treatment of superannuation contributions, earnings and income streams are designed to encourage and bolster retirement savings. These concessions, however, result in a high public cost in forgone tax revenue and the benefits disproportionally go to the wealthy[5]. Official estimates indicate that superannuation concessions on earnings and contributions are the second and third largest tax expenditures after the tax free treatment of owner occupied housing. The Department of the Treasury (2018) estimate that the tax relief for superannuation earnings and contribution account for $19.25 billion and $16.9 billion respectively in 2016-17 alone. These figures emphasise the need to understand how superannuation system is performing and its distributive effects. For further detail, the Productivity Commission (2015) published a review of Australia's retirement income system which highlights design issues and incentives that

[4]The Australian Taxation Office (ATO) and the Australian Securities and Investment Commission (ASIC) work collaboratively to regulate SMSFs.

[5]Department of the Treasury (2012) analysis shows the share of superannuation tax concessions disproportionally goes to those on higher incomes. In 2012-13, for example, Treasury estimate that the top 5 percent of contributors received 20.3 percent of contribution concessions.

are embedded in the system.

2.2 Transition to retirement income streams

TRIS is an Australian Government program that intends to enhance the labour supply of workers aged between 55 and 65 years. The program was was introduced on 1 July 2005 and continues to be available at the time of writing. TRIS offers limited early release to a worker's compulsory superannuation (retirement) savings. Prior to the introduction of TRIS, a superannuation fund member had to satisfy the 'conditions of release' to access their savings. For most, this involved reaching the superannuation preservation age[6] and retiring from the labour market. There was concern among policy makers that these conditions would lead to workers prematurely leaving the labour market just to access their savings. TRIS aims to mitigate this effect by enabling limited 'early access' superannuation draw-downs for qualifying workers. Policy makers envisaged that TRIS could be used to supplement the salaries of those who reduce their working hours as they 'transitioned to retirement'.

TRIS offers up to 10 years early access to superannuation for a worker who remains the labour market to age 65 or older. This represents a 10 year differential between the superannuation preservation age (55 years) and the age that an individual is free to access their superannuation irrespective of their working status (65 years). A person in the 60 to 65 year age range was required to leave the labour market to access their superannuation, while an person in the 55 to 60 year age range was additionally required to declare no intention of returning to the labour market.

TRIS conditionally relaxed these requirements by offering a capped non-commutable superannuation income stream (not a lump sum) for those who who met the superan-

[6] Access to superannuation is generally restricted to those who have reached their preservation age. The preservation age is based on an individual's date of birth. It is 55 years of age for individuals born before 1 July 1960, and gradually increases to 60 years, in one year increments, for individuals born after 30 June 1964.

nuation preservation age requirements and continued to work. The annual TRIS must be no less than 4 percent of an individual's superannuation balance at the beginning of the financial year, and no greater than 10 percent. TRIS attracts the equivalent tax treatment as would apply for retired individuals. This includes a 15 percent tax offset on the annual amount of the income stream, along with tax free earnings within the superannuation fund[7]. From 1 July 2007, the *Simplified Superannuation* package brought a change that made superannuation draw-downs, including TRIS, tax free for people over the age of 60 years. This increased the financial incentive to adopt TRIS.

TRIS was designed to supplement the incomes of older workers who decide reduce their engagement in the labour market. This could include those who move from full- to part-time working arrangements, or who otherwise reduce their work responsibilities with an corresponding reduction in remuneration. A potential failing of the TRIS design is that a work test was not implemented which means the program is poorly targeted. Full-time workers are eligible to use TRIS even if they have no intention of transitioning to retirement. A work test was abandoned in the original design as it was argued it would place an unreasonable compliance burden on superannuation funds. Hanegbi (2013) suggests that this burden should be shifted onto the taxpayer seeking to use TRIS through self-assessment.

For more detail, Section A.1 in the Appendix provides a sense of the program benefits through three simplified use case examples. Section A.2 in the Appendix provides detail on strategies that can be employed to reduce one's tax liability. In this section, we define a 'tax effective strategy' as a scenario whereby a worker draws a TRIS pension while, within the same year, makes voluntary salary sacrificed contributions back into their superannuation fund.

[7]Superannuation fund earnings would otherwise attract a 15 percent tax rate while the fund is in an accumulation phase. This tax free exemption for earnings on TRIS accounts was later repealed from 1 July 2017.

3 Conceptual framework

We adapt a simple life cycle framework to consider the effect of the TRIS on an individual's choice to continue working or retire. Life cycle models have been widely used in the pensions and retirement behaviour literature. Relevant examples we draw from are presented in Burbidge and Robb (1980) and, more recently, Atalay and Barrett (2015) which consider the effects of changes to pension plans on retirement decisions for individuals. The models begin with a person who seeks to determine the optimal time to retire from the labour market. More time in the labour market results in higher savings in retirement. The trade-off in working longer is less leisure.

The life cycle model assumes an individual maximises her lifetime utility subject to her lifetime budget constraint. Utility is defined as a function of consumption and leisure $U(C_t, L_t)$ where marginal utility is held constant over the life cycle. For simplicity, we assume there are only two states in the life cycle: (i) the period an individual works; and (ii) the period an individual is retired. An individual assumes she will live to a specific age T, and will spend time until age R working in the labour market. By construction, T minus R equals the time spent in retirement.

The discounted value of lifetime utility V over time t is presented as:

$$V = \int_0^R U(C_t, 0)e^{-\delta t}dt + \int_R^T U(C_t, 1)e^{-\delta t}dt \tag{1}$$

where the time spent working is denoted as 0, time in retirement is 1, and δ is the discount rate per period of time t. An individual works full-time unless she chooses to move to part-time work arrangements by participating in the TRIS program. Therefore, leisure can only be varied over the life cycle by retiring or, in this analysis, by participating in the TRIS program. Participation in TRIS is captured in the first integral in equation (1) given participation in TRIS is conditional on working.

The lifetime budget constraint (equation (2)) shows that the lifetime discounted value of consumption C equals discounted value of income from work Y, income from TRIS TR, and retirement income RI. We define retirement income broadly. This could include superannuation income, pension income, private savings and/or income derived from other assets. $TRIS_q$ represents the minimum qualifying age for the TRIS program. The first two integrals in equation (2) overlap from the TRIS qualifying age $TRISq$ until the retirement age R, given the program participation is conditional on working.

$$\begin{aligned}\int_0^T C_t e^{-rt} dt = \int_0^R (1-\alpha) Y_t e^{-rt} dt + \int_{TRIS_q}^R (1-\beta) TR_t e^{-rt} dt \\ + \int_R^T (1-\theta) RI_t e^{-rt} dt\end{aligned} \tag{2}$$

In equation (2), α, β and θ represent the tax rates on earnings from work, TRIS, and retirement income respectively. We account for the tax settings to emphasise the inducement effect offered by the retirement income tax concessions. Recall that for TRIS recipients, β will be zero for individuals aged 60 years or more from 2007-08, and attract 15 percent tax offset on this income otherwise. From this point, we do not include the tax rate components in the subsequent equations to simplify the notation.

The relationship between the income components in equation (2) is complicated and will depends several factors. In equation (3) we shows that retirement income RI at time t is a function of income from work Y and income from TRIS TR. The derivative of income from work will be greater than zero ($f_Y > 0$) given more time in the labour market will result in more retirement income. The derivative of TRIS income will be less than zero ($f_{TR} < 0$) given the program is providing early access to retirement income RI.

$$RI_t = f(Y_t, TR_t) \tag{3}$$

The optimization problem with respect to C and R can be expressed as a Lagrangian function, using equation (1) and equation (2), and solved for any value of R, where R is constrained as a value greater than zero and less than T. The individual seeks to maximise utility subject to the budget constraint with respect to C and R. For simplicity, we express $U(C,0) = U_C^W$ and $U(C,1) = U_C^R$ and let δ equal r.

$$\begin{aligned}\mathcal{L} = &\int_0^R U_C^W e^{-rt} dt + \int_R^T U_C^R e^{-rt} dt \\ &- \lambda \left\{ \int_0^T C_t e^{-rt} dt - \int_0^R Y_t e^{-rt} dt - \int_{TRIS_q}^R TR_t e^{-rt} dt - \int_R^T RI_t e^{-rt} dt \right\}\end{aligned} \tag{4}$$

The first-order conditions (excluding the budget constraint) state that the individual's marginal utility of consumption while both working and in retirement are equal. This equals the Lagrange multiplier λ constant (equation (5)), which by definition represents the marginal utility of wealth.

$$U_C^W = U_C^R = U_C = \lambda \tag{5}$$

$$U_C^R - U_C^W + \lambda \left\{ Y_t + \int_{TRIS_q}^R \frac{dTR}{dR} e^{-rt} dt - RI_t \right\} = 0 \tag{6}$$

The individual seeks maximize utility subject to C and R. We set equation (6) zero and, using expression (5), rearrange equation (6) to arrive at equation (7).

$$\frac{U_C^R - U_C^W}{U_C} = Y_t + \int_{TRIS_q}^R \frac{dTR}{dR} e^{-rt} dt - RI_t \tag{7}$$

The left hand side of the equation (7) shows the marginal rate of substitution between retirement and consumption. This is the marginal utility gained from an additional year in retirement divided by the marginal utility of an increase in consumption per year.

We rearrange the right hand side of equation (7) to give equation (8). The right hand side shows the slope of the budget constraint which captures the trade off of foregoing an additional year of retirement against the increase in lifetime income.

$$\frac{U_C^R - U_C^W}{U_C} = Y_t + \frac{dTR}{dR}\left(\frac{1 - e^{-r(R-TRIS_q)}}{r}\right) - RI_t \tag{8}$$

The life cycle model has two effects that are relevant for predicting the labour supply response. The first is the income effect. The tax concessions offered by TRIS are similar to the effect of a wage increase. An increase in income typically reduces the retirement age. This is because income and savings goals can be achieved earlier than they would have otherwise in the absence of the program. The second effect is the substitution effect which confounds the income effect. A higher wage will, contrarily, increase lifetime consumption. People may, therefore, choose to substitute time in retirement for additional time in the labour market to increase income and savings. The theory on the dominant effect is ambiguous. Our intuition for the TRIS program, however, suggests that the substitution effect will be stronger. This is because the income effect may appear small in the context of total lifetime earnings, noting the qualifying age for TRIS restricts the program benefits to the latter years of one's working life. Ultimately, teasing out the magnitude of the income and substitution effects is a matter for empirical research.

