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The impact of private health insurance on household savings: Evidence from Australia

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The impact of private health insurance on household savings: Evidence from Australia

John Nguyen[†]

Abstract

This paper analyses for the first time, the relationship between private health insurance and household savings behaviour in Australia. Using the nationally representative longitudinal dataset from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, we estimate the effect of private health insurance on savings, wealth accumulation and different types of asset holdings. We find strong evidence of a positive relationship between private health insurance and savings using a variety of panel fixed-effects, instrumental and non-instrumental methods. The magnitude of the effect is larger for households that do not receive public transfers, reside in a major city, have better health or have completed tertiary education. Our findings show that time preference is a partial mediation channel between private health insurance and savings, resulting in larger effects for non-financial asset holdings driven mostly by real estate wealth.

Keywords: Private health insurance, savings, wealth accumulation, Australia
JEL classifications: I13, D14, E21, G51

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This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper are those of the author and should not be attributed to the DSS or the Melbourne Institute.

1 Introduction

The relationship between savings and economic growth has been repeatedly emphasised in the preeminent growth theories of the last century (Aghion et al., 2016; Mankiw et al., 1992; Romer, 1986; Solow, 1956). In particular, they find that household savings play a pivotal role in sustaining long-term growth by forming domestic investments that fund the accumulation of capital. To understand household savings behaviour, the economic literature has empirically investigated the key underlying motives[2] for savings, finding evidence that are consistent with the life-cycle (e.g., Attanasio and Brugiavini, 2003; Dolls et al., 2018), bequest (e.g., Dynan et al., 2002; Horioka et al., 2006) and precautionary savings (e.g., Cagetti, 2003; Carroll and Samwick, 1998; Guariglia, 2001) motives.

A more recent but growing body of the empirical literature has investigated the determinants of savings including a myriad of socioeconomic, demographic, psychographic and behavioural factors that have a significant impact on household savings (Attanasio & Brugiavini, 2003; Baidoo et al., 2018; Bernheim et al., 2001; Bloom et al., 2007; Cobb-Clark et al., 2016, Cronqvist & Siegel, 2015; Fernandez-Lopez et al., 2015; Lunt & Livingstone, 1991; Madrian & Shea, 2001; Nwosu et al., 2020; Ye et al., 2021). While this extensive body of empirical research has enhanced our understanding of savings behaviour, there remains a labyrinth of unexplained variations in household savings and few empirical studies that have investigated the impact of private health insurance on savings behaviour.

The objective of this paper is to contribute to this area of research by empirically investigating the relationship between private health insurance and household savings in Australia using longitudinal data from the Household, Income and Labour Dynamics in

[2] Life-cycle-permanent income (Friedman, 1957; Modigliani & Brumberg, 1954), bequest (Bernheim et al., 1985; Davies, 1981; Yaari, 1965) and precautionary savings (Drèze and Modigliani, 1972; Leland, 1968; Sandmo, 1970) motives.

Australia (HILDA) Survey. More specifically, this study examines whether private health insurance crowds-out household savings as hypothesised by the precautionary savings motive. Given the high variability in healthcare costs[3], prudent households would safe-guard against the risk of potential out-of-pocket healthcare expenditures by accumulating more precautionary savings or wealth. Since private health insurance coverage mitigates uncertainty in healthcare costs, the precautionary savings motive stipulates that insured households would substitute savings for insurance and thus, ceteris paribus, insured households would save less of their disposable income and as a result accumulate less wealth compared to uninsured households. Furthermore, we hypothesise that time preference, risk preference and out-of-pocket healthcare expenditures are potential mechanisms that mediate the relationship between private health insurance and savings. Our study takes advantage of Australia's: (1) nationally representative household panel data to analyse the complexity of household savings behaviour over time, and (2) the ongoing government intervention in the private health insurance market to rigorously investigate the relationship between private health insurance and household savings using a wide range of econometric specifications. More background information about the healthcare system in Australia that motivates this study is provided in Section A of the Appendix.

Through using a variety of panel fixed-effects, instrumental and non-instrumental empirical methods, we find strong evidence of a positive association between private health insurance expenditures and various measures of household savings and wealth in all our specifications. Our results suggest that private health insurance does not crowd out household savings in Australia, in contrast to the conjectures of the precautionary savings motive. We find heterogenous effects across various subgroups, where the effect is significantly larger in households that: (1) do not receive public transfers, (2) reside in a major city, (3) have better

[3] Forget et al. (2008) finds that there are substantial variations in healthcare costs over the span of an individuals' lifetime.

self-reported health or (4) have completed tertiary education. Furthermore, we find evidence that time preference is a plausible mechanism that partially mediates the positive relationship between private health insurance and household savings, resulting in the larger estimated effect on the real estate component of non-financial assets. A possible reason for this is that private health insurance enables households to receive higher quality and timely medical treatment that improves their health outcomes and life expectancy.