4 Related Literature

We are not aware if there are other countries that have piloted approaches like TRIS to prolong participation. As such, the literature on the effects of similar programs appear scarce. Typically, early access to compulsory retirement savings are only provided in rare and exceptional circumstances, including severe financial hardship, on compassionate

grounds, or for people with terminal medical conditions. The literature on retirement decisions in response to policy change usually focus more on changes to policy parameters such as the increases to the pension or social security qualifying ages. Examples include Mastrobuoni (2009), Staubli and Zweimller (2013), Hanel and Riphahn (2012), Vestad (2013), and Atalay and Barrett (2015) who examine these effects in the United States, Austria, Switzerland, Norway and Australia respectively. These studies find the increase in the qualifying age is effective at prolonging time in the labour market, with larger responses identified for lower educated workers. Otherwise, Hanel (2010) examines a financial incentive that aimed to delay retirement following a pension reform in Germany. The reform introduced a change that was estimated to have reduced pension benefits for early retirees which delayed retirement by about 10 months on average. Laun (2017) examine the effect of age targeted credits on labour force participation of older workers in Sweden. The results show small positive extensive margin effects which lead the author to conclude that tax incentives for older workers can be a viable tool for delaying retirement.

Ramnath (2013) examines taxpayer responses to the Saver's Credit program in the United States. This is a tax incentive designed to encourage retirement savings among low and middle income earners. The authors note that, while the incentives are generous, take up of the program is low due to its complexity and the non-refundable nature of the credit; meaning a substantial share of the target group not able to realise the benefits. Similarly, Feng (2014) examine the effect of tax incentives on salary sacrifice superannuation contributions participation in Australia. The author finds participation in the program is relatively low, despite generous tax incentives. Various reasons are put forward to explain these results, including the lack of knowledge of the policy, competing vehicles for long-term saving, and a common belief that compulsory saving through Australia's superannuation guarantee will be 'enough' to fund one's retirement. Similarly, Disney et al. (2010) examine the participation of a new private pension ar-

rangement in the United Kingdom which aimed to incentivise retirement savings. They find little or no impact on savings behaviour. The authors also note that there is little agreement in the literature in terms of what policies are most effective at encouraging private savings.

A lack of tax system engagement for some groups is a recurring theme in the literature that is thought to limit the effectiveness of targeted programs. Eissa and Liebman (1996) cite evidence from interviews with Earned Income Tax Credit (EITC) recipients that revealed many individuals had heard of the EITC program in the United States but did not understand how it related to their earnings. Chetty et al. (2009) find that the provision of EITC program information to EITC recipients at the right time can induce material labour supply responses. This study provides evidence to support to the hypothesis that people do not fully optimise behaviour in response to government policy due to a lack of engagement; challenging what is often a core assumption in the public finance literature. For retirement savings incentives, Feng (2014) also cited a lack of knowledge as a factor which results in low participation. Worthington (2008) suggests that a policy response to increase knowledge could be to provide subsided, or compulsory, retirement planning advice for people at particular work-life milestones.

5 Data and variable construction

We use ATO administrative data and Australian population estimates (Australian Bureau of Statistics (2020)), following the data construction methodology of Carter and Breunig (2019). We augment data from three sources to derive labour supply rates for the age groups of interest within the Australian resident population. This approach is required given the ATO data alone does not account for the entire population of working and non-working individuals. Table 1 illustrates how the different data sources are combined to construct labour supply rates.

Table 1: Data sources

	Worked	Did not work
Filed	Income tax return data	Income tax return data
Did not file	PAYG payment summary data (for salary or wage payments only)	Residual population calculated from ABS estimates

We use the ATO's Income Tax Return (ITR) data to capture the share of the population who filed a tax return. Using this data, we classify those who worked and those who did not according to the specific sources of their income (this approach is discussed in the next section). We use the ATO's salary and wage Pay-As-You-Go (PAYG) payment summary data to account for the small share of individuals who appear to have worked, but did not file a return. We account for the remaining non-working population by 'topping up' our sample to match aggregate resident population estimates, published by Australian Bureau of Statistics (2020). We exclude non-resident tax filers to align the data construction method more closely with the ABS definition. We also exclude a very small share of deceased tax filers who passed away before the beginning of a given lodgement year[8].

We draw on the ATO's superannuation Member Contribution Statement (MCS) data to observe contributions to superannuation accounts. We include employer contributions to broaden our 'working' and 'earnings' definitions to capture the small share of individuals who salary sacrifice their entire salary and wage payments into their superannuation account. Workers in this category would not have otherwise be counted by our 'working' definitions.

Using this approach, we construct a panel dataset for a period that spans sixteen financial years, from 2000-01 to 2015-16, for people who are aged 53 to 62 years by the end of a given financial year. The panel captures the five years before the TRIS was introduced, along with the first eleven years it was available. There are 40.2 million observations

[8]Filing can occur beyond death in cases where taxable income continues to accrue until the estate of the deceased is dissolved.

over this period which, by construction, matches the ABS population estimates. The data were extracted from ATO's systems on 1 November 2018.

5.1 Measures of labour supply and earnings

The ATO data does not directly record the working status of people. There are, however, various options to derive measures of labour supply from the data. For instance, it should be reasonable to assume that people who report salary and wage payments worked to earn this income. This simple inference can be broadened to include other 'earned income' fields from the tax return. To do so, we start with the ATO definition that was used as a work test to administer the now discontinued Mature Age Worker Tax Offset (MAWTO). This definition, known as 'Net income from working', is presented in Table 2 is the sum of work-related income minus work-related expenses. For our study, we add 'total employer superannuation contributions' (component 12 in Table 2) as mentioned in the previous section. This addition, however, does not have a material effect on our results.

The ATO measure, which was referred to as 'Net income from working' (NIFW), is not available in ATO databases for workers below the MAWTO's qualifying age threshold and in years the MAWTO was not available. Further, it cannot be perfectly recalculated for people with business and partnership income because they were required to complete a supplementary schedule in the years that the MAWTO was in force. This schedule asked taxpayers to separate the income components that were derived from work (as opposed to passive income). This income is reported in component 11 in Table 2 which cannot be perfectly recalculated.

To create an alternative variable that is consistent over time and for all age groups of interest, we recalculate NIFW using all components in Table 2, noting we are overstating component 11 income as we cannot separate the share that is attributed to work.

This does not have a material effect for the purpose of classifying a person's working status, but will slightly overestimate 'earned income' for individuals with business and partnership income.

Table 2: 'Net income from working 2', adjusted ATO definition

	Net income from working	
=	Total gross salary and wage payments	(1)
+	Income from allowances, earnings, tips, director's fees etc.	(2)
+	Attributed personal services income	(3)
+	Total reportable fringe benefits (RFB) amounts (if RFB >= RFB threshold)	(4)
–	Work related car expenses	(5)
–	Work related travel expenses	(6)
–	Work related clothing expenses	(7)
–	Work related self education expenses	(8)
–	Other work related expenses	(9)
–	Low value pool deduction[1]	(10)
+	Net income from working (supplementary section)[2]	(11)
+	*Total employer superannuation contributions*	*(12)*

[1] Low value pool deductions refer to 'low-cost' and 'low-value' assets used in the course of generating income. These are assets costing less than $1,000 which can be depreciated over multiple tax lodgement years.
[2] NIFW (supplementary section) refers to business and partnership income that is derived from working.

To provide insight into the sensitivity of our definitions on our results, we examine the following three labour supply measures:

1. NIFW indicator 2 – this measure re-calculates ATO's 'NIFW indicator' measure by summing the tax return components shown in Table 2. This measure slightly overestimates component 11 in Table 2.

2. NIFW indicator 3 – This measure removes component 11 in Table 2 from the definition. This change reduces employment rates by around 12 percent for males and 7 percent for females.

3. Salary & wage indicator – this is a simple measure which further underestimates the true labour supply rates. Salary and wage payments (component 1) are by far the most commonly reported earning component in Table 2. This measure reduces employment rates by 14 percent for males and 8 percent for females, relative to

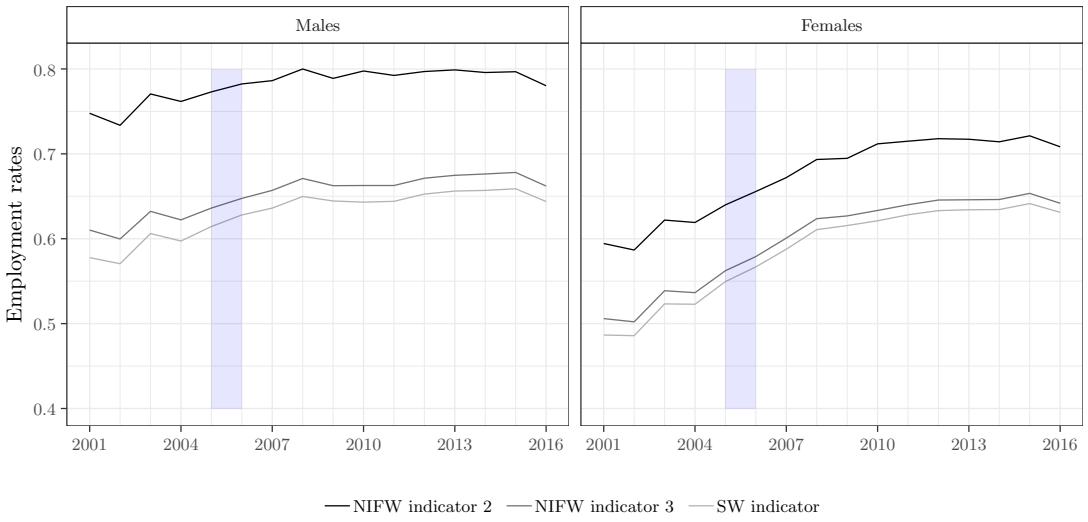

Figure 1: Derived employment rates for individuals aged 56 years

NIFW indicator 2.

The difference in derived labour supply rates are shown graphically in Figure 1 for males and females aged 56 by the end of a given financial year. For this analysis, we prefer NIFW indicator 2 given it captures a broader group of people with business and partnership income who are likely to materially benefit from tax planning strategies.

5.2 Data limitations

In contrast to survey data, the ATO's administrative data are better suited to this study given we wish to examine specific effects of TRIS which is administered through the tax and superannuation systems. The administrative data provide a richer source of relevant income components and flows to and from superannuation accounts, including those who receive tax offsets on qualifying superannuation income streams. The administrative data also enables more precise estimates, relative to survey datasets, given additional statistical power is obtained from larger samples.

There are however draw-backs. The administrative data has fewer variables to control for

individual characteristics. We also cannot ascertain when an individual worked within a given year, or for how long, given a measure for hours worked is not available. Thus we can only analyse extensive margin effects of the program. We do present results on the 'earned income' effects which could be thought as an imperfect proxy to analyse intensive margin effects.

5.3 Identifying TRIS recipients

TRIS recipients cannot be directly identified in the ATO data. While TRIS are taxable income for all in the program's initial years, there is no indicator to distinguish TRIS from other superannuation income streams[9]. Fortunately, identifying TRIS recipients is not critical for the main analysis on the employment and earnings effects. We do, however, attempt to identify people with 'TRIS-like-behaviour' by deriving rules. These rules identify people as TRIS recipients if they worked (according to our three NIFW definitions) while drawing income from their superannuation in the same year. For taxpayers who meet this rule, we include an additional condition to ensure recipients are receiving a tax offset of 15 percent of the superannuation income stream[10]. This additional condition filters out individuals who receive income streams from defined benefits schemes which attract a 10 percent offset. Further, given the data are recorded on an annual basis, we remove individuals who observe 'TRIS-like behaviour' in a single year only. It is likely that the majority of workers in this category are ordinary retirees. That is, they simply worked part of the year before retiring and drawing a superannuation income stream in the same financial year. We show the share of the population who exhibit 'TRIS-like-behaviour', as identified by the NIFW indicator 2 measure, in Figure 2 for males and females. These charts reveal that the adoption of TRIS appears relatively

[9]This is with the exception of individuals who draw TRIS from SMSFs from 2008-09. From this year, there was a change to the SMSF income tax return form that required direct identification of TRIS draw downs.

[10]We actually allow for a tax offset range between 14 percent and 16 percent to account for rounding effects, but find that the results are not sensitive to this requirement.

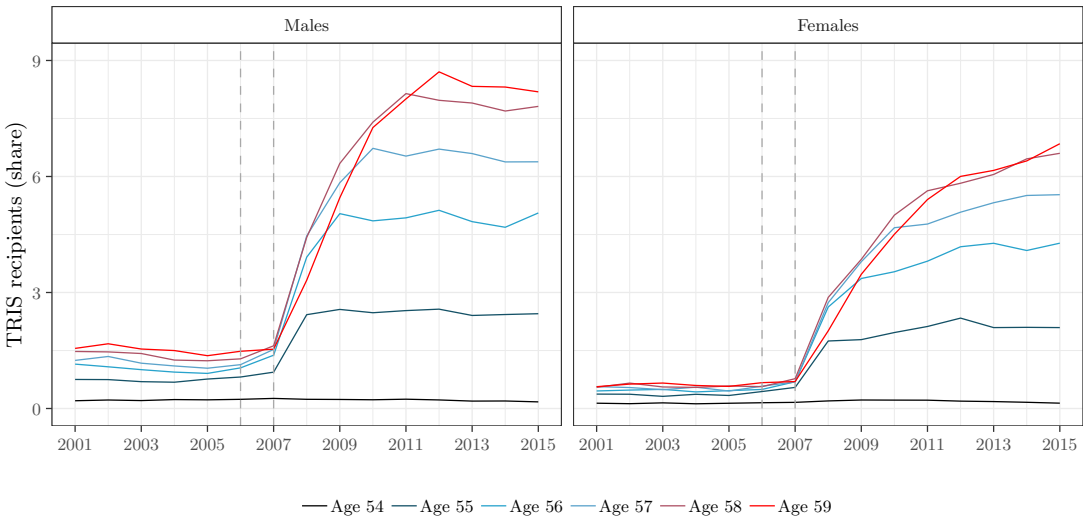

Figure 2: 'TRIS-like-behaviour', using NIFW indicator 2 TRIS rule

subdued in the first two years the program was available before increasing sharply and plateauing towards the end of the period.

There are three points we wish to emphasise. First, the figures show that there is a relatively stable cohort of individuals who are classified as TRIS recipients before the policy was introduced (pre 2005-06). It is likely that these people are receiving an annuity stream before TRIS was introduced. Unfortunately, our rule fails to separate this cohort from actual TRIS recipients. Second, there is also a very small and stable share of individuals who are aged 54, below the superannuation preservation age, who fit our 'TRIS-like-behaviour' definition. This cohort could be individuals with rare and exceptional circumstances who are receiving superannuation income streams before reaching the superannuation preservation age. Third, our rule fails to capture recipients over the age of 60 from 2007-08. This is because TRIS were no longer reported on the income tax return given the tax free status of this income.

Data are available from 2007-08 for those drawing TRIS from self-managed superannuation funds (SMSFs), following change to the SMSF annual return that introduced

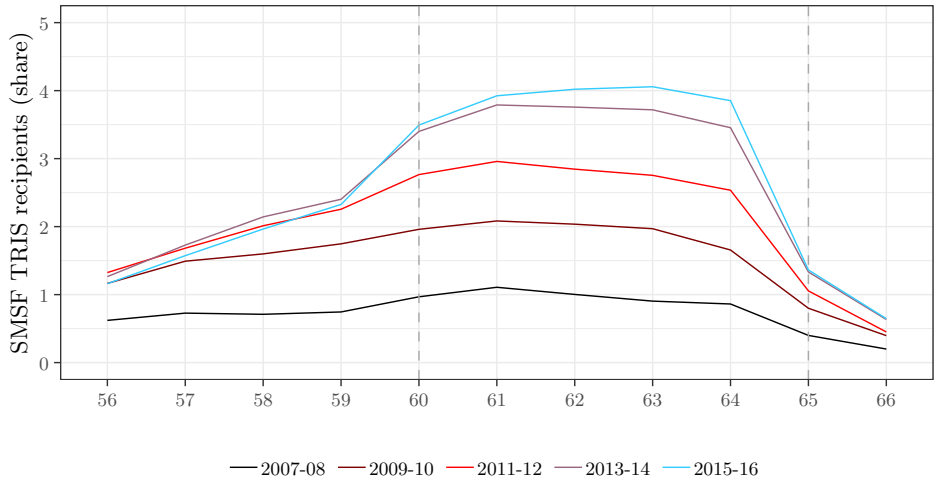

Figure 3: Reported SMSF TRIS, males and females pooled

a field to identify TRIS directly. Previously, TRIS were pooled with other reportable superannuation income steams. The benefit of these data is that it provides insight on program adoption for individuals aged 60 years and over. Taking this data at face value (i.e. not using our 'TRIS-like-behaviour' rule), we plot the share of the population who reported TRIS by age and income year in Figure 3. In this figure, we have pooled males and females and show age on the x-axis to show the increased uptake for people in the 60 to 64 year age range who benefit from tax free TRIS. The figure reveal three points of interest. First, we see that program adoption continues to increase with time and age. Second, we observe that the rate of change in uptake for people aged 60 years becomes more acute in the latter years. It therefore appears to imply a 'learning effect' as program adoption matures. Third, we can also see the expected drop off in TRIS participation from age 65 given this group is free to access their superannuation irrespective of their working status.

In Section A.3 of the Appendix we use APRA data as an independent cross-check for our derived 'TRIS-like-behaviour' rules. Despite some technical issues between the two data sources, we find our method produces a number of TRIS recipients that is broadly

comparable to the APRA data. The APRA statistics additionally show the strength in TRIS adoption for individuals aged over 60 years, which we cannot observe in the ATO data. Adoption for the 60 to 64 year age range almost doubles relative to the 55 to 59 age grouping for individuals with APRA regulated (non-SMSF) accounts.

6 Identification strategy

6.1 Difference-in-difference

We use a D-i-D design to detect the labour supply and corresponding earnings response to the TRIS. This is an 'intent to treat' effect given the voluntary nature of the program. We compare the difference in labour supply rates of 54- (control) and 56-year-olds (treatment) in the TRIS' first year (2005-06) with the same difference in the year before it was introduced (2004-05). We do not focus on the difference in 55-year-olds given there is a partial treatment effect. This arises due to the annual frequency of the data meaning only around half of the people who are aged 55 years by the end of a given financial year qualify for TRIS. The first income year that the TRIS was available, along with the minimum qualifying age, provide crisp boundaries to assign 'control' and 'treatment' groups before and after TRIS' introduction. We compare individuals who are close in age as they are likely to be similar in other ways. We subsequently repeat this analysis for the corresponding measures of earnings. We estimate the effects of males and females separately, given the labour supply rates differ by sex. Pooled results were also estimated but not presented given they show a weighted average of the D-i-D coefficients by sex.

Noting that the TRIS adoption profile appeared relatively flat in the first year, we then examine the effect on the D-i-D estimates of skipping the first year TRIS were available. Under this estimation the control group remains the same, however 2006-07 is assigned

as the treatment year. The intention is to see whether an increased effect is detected in the second year. We then again repeat this approach for the program's third year. These D-i-D estimates are discussed in the 'Empirical results' section.

Once we account for the different labour supply rates by age and sex, along with wage inflation between periods, our control and treatment groups appear similar in other ways. The summary statistics are presented in Table A.3 and Table A.4. These tables include statistics on two 'treatment' groups that we examine separately (2005-06 and 2006-07).

We repeat this approach to estimate this additional tax free effect for workers aged 60 years or over from 2007-08 (treatment), by comparing the labour supply rates in 2006-07 (control). In this case we compare labour supply rates of individuals aged 59 years (control group) and with individuals aged 61 (treatment group). As with the previous estimates, we skip reporting results for individuals age 60 given the partial-treatment effect.

A key identifying assumption of D-i-D is that common trends hold in periods where there is no 'treatment'. This assumption is required in order to isolate the treatment effect of the TRIS with confidence. We graphically present these trends and discuss the factors that challenge this assumption in the 'Robustness checks' section.

Further, reflecting on the life cycle model presented in Section 3, we emphasise that the D-i-D design only attempts to detect the local treatment effects for the two 'treatment' age groups mentioned above, 56 and 61 year olds. The D-i-D design does not attempt to isolate effects for other age groups who could have different responses.

7 Model specification

7.1 Labour supply

We estimate linear probability models to detect the effect of the TRIS on labour supply (see equation (9)). A binary dependent variable $participation_{it}$ takes the value of 1 if an individual is working in a given year. We define working as a 'non-zero' amount of earned income according to our definitions (the 'earned income' components were previously shown in Table 2). The explanatory variables are also binary. The first taking a value of 1 if the TRIS qualifying age was met ($D_i = 1$ if aged 56). The second indicates whether the TRIS was available in the given year ($T_t = 1$ if TRIS was available). Finally, the D-i-D estimator is the estimate of β_3 from the interaction of $T_t = 1$ and $D_i = 1$.

$$participation_{it} = \beta_0 + \beta_1 D_i + \beta_2 T_t + \beta_3 (D_i \cdot T_t) + \epsilon_{it} \tag{9}$$

We do not have any additional controls available for the labour supply estimation. This is because our data construction approach utilises official population estimates to account for the assumed non-working population that is not observed in the administrative data. Hence, no further information is available on these people other than their sex.

7.2 Earned income

To examine the effect on earnings we substitute binary dependent variable from equation (9) with the corresponding log dollar value of 'earned income' (equation (10)). This is the sum of some or all of the income components in Table 4, depending on the measure. This estimation is conditional on working so we exclude the non-working individuals from the data, as defined by the NIFW measures. Noting that there is a small share of individuals who report negative business income (a loss) we convert their

negative income values to $0.01 and assign an additional dummy variable as a control for this group.

$$ln(income_{it}) = \beta_0 + \beta_1 D_i + \beta_2 T_t + \beta_3 (D_i \cdot T_t) + \beta_4 negative_{it} + \epsilon_{it} \quad (10)$$

8 Empirical results

8.1 Labour supply

Table 3 presents the average employment rates for the control and treatment groups in the 12 month periods before and after the introduction of the TRIS. The employment rates in Columns 1 and 2 show that a higher share of people aged 54 years (control group) work, compared with people aged 56 years (treatment group). This is consistent with observed labour supply rates which peak at around age 50 before beginning to trend down as workers gradually retire with age. The difference in employment rates between the two periods is shown in Column 3, and the D-i-D estimate is shown in Column 4. Labour supply rates range from 57.7 percent for females aged 56 years under the salary & wage measure, to 84.3 percent for males are 54 years under the more comprehensive NIFW indicator 2 measure. The D-i-D estimates for the treatment group (individuals age 56 years) are presented in Column 4. These estimates imply that TRIS did not have an effect that was significantly different from zero in the first year it was available. These results appear consistent with the TRIS adoption profile (shown in Figure 2).

Noting the apparent delayed adoption of the TRIS program, we test the effect of skipping the first year (2005-06) to see whether we begin pick up a response if 2006-07 is assigned the treatment year. In Table 4 we present two variations of the D-i-D coefficients. Column 1 shows the D-i-D estimators from previous table (Table 3) and Column 2 shows the D-i-D estimators which pick up the second year response. The results for

Table 3: Labour supply rates in periods before and after the introduction of TRIS

		Pre-TRIS 2004-05 (1)	TRIS 2005-06 (2)	Difference (2 – 1) (3)	Difference-in-difference (4)
Males					
A	*NIFW indicator 2*				
	Treatment (age 56)	0.7977	0.8080	0.0102***	
	[249,728]	(0.0011)	(0.0011)	(0.0016)	
	Control (age 54)	0.8317	0.8432	0.0115***	-0.0013
	[256,949]	(0.001)	(0.001)	(0.0015)	(0.0022)
B	*NIFW indicator 3*				
	Treatment (age 56)	0.6729	0.6867	0.0138***	
	[249,728]	(0.0013)	(0.0013)	(0.0019)	
	Control (age 54)	0.7111	0.7234	0.0124***	0.0014
	[256,949]	(0.0013)	(0.0012)	(0.0018)	(0.0026)
C	*Salary & wage indicator*				
	Treatment (age 56)	0.6557	0.6711	0.0154***	
	[249,728]	(0.0014)	(0.0013)	(0.0019)	
	Control (age 54)	0.6962	0.7089	0.0127***	0.0027
	[256,949]	(0.0013)	(0.0013)	(0.0018)	(0.0026)
Females					
D	*NIFW indicator 2*				
	Treatment (age 56)	0.6603	0.6778	0.0175***	
	[250,487]	(0.0013)	(0.0013)	(0.0019)	
	Control (age 54)	0.7168	0.7362	0.0194***	-0.0019
	[258,953]	(0.0013)	(0.0012)	(0.0018)	(0.0026)
E	*NIFW indicator 3*				
	Treatment (age 56)	0.5873	0.6060	0.0186***	
	[250,487]	(0.0014)	(0.0014)	(0.002)	
	Control (age 54)	0.6476	0.6687	0.0212***	-0.0025
	[258,953]	(0.0013)	(0.0013)	(0.0019)	(0.0027)
F	*Salary & wage indicator*				
	Treatment (age 56)	0.5765	0.5959	0.0194***	
	[250,487]	(0.0014)	(0.0014)	(0.002)	
	Control (age 54)	0.6387	0.6597	0.0211***	-0.0017
	[258,953]	(0.0013)	(0.0013)	(0.0019)	(0.0027)

Notes: Labour supply equals one if the specific NIFW measure has a dollar value that does not equal zero. Sample size is presented in the square brackets and robust standard errors in parentheses. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

males now become slightly positive and significant. The response ranges from half a percentage point for NIFW indicator 2, to 1.0 percentage point for NIFW indicator 3 and the Salary & wages indicator. The employment response for females remains statistically insignificant.

We also examine the effect of skipping the second year by assigning 2007-08 as the treatment year given TRIS adoption appeared to increase substantially from this year. These results now show stronger labour supply responses of up to 1.4 percentage points for males and up to 1.1 percentage points for women. As with the previous estimates, the response appears consistent with the observed trends in TRIS adoption. We note, however, that the identification weakened under this estimation given the reassigned treatment year coincides with the *Simplified Superannuation* reforms package which may have influenced the employment rates for our control and treatment groups differently, in addition to moving further away from our control year (2004-05). Nevertheless, the larger response does seem plausible given the TRIS adoption profile.

The bottom half of Table 4 shows the responses for individuals over the age of 60 from 2006-07. We find statistically significant results for both men and women under both scenarios irrespective of whether we skip the first year TRIS were tax free (2007-08). The response for men is as high as 2.5 percentage points in 2007-08 and up to 1.4 percentage point 2008-09 when this year is assigned the treatment. The response for women is around half the response for men under all measures.

8.2 Earned income

Table 4 also reports the results for the corresponding 'earned income' (conditional on working) measures. These results are mixed which probably reflects the balancing effect of the different TRIS strategies that workers can employ. The D-i-D estimators for people aged 56 range from not significantly different from zero to 2.4 percent for NIFW

Table 4: TRIS effects on 'labour supply' and 'earnings' (D-i-D coefficients)

	2004-05 vs 2005-06		2004-05 vs **2006-07**	
	(1)		(2)	
ITR, PAYG *and* ABS estimates	54 vs 56		54 vs 56	
Labour supply			Males	
NIFW 2 D-i-D (TRIS · Age)	-0.0013	[0.0022]	0.0052**	[0.0021]
NIFW 3 D-i-D (TRIS · Age)	0.0014	[0.0026]	0.0102***	[0.0026]
Salary & wage D-i-D (TRIS · Age)	0.0027	[0.0026]	0.0101***	[0.0026]
			Females	
NIFW 2 D-i-D (TRIS · Age)	-0.0019	[0.0026]	-0.0008	[0.0025]
NIFW 3 D-i-D (TRIS · Age)	-0.0025	[0.0027]	0.0001	[0.0027]
Salary & wage D-i-D (TRIS · Age)	-0.0017	[0.0027]	0.0003	[0.0027]
ITR *and* PAYG data	54 vs 56		54 vs 56	
Earned income			Males	
NIFW 2 D-i-D (TRIS · Age)	0.0173**	[0.0073]	0.0244***	[0.0073]
NIFW 3 D-i-D (TRIS · Age)	0.0018	[0.0079]	0.0161**	[0.0079]
Salary & wage D-i-D (TRIS · Age)	0.0021	[0.0080]	0.0179**	[0.0080]
			Females	
NIFW 2 D-i-D (TRIS · Age)	-0.0080	[0.0083]	0.0012	[0.0082]
NIFW 3 D-i-D (TRIS · Age)	-0.0175**	[0.0084]	-0.0099	[0.0082]
Salary & wage D-i-D (TRIS · Age)	-0.0190**	[0.0084]	-0.0084	[0.0083]
	2006-07 vs 2007-08		2006-07 vs **2008-09**	
ITR, PAYG *and* ABS estimates	59 vs 61		59 vs 61	
Labour supply			Males	
NIFW 2 D-i-D (TRIS · Age)	0.0247***	[0.0026]	0.0110***	[0.0026]
NIFW 3 D-i-D (TRIS · Age)	0.0253***	[0.0028]	0.0136***	[0.0028]
Salary & wage D-i-D (TRIS · Age)	0.0238***	[0.0028]	0.0115***	[0.0029]
			Females	
NIFW 2 D-i-D (TRIS · Age)	0.0134***	[0.0029]	0.0058**	[0.0029]
NIFW 3 D-i-D (TRIS · Age)	0.0113***	[0.0029]	0.0058**	[0.0029]
Salary & wage D-i-D (TRIS · Age)	0.0113***	[0.0029]	0.0050*	[0.0029]
ITR *and* PAYG data	59 vs 61		59 vs 61	
Earned income			Males	
NIFW 2 D-i-D (TRIS · Age)	0.0024	[0.0088]	0.0020	[0.0092]
NIFW 3 D-i-D (TRIS · Age)	-0.0149	[0.0093]	-0.0133	[0.0097]
Salary & wage D-i-D (TRIS · Age)	-0.0166	[0.0102]	-0.0110	[0.0099]
			Females	
NIFW 2 D-i-D (TRIS · Age)	0.0074	[0.0112]	0.0137	[0.0111]
NIFW 3 D-i-D (TRIS · Age)	-0.0229**	[0.0113]	-0.0197*	[0.0111]
Salary & wage D-i-D (TRIS · Age)	-0.0263**	[0.0114]	-0.0217*	[0.0111]

Notes: Robust standard errors are presented in brackets. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

indicator 2 when 2006-07 is assigned the treatment year. The inverse is true for females where we find the results range from insignificant to negative 1.9 percent when 2005-06 is assigned the treatment year. Taken at face value, this may imply males are more likely to use TRIS to boost income in the current year (e.g. continue working full time while drawing TRIS), while females reduced their attachment to the labour market, however TRIS isn't quite topping up their incomes to previous levels. Unfortunately, it is not possible to disentangle these effects given a measure for time spent working is unavailable in the data.

The bottom half of Table 4 shows the earned income D-i-D estimates for individuals age 61 in 2007-08 and 2008-09 (skipping the first year). Here we find no effect for males and, consistent with the previous estimates, slightly negative results for females. Column 1 shows that the earnings effect for women are not statistically different from zero for NIFW indicator 2, while both NIFW indicator 2 and the salary and wage indicator are both negative and statistically significant. The estimates are similar but slightly stronger when 2008-09 is assigned the treatment year.

8.3 TRIS adoption – supplementary descriptive analysis

We regress the binary 'TRIS-like-behaviour' variable against a series of explanatory variables to gain insight on TRIS adoption over time. The intention is to provide some descriptive analysis to provide additional context for the main results. The underlying population for this analysis includes all tax filers in the 54 to 59 year age range for the financial years 2004-05 to 2015-16. Unfortunately, individuals aged 60 years and over are excluded given our 'TRIS-like-behaviour' rule fails for this age group. The following linear probability model is estimated separately for males and females:

$$tris_{it} = \beta_0 + \beta_1 D2006_t + \beta_2 D2007_t + \beta_3 D2008_t + ... + \beta_{11} D2016_t + \epsilon_{it} \qquad (11)$$

In equation (11), $tris_{it}$ is an indicator if the individual was drawing a TRIS in a given financial year. This variable is equivalent to the series plotted in Figure 2. The right hand side includes financial year dummies to reveal how the adoption of TRIS has changed over time. Robust standard errors in this estimation are clustered at the individual. The coefficients show the TRIS adoption rates relative to the year before the policy was introduced (2004-05), the year where no dummy was assigned. We then extend this basic model to include controls for age as at 30 June in a given year, before further extending the estimation a third time for additional controls that are available. These controls include the log of taxable income[11], and the following binary controls: self-prepared tax return (as opposed to using a tax agent); whether the individual reported a partner; indicators of geographical remoteness; and for taxpayers who report any income in the following categories: Personal Services Income (PSI); business and partnership income; dividend income; and rental income. The remoteness indicators were created by mapping Australian residential postcodes the Australian Statistical Geographic Standard (Australian Bureau of Statistics (2011)). The regression output for the three specifications are presented in Table A.5 and Table A.6 for males and females respectively.

The results show the year and age coefficients (in Columns (1), (2) and (3)) remain stable and, as expected, confirm that adoption of TRIS was slow in the initial years before picking up noticeably from 2007-08. Adoption rates continue to increase over the course of the remaining years. A similar trend is observed with the age variable in Column (2) where program adoption increases as individuals age. We note that the 'partial treatment' effect, previously mentioned, is captured here for age 55 noting the muted response for this age group.

The regression coefficients show males and females exhibit relatively similar adoption

[11]Negative taxable income (a loss) is possible for a small share of individuals with business income. In this case we convert negative taxable income to 0.01 and include a dummy variable to control for individuals with negative taxable income.

patterns across time. A difference, however, is that a higher share of males appear to use TRIS relative to females. Perhaps unsurprisingly, adoption of TRIS is positively correlated with income, and for those with diverse sources of income (e.g business, dividend and rental income). Having professional services income (PSI) has a slightly negative effects for males and is not significant for females. The effect of a reported partner is slightly positive for males. The effect for those who self-prepare tax returns is not statistically significant for males and slightly negative for females. Adoption of TRIS is less likely for individuals who live in more remote areas of Australia.

9 Discussion and robustness checks

9.1 Extended age groupings

We examine the sensitivity of the results by extending the control and treatment age groupings to two years either side of the introduction of TRIS. Table A.7 shows that the effects are stronger for both males and females when compared with the single-year age group estimates. Here we compare groups aged 53 to 54 (control group) with individuals aged 56 to 57 (treatment group). The labour supply D-i-D estimators are all statistically significant with effects ranging from around 0.6 percent for females in 2005-06 (TRIS' first year) to almost 1.9 percent for the salary and wage indicator in 2006-07 (TRIS' second year) for males. It appears the double age groupings are picking up the effect that older individuals, in this instance the addition of people age 57 years, are more likely to use TRIS. This effect is also observed in the TRIS adoption profiles (Figure 2) and the supplementary regression results (Table A.5 and Table A.6). Given adoption is still maturing in this period, it supports the argument that the main results should be considered lower bound estimates.

Similarly, we examine the effects of the extended age grouping for over 60s. With this

check, we compare groups aged 58 to 59 (control group) with individuals aged 61 to 62 (treatment group). The D-i-D estimators in 2007-08, show in Table A.7, are still positive and statistically significant for males but are much weaker compared with the single year age estimates. The D-i-D estimates for females are also weaker. They move from being positive and statistically significant in the single year specification to not significantly different from zero under the extended age grouping specification. Under the second specification that skips the first tax free year (now assigning 2007-08 as the control), the estimates remain similar to the single year age groupings however the effects are slightly stronger for both males and females.

9.2 Common trends assumption

It is common practice for studies that use D-i-D approaches to undertake placebo tests in periods where there is no treatment. These tests aim to demonstrate that the D-i-D coefficients return effects that are not statistically different from zero in periods where there was no treatment to validate the identification strategy. For this check, we reassign the control and treatment periods for each of the neighbouring two years in our panel. For example, we compare 2001 (assigned control) with 2002 (assigned treatment), then separately for 2002 (assigned control) with 2003 (assigned treatment) and repeat this analysis for all subsequent years.

We estimate these placebo checks for males and females separately. The coefficients are presented graphically in Figure 4 and Figure 5. The figures confirm that there are modest non-zero movements in other years. As Carter and Breunig (2019) found when they examined responses to Australia's Mature Age Worker Tax Offset, there are other known factors influencing labour supply rates in other years. These checks are therefore not true placebo tests given other known fiscal, macroeconomic and demographic changes. The large apparent 'treatment' effects detected in 2002-03 and 2003-04 show the unusual

effects of demographic patterns that are well documented. The instability in the early period to 2003-04 are accounted for by individuals who were born in 1947 which was the peak year of the post World War II baby boom, as documented by Australian Bureau of Statistics (2004). This period with its unusual demographic patterns highlights a key problem with using D-i-D when common trends fail to hold. Fortunately, TRIS was implemented after this period at a time where the trends appear to have reverted to a more parallel state.

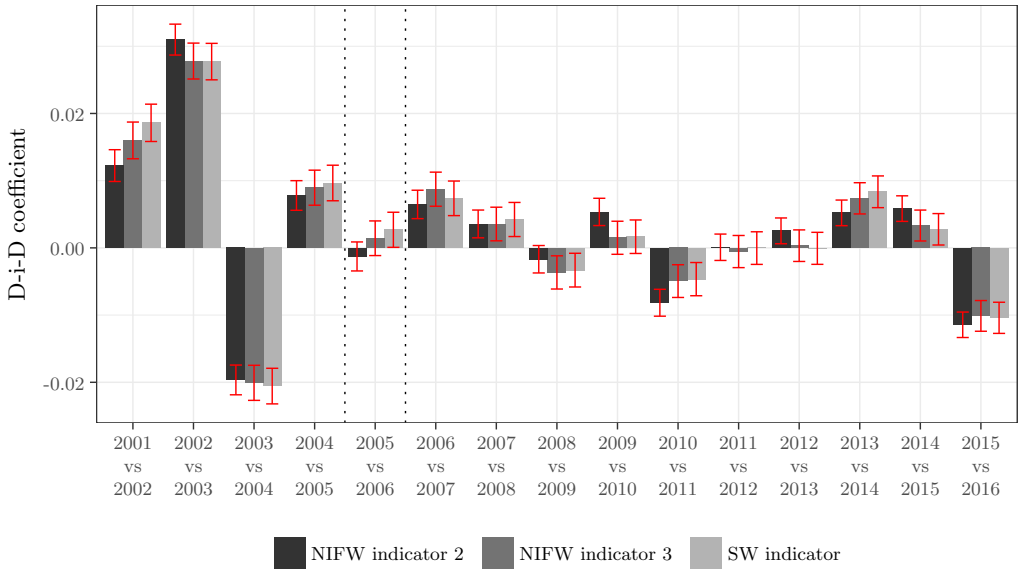

Figure 4: Rolling D-i-D estimates - 54 vs 56 years of age, males

The Mature Age Worker Tax Offset, an EITC for people over the age of 55 years, was introduced in 2004-05 and was found to have small positive labour supply effects. TRIS was introduced in the following year, which is a period highlighted by the dotted lines in the figures, along with the subsequent effects that are in line with the increase in the TRIS adoption profile. Problems isolating specific effects arise from 2007-08 given this period coincided with the *Simplified Superannuation* reforms and subsequent onset of the Global Financial Crisis. The Global Financial Crisis, in particular, may have delayed retirement decisions given the value of retirement investment holdings were significantly

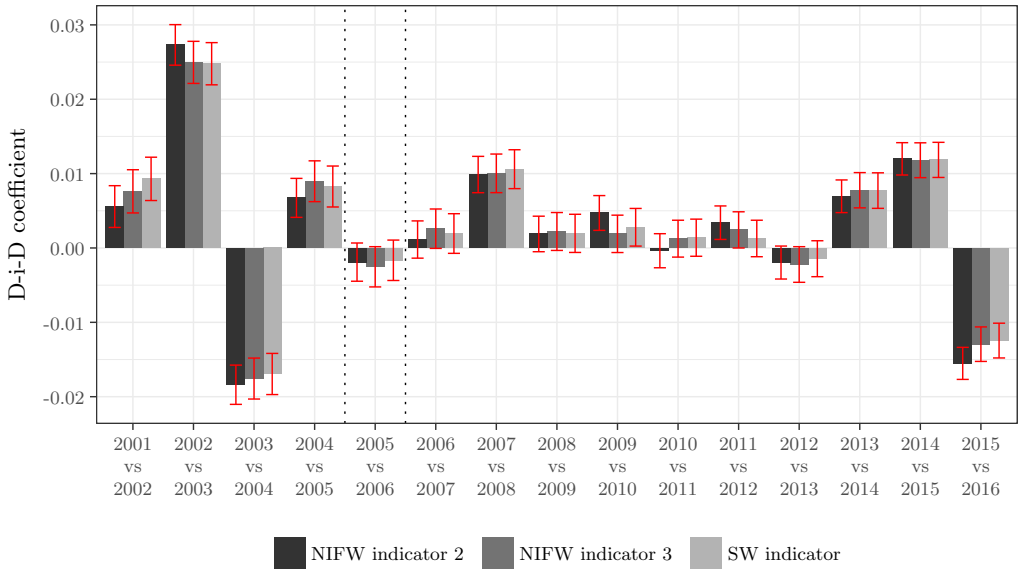

Figure 5: Rolling D-i-D estimates - 54 vs 56 years of age, females

reduced.

The trends in employment rates for individuals age 54 (control group) and individuals aged 56 years (treatment group) are show in Figure 6. This provides an alternative way to view the rolling D-i-D estimates presented in Figure 4 and Figure 5. Figure 6 shows the obvious labour supply spikes in 2000-01 and 2002-03 which are explained by unusual demographic patterns. The two highlighted areas in the figure shows the key TRIS periods of interest for this paper.

These checks provide important context for the main results. Above all, care should be taking in interpreting the D-i-D estimates as we cannot demonstrate null effects in periods where there is no TRIS treatment. Further, our placebo-like tests lend support to the hypothesis that the TRIS program may have had more of an effect on employment rates in subsequent years as program adoption rates increased.

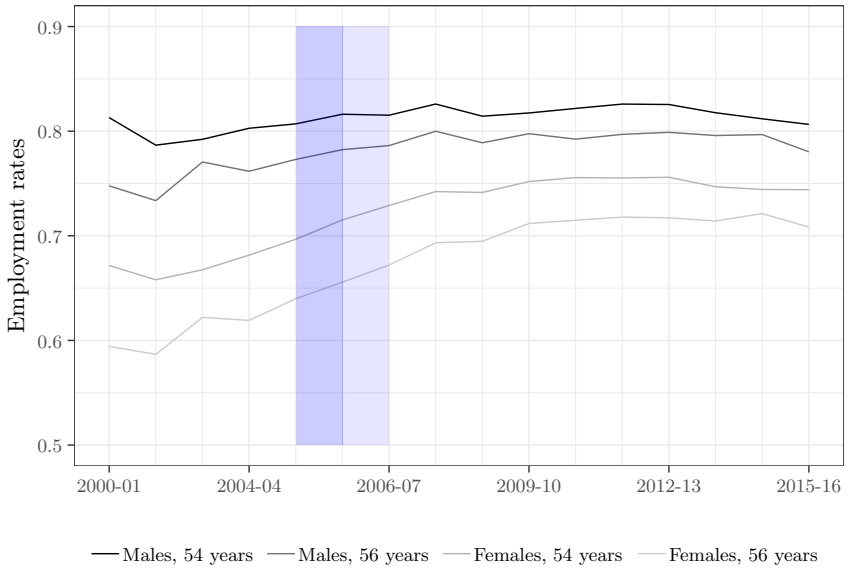

Figure 6: Trends in employment rates (NIFW indicator 2)

9.3 Low rates of adoption

It appears less than 10 percent of workers in the 56 to 59 age grouping are using TRIS by 2014-15 (according to our NIFW indicator 2 measure). This seems low relative to the share of eligible workers who would likely benefit from the program. There are several reasons that could explain the low adoption. First, low adoption in the initial years could be due to a 'learning effect'. It may have taken time for knowledge of the program to spread and for workers to understand the benefits. Second, it is a voluntary program which means workers need to set up TRIS pension with their superannuation fund. Third, it is likely that a proportion of workers remain unaware of the provisions. Fourth, individuals on lower incomes and/or with lower superannuation balances have less to gain from TRIS. This is because the maximum 10 percent annual superannuation balance draw down may be too low to make entering into the arrangement worthwhile. In addition, lower income workers may have little, or perhaps nothing, to gain from a tax savings perspective if their income is already subject to lower marginal income tax

rates.

9.4 A tax effective strategy

For those individuals who meet the 'TRIS-like-behaviour' rule, we attempt to identify the subset who appear to be using a tax effective strategy. Recall that we define a tax effective strategy as a worker who draws a TRIS pension while, within the same year, makes voluntary salary sacrificed contributions back into their superannuation fund[12]. From 2009-10 to 2014-15, the final year in which we can derive our 'TRIS-like-behaviour' rule in our data, it appears at least half of the workers in the 56 to 59 year age grouping are using tax effective strategies. Unfortunately, we cannot say anything for individuals over 60 years of age.

The introduction of concessional contributions caps (see Figure A.2) lessened opportunities for higher income earners to use TRIS to minimise tax if their concessional contributions were already at, or above, the cap. For those with 'TRIS-like-behaviour' in 2014-15, it appears around 1 percent had already exhausted their concessional contributions limit and were therefore not able to use a tax effective strategy. To provide some context, in 2014-15 the cap was $35,000 which implies, for workers receiving the Superannuation Guarantee at 9.5 percent, a corresponding annual salary of around $370,000 or more[13]. This cap was further reduced to $25,000 from 2017-18.

[12] We use the 'reportable superannuation contributions' field from the individual's income tax return form which isolates salary sacrificed superannuation contributions from employer Superannuation Guarantee contributions. Separating out reportable superannuation contributions prior to 2009-10 is not possible as the amounts are pooled into a single field in the data.

[13] We note that it is common for certain occupations to receive more that the Superannuation Guarantee rate. For example, Australian public servants usually receive 15.4 percent of ordinary time earnings and academia is known to offer even higher rates.

10 Conclusion

The TRIS program is a novel approach to incentivise the labour supply of older workers. This paper considers the effect of the program in the context of a life cycle model and empirically examines the effects on labour supply and earnings. Consistent with the literature, and despite generous financial incentives, adoption of the program is low and is concentrated towards higher earners. We report TRIS had no detectable effect on labour supply its first year, small positive effects of around 1.0 percent for males only in its second year, and larger effects in the program's third year of up to 1.4 percent for both males and females. For people over the age of 60 years, we find stronger responses of up to 2.5 percent from 2007-08 when superannuation income streams became tax free for this group.

The program effects on earnings are ambiguous. This is because individuals can adopt different TRIS strategies depending on their income and savings goals. Despite this, we report that the TRIS had nil or very small positive earnings effects for males, and nil or slightly negative effects for females. Taken at face value, these small average effects might imply that males are more likely to use TRIS as a way to boost incomes while continuing to work full-time, and females are more likely to use the policy as it is intended. This is, however, difficult to ascertain given the lack of a measure for time spent working in the data.

We highlight that the delay in program adoption weakens the clean identification of program effects, along with modest deviations to the common trends assumption in other years. It appears that it took time for knowledge of the program to spread and, hence, for program adoption to mature. This delay is consistent with the size and direction of main labour supply effects which are nil or slightly positive in the initial years and increase in subsequent years. A related issue is that our ability to accurately detect the program effects becomes less reliable the further we move away from the

program's initial year. This means that we cannot estimate the causal effects for all age groups as program adoption matured. For this reason, we argue our results should be viewed as a lower bound on the true program effects.

Higher earners have more to gain from TRIS and our analysis confirms this group is more likely to participate in the program. The lack of a work test has given rise to the opportunity to use TRIS as a tool to minimise tax. It appears at least half of the TRIS recipients are employing a tax effective strategies. Hanegbi (2013) suggests that the program could be better targeted by requiring taxpayer self-assessment against specific criteria to ensure the program is used as intended. Workers who enter into TRIS arrangements with no intention of reducing hours or workplace responsibilities seems at odds with the policy's intent – and particularly for those employing tax effective strategies.

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A APPENDIX

A.1 Simplified story

TRIS encourages labour supply by providing (i) financial flexibility to workers through the early release of superannuation, (ii) tax concessions via a tax offset on TRIS income (which became tax free income for over 60s from 1 July 2007), along with tax free earnings within TRIS pension accounts, and (iii) tax planning opportunities. Three simplified examples of TRIS use cases are presented in this section based on the 2005-06 tax settings[14]. The intention of this section is to provide a sense of the program benefits.

Intended use – reducing work

John recently turned 55 and wishes to reduce his working hours without reducing his take home pay. John earns a full-time annual salary of $80,000 and transfers $200,000 of his superannuation balance to a transition to retirement pension account. John decides to work 3.5 days per week, now earning earning $60,000 annually. In order to maintain his previous post-tax income, John draws a TRIS of $19,068. As a result, John saves $4,932 in income tax due to the TRIS tax offset while maintaining the same post-tax income.

Moderate use – boosting income

Sally is 55 and is looking to boost her income in the current year to make higher mortgage repayments. Sally earns $100,000 annually and transfers $250,000 of her superannuation into a transition to retirement pension account. Sally continues to work full-time while drawing a TRIS of $25,000. Sally's post-tax income is increased by $16,550. The tax offset on the TRIS provides a tax saving of $3,750.

[14]Please see Table A.2 for the calculations that underpin these examples.

Aggressive use – tax planning

Emily is 55 and is looking for opportunities to minimise tax. Emily earns $140,000 and transfers $350,000 of her superannuation into a transition to retirement pension account. Emily asks her employer to salary sacrifice her entire wage payments into her superannuation. Emily now only pays flat 15 percent superannuation contributions tax on this income, avoiding her marginal tax rate of 47 percent. Within the same year, Emily also draws a TRIS of $35,000. Emily's post-tax income drops from $90,650 to $33,890 but Emily doesn't mind because she has other savings to draw upon for current year consumption, and she is saving $27,240 in tax.

Each of the above examples became more attractive for individuals aged 60 years or over when TRIS became tax free income from 2007-08. From this year, however, the opportunity to use TRIS to minimise tax was lessened due to the introduction of limits on concessional superannuation contributions (see Appendix A.2 for more detail).

A.2 Tax planning with TRIS

TRIS 'tax planning' opportunities are commonly advertised by financial planners as a strategy that all eligible working individuals should consider[15]. Strategies can be tailored depending on individual circumstances and retirement income goals. For example, strategies can be designed to top-up incomes for those reducing hours; boost post-tax income and/or superannuation contributions; or to simply to reduce an individual's tax liability.

A tax effective strategy is to use TRIS in conjunction with concessionally taxed salary-sacrifice contributions provisions that are commonly available to working taxpayers.

[15]The Australian Securities & Investments Commission's 'Money Smart' website also advertises strategies to minimise tax `https://www.moneysmart.gov.au/superannuation-and-retirement/income-sources-in-retirement/income-from-super/transition-to-retirement` (accessed 4 July 2020).

Using this approach, the employee draws down on their superannuation while, concurrently, deposits salary-sacrificed voluntary contributions (in addition to compulsory employer Superannuation Guarantee contributions) back into their superannuation fund. This opportunity allows people to take advantage of the difference between the 15 percent tax on contributions paid within the fund and a taxpayer's marginal rate. This strategy became more attractive for people aged over 60 years when superannuation income streams became tax free from 1 July 2007. Figure A.1 depicts the income streams flowing to and from the superannuation system to lower an individual's tax liability. Higher income earners have more to gain as they avoid relatively higher marginal tax rates that their wages would have otherwise attracted. Further, they are more likely to have larger superannuation balances to draw TRIS and will typically have increased capacity to make larger salary sacrificed contributions back into their superannuation fund.

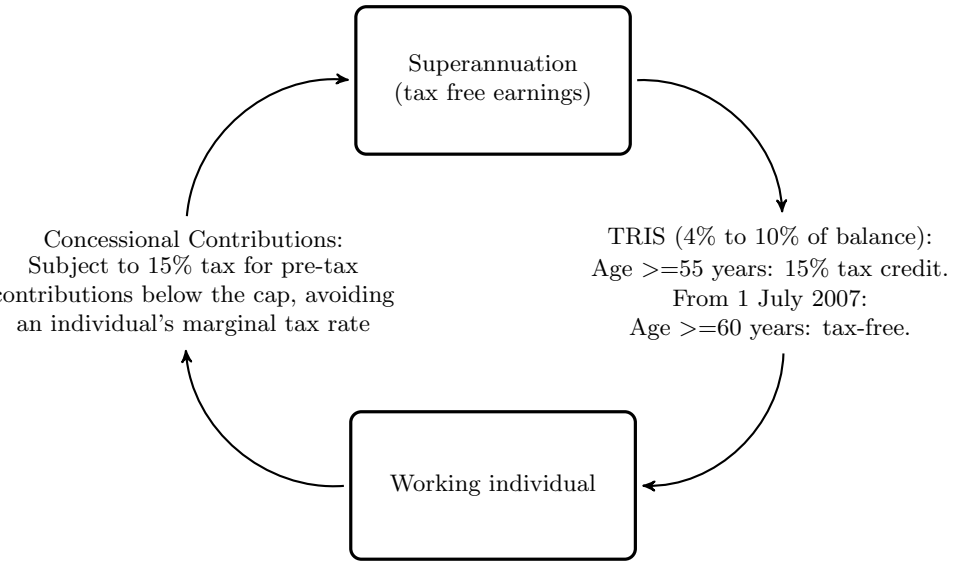

Figure A.1: A tax effective strategy

A limit on the amount of concessional (pre-tax) salary contributions was introduced in the 2007-08 financial year, two years after the introduction of TRIS. Caps were introduced as an integrity measure to lessen opportunities to channel excessively large

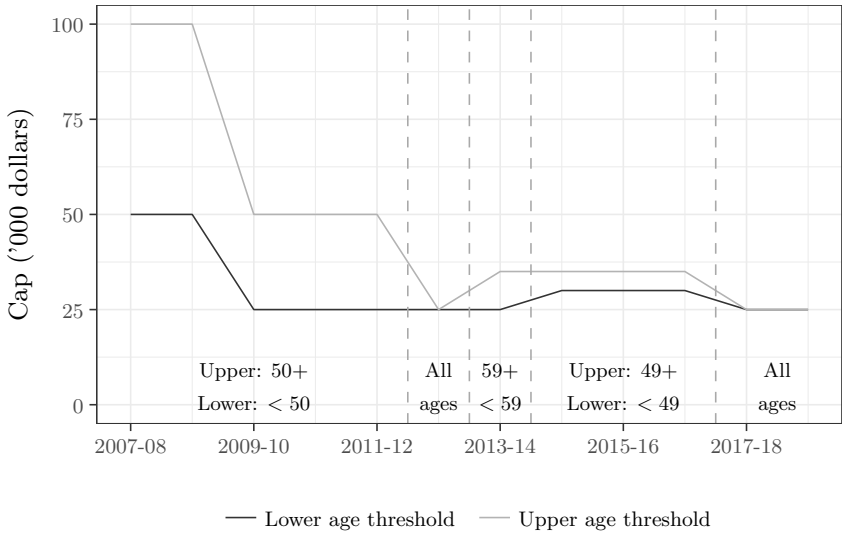

Figure A.2: Historical concessional contributions caps

amounts of pre-tax income into superannuation. Throughout the introductory years, caps were generous which meant effective tax minimisation strategies could still be implemented. Figure A.2 shows how the concessional contributions caps have gradually reduced since their introduction.

A.3 Benchmarking our 'TRIS-like-behaviour' rules

Very little published information exists on TRIS usage. This is with the exception of 'one-off' Australian Prudential Regulation Authority (2015) publication that provides some summary data for the 2014-15 income year only. We use the APRA data as independent cross-check for our derived 'TRIS-like-behaviour' rules in this year[16]. Table A.1 shows the three derived TRIS measure (row 'A' to row 'D', and row 'H' to row 'K') for the 55 to 59 year age range.

This is not a perfect comparison. The unit reporting between the APRA statistics

[16]The author wrote to APRA to ask whether these summary statistics by gender and age could be made available in other years. APRA indicated they only have collected data from 2015 given changes to reporting requirements that took effect around this time.

Table A.1: TRIS measures versus APRA statistics, 55 – 59 age range, 2014-15[1]

		APRA regulated funds			SMSFs		
		Female	Male	Total	Female	Male	Total
		Count of TRIS recipients ('000)					
A	NIFW indicator 2	30	35	65	7	7	14
B	NIFW indicator 3	27	31	58	6	5	11
C	SW indicator	26	30	56	5	5	10
D	APRA 55-59	21	26	47	na	na	na
E	*APRA 60-64*	*40*	*52*	*92*	*na*	*na*	*na*
F	*APRA 65-69*	*3*	*4*	*7*	*na*	*na*	*na*
		Total TRIS payments ($ million)					
G	NIFW indicator 2	342	498	840	125	182	307
H	NIFW indicator 3	298	432	730	98	140	237
I	SW indicator	282	408	690	87	122	208
J	APRA 55-59	204	325	529	na	na	na
K	*APRA 60-64*	*438*	*801*	*1,239*	*na*	*na*	*na*
L	*APRA 65-69*	*38*	*72*	*110*	*na*	*na*	*na*

[1]There is a difference on the reported unit between the APRA and derived TRIS estimates. The APRA statistics are on an account basis, whereas the derived TRIS estimates are on an individual basis.

and our derived rules are different. The APRA statistics are on a superannuation account basis, compared to the derived measures which are on an individual basis. Using the ATO data we cannot identify people who may be drawing a TRIS from multiple accounts. Despite these issues, this benchmarking exercise provides some validation that our method is capturing a comparable number of TRIS recipients, particularly once we adjust for the apparent over counting of people who fit our 'TRIS-like-behaviour' rule in the years prior to the introduction of the program (pre 2005-06).

The APRA statistics additionally show the strength in TRIS adoption for individuals aged over 60 years which we cannot observe in the ATO data. Adoption for the 60 to 64 year age range almost doubles relative to the 55 to 59 age grouping. A limitation of the APRA data is that we do not observe adoption for those with SMSFs. The ATO 'TRIS-like-behaviour' aggregates show SMSF TRIS recipients accounted for around 16 percent of the total, while receiving around 25 percent of TRIS payments in 2014-15.

A.4 Additional tables

Table A.2: Hypothetical TRIS use cases in 2005-06

		Intended Reduced labour $ 000	**Moderate** Bolster income $ 000	**Aggressive** Tax planning $ 000	Notes
Benchmark					
A	Earnings from work	80.0	100.0	140.0	
B	Income tax on earnings	21.9	30.6	49.4	2004-05 schedule
C	Post-tax earnings	58.1	69.5	90.7	=A-B
D	Employer contributions	7.2	9.0	12.6	=A*0.09[a]
E	Salary sacrifice conts	0.0	0.0	0.0	
F	Tax on contributions	1.1	1.4	1.9	=(D+E)*0.15
Using TRIS					
H	Earnings from work	56.0	100.0	0.0	
I	TRIS	19.1	25.0	35.0	=R*0.1[b]
J	Assessable income	75.1	125.0	35.0	=H+I
K	Tax on earnings	19.8	42.8	6.4	2004-05 schedule
L	TRIS tax offset	2.9	3.8	5.3	=H*0.15
M	Tax minus TRIS offset	17.0	39.0	1.1	=K+L
N	Post-tax earnings	58.1	86.0	33.9	=J–M
O	Employer contributions	5.0	9.0	12.6	=H*.09[a]
P	Salary sacrifice conts	0.0	0.0	140.0	
Q	Tax on contributions	0.8	1.4	22.9	=O+P*0.15
R	Superannuation balance	200.0	250.0	350.0	A*2.5[c]
Difference					
S	After tax earnings	0.0	16.6	-56.8	=N–C
T	Tax on income	-4.9	8.5	-48.2	=M–B
U	Super contributions	-2.2	0.0	140.0	=O+P–D
V	Tax on contributions	-0.3	0.0	21.0	=Q–F
W	Tax paid	-5.3	8.5	-27.2	=U+W

[a] Assumed to be at the superannuation guarantee rate of 9.0 percent in 2005-06.

[b] TRIS is assumed to be at the maximum rates of 10 percent.

[c] Superannuation balance is assumed to be 2.5 times earnings from work.

Table A.3: Summary statistics before and after the TRIS' introduction, males

	Control period 2004–05		Treatment 1 2005–06		Treatment 2 2006–07	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
ITR, PAYG *plus* ABS estimates						
Income year	2004-05	0.00	2005-06	0.00	2006-07	0.00
Age at 30 June	54.98	1.00	54.99	1.00	54.98	1.00
Employment rates						
NIFW indicator 2	0.82	0.39	0.83	0.38	0.83	0.38
NIFW indicator 3	0.69	0.46	0.71	0.46	0.71	0.45
Salary & wage indicator	0.68	0.47	0.69	0.46	0.70	0.46
Earned income						
NIFW 2 ($)	56,419	74,440	60,311	92,301	64,771	93,301
NIFW 3 ($)	57,697	63,970	61,602	87,307	65,952	83,799
Salary & wage ($)	57,908	60,298	61,928	82,835	66350	81,510
Observations (number)	251,666	na	255,011	na	258,715	na
Income tax return observations only						
Income year	2004-05	0.00	2005-06	0.00	2006-07	0.00
Age at 30 June	54.98	1.00	54.98	1.00	54.97	1.00
Employment rates						
NIFW indicator 2	0.93	0.25	0.94	0.25	0.94	0.24
NIFW indicator 3	0.79	0.41	0.80	0.40	0.80	0.40
Salary & wage indicator	0.77	0.42	0.78	0.42	0.79	0.41
Earned income						
NIFW 2 ($)	57,099	75,080	61,023	93,193	65,536	94,171
NIFW 3 ($)	58,539	64,496	62,477	88,249	66,881	84,624
Salary & wage ($)	58,777	60,751	62,832	83,706	67,311	82,302
Controls						
Reported spouse	0.59	0.49	0.62	0.48	0.62	0.48
Self-prepared tax return	0.20	0.40	0.20	0.40	0.20	0.40
Business and PSI income	0.11	0.32	0.11	0.32	0.12	0.33
Partnership & trust inc.	0.21	0.41	0.20	0.40	0.20	0.40
Dividend income	0.39	0.49	0.37	0.48	0.37	0.48
Rental income	0.21	0.41	0.21	0.41	0.22	0.41
Remoteness						
Major cities	0.68	0.47	0.68	0.47	0.67	0.47
Inner regional	0.20	0.40	0.21	0.40	0.21	0.41
Outer regional	0.09	0.29	0.09	0.29	0.09	0.29
Remote & very remote	0.02	0.13	0.02	0.13	0.02	0.13
Not available	0.01	0.09	0.01	0.10	0.01	0.11
Observations (number)	214,771	na	219,504	na	222,946	na

Note: The *Earned income measures* show the mean and standard deviation for working individuals only. The number of individuals that have *Earned income* in a given year can be calculated by multiplying the relevant 'Participation measure' by the number of observations.

Table A.4: Summary statistics before and after the TRIS' introduction, females

	Control period 2004–05		Treatment 1 2005–06		Treatment 2 2006–07	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
ITR, PAYG *plus* ABS estimates						
Income year	2004-05	0.00	2005-06	0.00	2006-07	0.00
Age at 30 June	54.98	1.00	54.99	1.00	54.98	1.00
Employment rates						
NIFW indicator 2	0.69	0.46	0.71	0.46	0.72	0.45
NIFW indicator 3	0.62	0.49	0.64	0.48	0.66	0.47
Salary & wage indicator	0.61	0.49	0.63	0.48	0.65	0.48
Earned income						
NIFW 2 ($)	35,971	29,205	38,557	32,599	41,412	36,773
NIFW 3 ($)	36,616	27,720	39,237	30,703	41,915	33,900
Salary & wage ($)	36,251	26,713	38,861	29,807	41,385	32,733
Observations (number)	252,876	na	256,564	na	261,864	na
Income tax return observations only						
Income year	2004-05	0.00	2005-06	0.00	2006-07	0.00
Age at 30 June	54.96	1.00	54.97	1.00	54.96	1.00
Employment rates						
NIFW indicator 2	0.88	0.32	0.89	0.31	0.90	0.30
NIFW indicator 3	0.79	0.41	0.80	0.40	0.82	0.39
Salary & wage indicator	0.78	0.42	0.79	0.41	0.80	0.40
Earned income						
NIFW 2 ($)	36,353	29,213	35,699	31,473	41,818	36,853
NIFW 3 ($)	37,060	27,679	39,696	30,705	42,380	33,909
Salary & wage ($)	36,692	26,649	39,317	29,790	41,838	32,729
Controls						
Reported spouse	0.51	0.50	0.56	0.50	0.56	0.50
Self-prepared tax return	0.23	0.42	0.23	0.42	0.24	0.43
Business and PSI income	0.05	0.22	0.05	0.22	0.06	0.24
Partnership & trust inc.	0.26	0.44	0.25	0.43	0.24	0.42
Dividend income	0.40	0.49	0.38	0.49	0.37	0.48
Rental income	0.20	0.40	0.20	0.40	0.21	0.40
Remoteness						
Major cities	0.69	0.46	0.69	0.46	0.69	0.46
Inner regional	0.20	0.40	0.20	0.40	0.20	0.40
Outer regional	0.08	0.28	0.08	0.28	0.08	0.28
Remote & very remote	0.01	0.12	0.01	0.12	0.01	0.12
Not available	0.01	0.08	0.01	0.09	0.01	0.10
Observations (number)	192,587	na	199,174	na	206,331	na

Note: The *Earned income measures* show the mean and standard deviation for working individuals only. The number of individuals that have *Earned income* in a given year can be calculated by multiplying the relevant 'Participation measure' by the number of observations.

Table A.5: TRIS adoption – descriptive analysis, males

	Without controls (1)		Plus age (2)		Additional controls (3)	
Income tax return data only						
Intercept	0.0096***	[0.0001]	-0.0255***	[0.0001]	-0.0854***	[0.0005]
D2006	0.0008***	[0.0001]	0.0003***	[0.0001]	-0.0000	[0.0001]
D2007	0.0027***	[0.0001]	0.0025***	[0.0001]	0.0021***	[0.0001]
D2008	0.0212***	[0.0002]	0.0211***	[0.0002]	0.0208***	[0.0002]
D2009	0.0320***	[0.0002]	0.0320***	[0.0002]	0.0322***	[0.0002]
D2010	0.0376***	[0.0003]	0.0378***	[0.0003]	0.0363***	[0.0003]
D2011	0.0398***	[0.0003]	0.0400***	[0.0003]	0.0382***	[0.0003]
D2012	0.0412***	[0.0003]	0.0415***	[0.0003]	0.0396***	[0.0003]
D2013	0.0397***	[0.0003]	0.0401***	[0.0003]	0.0373***	[0.0003]
D2014	0.0388***	[0.0003]	0.0392***	[0.0003]	0.0365***	[0.0003]
D2015	0.0395***	[0.0003]	0.0398***	[0.0003]	0.0380***	[0.0003]
Age at 30 June						
Age 54	–	–	0.0005***	[0.0000]	0.0003***	[0.0000]
Age 55	–	–	0.0219***	[0.0001]	0.0215***	[0.0001]
Age 56	–	–	0.0433***	[0.0002]	0.0427***	[0.0002]
Age 57	–	–	0.0563***	[0.0002]	0.0557***	[0.0002]
Age 58	–	–	0.0660***	[0.0002]	0.0654***	[0.0002]
Age 59	–	–	0.0672***	[0.0002]	0.0666***	[0.0002]
Additional controls						
Log(Taxable income)	–	–	–	–	0.0046***	[0.0000]
Neg. taxable income	–	–	–	–	0.0463***	[0.0006]
Self-prepared return	–	–	–	–	-0.0012***	[0.0003]
Reported partner	–	–	–	–	-0.0083***	[0.0002]
PSI income	–	–	–	–	-0.0022***	[0.0003]
Bus & Prtnrshp inc	–	–	–	–	0.0046***	[0.0003]
Dividend income	–	–	–	–	0.0168***	[0.0002]
Rental income	–	–	–	–	0.0062***	[0.0003]
Remoteness						
Inner regional	–	–	–	–	0.0022***	[0.0003]
Outer regional	–	–	–	–	-0.0078***	[0.0004]
Remote & very	–	–	–	–	-0.0189***	[0.0006]
remote	–	–	–	–		
Not available	–	–	–	–	-0.0133***	[0.0005]
Observations	8,809,835		8,809,835		8,809,835	
R-squared	0.0074		0.0280		0.0346	

Notes: Robust standard errors clustered at the individual level are presented in brackets. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

Table A.6: TRIS adoption – descriptive analysis, females

	Without controls (1)		Plus age (2)		Additional controls (3)	
Income tax return data only						
Intercept	0.0051***	[0.0001]	-0.0228***	[0.0001]	-0.0728***	[0.0004]
D2006	0.0006***	[0.0001]	0.0003***	[0.0001]	0.0005***	[0.0001]
D2007	0.0017***	[0.0002]	0.0015***	[0.0001]	0.0017***	[0.0001]
D2008	0.0170***	[0.0002]	0.0169***	[0.0002]	0.0172***	[0.0002]
D2009	0.0244***	[0.0002]	0.0243***	[0.0002]	0.0257***	[0.0002]
D2010	0.0302***	[0.0002]	0.0301***	[0.0002]	0.0299***	[0.0002]
D2011	0.0335***	[0.0002]	0.0334***	[0.0002]	0.0330***	[0.0002]
D2012	0.0366***	[0.0002]	0.0365***	[0.0002]	0.0356***	[0.0002]
D2013	0.0377***	[0.0002]	0.0376***	[0.0002]	0.0369***	[0.0002]
D2014	0.0388***	[0.0002]	0.0386***	[0.0002]	0.0379***	[0.0002]
D2015	0.0401***	[0.0002]	0.0399***	[0.0002]	0.0400***	[0.0003]
Age at 30 June						
Age 54	–	–	0.0003***	[0.0000]	0.0002***	[0.0000]
Age 55	–	–	0.0186***	[0.0001]	0.0181***	[0.0001]
Age 56	–	–	0.0361***	[0.0002]	0.0355***	[0.0002]
Age 57	–	–	0.0459***	[0.0002]	0.0454***	[0.0002]
Age 58	–	–	0.0531***	[0.0002]	0.0525***	[0.0002]
Age 59	–	–	0.0529***	[0.0003]	0.0524***	[0.0002]
Additional controls						
Log(Taxable income)	–	–	–	–	0.0046***	[0.0000]
Neg. taxable income	–	–	–	–	0.0480***	[0.0006]
Self-prepared return	–	–	–	–	-0.0067***	[0.0002]
Reported partner	–	–	–	–	-0.0045***	[0.0002]
PSI income	–	–	–	–	0.0017***	[0.0004]
Bus & Prtnrshp inc	–	–	–	–	0.0107***	[0.0003]
Dividend income	–	–	–	–	0.0135***	[0.0002]
Rental income	–	–	–	–	0.0053***	[0.0003]
Remoteness						
Inner regional	–	–	–	–	0.0008**	[0.0003]
Outer regional	–	–	–	–	-0.0063***	[0.0004]
Remote & very	–	–	–	–	-0.0156***	[0.0006]
remote	–	–	–	–		
Not available	–	–	–	–	-0.0095***	[0.0004]
Observations	8,182,689		8,182,689		8,182,689	
R-squared	0.0079		0.0242		0.0311	

Notes: Robust standard errors clustered at the individual level are presented in brackets. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.

Table A.7: TRIS effects on 'labour supply' and 'earnings' (double age grouping D-i-D coefficients)

	2004-05 vs 2005-06		2004-05 vs **2006-07**	
	(1)		(2)	
ITR, PAYG *and* ABS estimates	53-54 vs 56-57		53-54 vs 56-57	
Labour supply		Males		
NIFW 2 D-i-D (TRIS · Age)	0.0100***	[0.0015]	0.0144***	[0.0015]
NIFW 3 D-i-D (TRIS · Age)	0.0116***	[0.0018]	0.0178***	[0.0018]
Salary & wage D-i-D (TRIS · Age)	0.0125***	[0.0018]	0.0185***	[0.0018]
		Females		
NIFW 2 D-i-D (TRIS · Age)	0.0062***	[0.0018]	0.0099***	[0.0018]
NIFW 3 D-i-D (TRIS · Age)	0.0057***	[0.0019]	0.0103***	[0.0019]
Salary & wage D-i-D (TRIS · Age)	0.0063***	[0.0019]	0.0105***	[0.0019]
ITR *and* PAYG data	53-54 vs 56-57		53-54 vs 56-57	
Earned income		Males		
NIFW 2 D-i-D (TRIS · Age)	0.0153***	[0.0052]	0.0264***	[0.0052]
NIFW 3 D-i-D (TRIS · Age)	0.0045	[0.0056]	0.0132**	[0.0056]
Salary & wage D-i-D (TRIS · Age)	0.0037	[0.0057]	0.0110*	[0.0057]
		Females		
NIFW 2 D-i-D (TRIS · Age)	-0.0037	[0.0059]	0.0048	[0.0058]
NIFW 3 D-i-D (TRIS · Age)	-0.0037	[0.0059]	-0.0019	[0.0059]
Salary & wage D-i-D (TRIS · Age)	-0.0069	[0.0059]	-0.0026	[0.0059]
	2006-07 vs 2007-08		2006-07 vs **2008-09**	
ITR, PAYG *and* ABS estimates	58-59 vs 61-62		58-59 vs 61-62	
Labour supply		Males		
NIFW 2 D-i-D (TRIS · Age)	0.0059***	[0.0019]	0.0133***	[0.0018]
NIFW 3 D-i-D (TRIS · Age)	0.0094***	[0.0020]	0.0146***	[0.0020]
Salary & wage D-i-D (TRIS · Age)	0.0092***	[0.0020]	0.0137***	[0.0020]
		Females		
NIFW 2 D-i-D (TRIS · Age)	0.0022	[0.0020]	0.0072***	[0.0020]
NIFW 3 D-i-D (TRIS · Age)	0.0022	[0.0020]	0.0078***	[0.0020]
Salary & wage D-i-D (TRIS · Age)	0.0022	[0.0020]	0.0073***	[0.0020]
ITR *and* PAYG data	58-59 vs 61-62		58-59 vs 61-62	
Earned income		Males		
NIFW 2 D-i-D (TRIS · Age)	0.0026	[0.0067]	0.0065	[0.0066]
NIFW 3 D-i-D (TRIS · Age)	-0.0141*	[0.0072]	-0.0046	[0.0070]
Salary & wage D-i-D (TRIS · Age)	-0.0191***	[0.0074]	-0.0064	[0.0071]
		Females		
NIFW 2 D-i-D (TRIS · Age)	0.0048	[0.0081]	0.0183**	[0.0079]
NIFW 3 D-i-D (TRIS · Age)	-0.0180**	[0.0082]	-0.0126	[0.0079]
Salary & wage D-i-D (TRIS · Age)	-0.2060**	[0.0083]	-0.0142*	[0.0079]

Notes: Robust standard errors are presented in brackets. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.1 levels respectively.