This study makes several major contributions to the literature. The first principal contribution of this paper pertains to the body of literature that tests the precautionary savings motive. In the economics literature, the existing empirical research on this topic has produced mixed and inconclusive results. While many studies have found evidence supporting the precautionary savings motive (Cagetti, 2003; Carroll & Samwick, 1997, 1998; Guariglia, 2001; Kazarosian, 1997; Mastrogiacomo & Alessie, 2013; Merrigan & Normadin, 1996), there were others that found inconclusive or no evidence at all (Dynan, 1993; Guiso et al., 1992; Lusardi, 1997, 1998). More importantly, the existing empirical research on this topic mostly focuses on uncertainty in household income, employment and expenditures [4], yet there is little empirical work that examines the effect of uncertainty in healthcare expenditures on savings and wealth accumulation. This study builds on these strands of literature by specifically focusing on the premise that private health insurance reduces uncertainty in out-of-pocket healthcare expenditures. Hence, this study also makes a valuable contribution to the under-researched area of the literature that examines the impact of health insurance on savings behaviour.

Most of the existing empirical studies on this topic have found mixed results across various countries over the years. For the US, Levin (1995) used cross-sectional data to measure the effect of private health insurance on wealth accumulation and found evidence of the

[4] See Lugilde et al. (2019) for a review of the empirical literature on the precautionary savings motive.

precautionary savings motive in the elderly population. On the other hand, Starr-McCluer (1996) extended the analysis to the general adult population of the US and found evidence of a positive relationship between private health insurance coverage and household net worth using cross-sectional data. In the case of the UK, Guariglia and Rossi (2004) found that private health insurance is positively associated with savings using household panel data. For other studies that investigate the impact of social health insurance coverage in the US (Gruber & Yelowitz, 1999), Taiwan (Choi et al., 2001), Thailand (Kirdruang & Glewwe, 2017) and Italy (Atella et al., 2005), the empirical evidence were in favour of the precautionary savings motive. To our knowledge, this is the first study to investigate the impact of private health insurance on household savings in Australia.

Our third contribution is attributed to the use of the nationally representative longitudinal data of Australian households (HILDA). The only other study to have used a national longitudinal survey to examine the effect of private health insurance on savings was Guariglia and Rossi (2004) for the UK. However, the British Household Panel Survey (BHPS) did not collect detailed and complete measures of savings and wealth for the sample period used in the study (1996-2000), restricting the analysis to censored data of the individuals with positive self-reported savings. Another limitation identified in the empirical literature is the use of cross-sectional data with limited household information, making the estimates susceptible to endogeneity bias and jeopardises the causal inference of the results. To strengthen the existing empirical findings on private health insurance and savings, we take advantage of the intricate household information from the HILDA Survey to estimate the causal effect of private health insurance on household savings in Australia.

Our fourth contribution is the introduction of the Medicare Levy Surcharge (MLS) instrument to control for endogeneity from private health insurance expenditures. The source of endogeneity stems from the notion that selection into private health insurance can be

influenced by unobservable characteristics such as the households' perception of risk. Hence, inherently risk-averse households have a higher propensity to save, and these households will also be more likely to select into private health insurance as a result of these omitted variables. Moreover, simultaneity bias may be another source of endogeneity as household savings and wealth can have a reverse causal effect on private health insurance expenditures. To control for endogeneity from omitted variable and simultaneity bias, we incorporate a two-stage least square (2SLS) model into our econometric specification by instrumenting the MLS rates that each household was subject to each year on their annual private health insurance expenditures. The MLS instrument is relevant in the Australian context as previous studies have found that the demand for private health insurance is largely driven by the income-tested tax levy imposed by the Australian Tax Office (ATO) (e.g., Buchmueller et al., 2021; Gong & Gao, 2018). Since the MLS is an additional tax levy paid by high-income households that do not have private medical or hospital cover[5], there are reasonable grounds to satisfy the exclusion restriction as being subject to the MLS only affects household savings indirectly through the decision to purchase private health insurance. In addition to the instrumental framework, we use the non-instrumental Kinky Least Squares (KLS) approach developed by Kiviet (2013,2020) to check the robustness of our IV results.

[5] Private health insurance in Australia is not compulsory but there are ongoing government initiatives and policies to encourage people to take out health insurance. There are two types of private health insurance cover available for consumers: (1) hospital cover for in-hospital treatment at private medical facility and (2) ancillary cover (extras) for ambulance, optometry, dental, physiotherapy and other services that are not covered by the public healthcare system. Combined policies of both hospital and extras are common.

2 Data and variables

2.1 Data

2.1.1 Sample criteria

The primary data source used in this study is the general release of the HILDA Survey. Established by the Melbourne Institute, the HILDA Survey is the national longitudinal study of Australian households since 2001 and collects detailed information on the economic, personal wellbeing, labour, and family dynamics of household members above the age of 15 years old (Watson & Wooden, 2012). Our analysis is restricted to waves[6] 6, 10, 14 and 18 of the HILDA Survey because information on private health insurance expenditures is available annually from 2005-2021, while household wealth measures are reported in four-year intervals between 2002-2018.

To target the eligible working-age adult population, we restrict our sample to individuals between 20-65 years old, which is similar to the age range used in several of the existing studies on private health insurance (Guariglia & Rossi, 2004) and savings behaviour (see e.g., Cobb-Clark et al., 2016). This allows our analysis to isolate the effects of early life-stage borrowings and retirement phase dissavings associated with the life-cycle motive.

The HILDA Survey does not explicitly identify the household reference person, so we applied the income and age tests proposed by Churchill and Smyth (2020) to construct an artificial reference person for each household. We define the household reference person as the household member with the highest gross regular income for each household in every wave[7]. To analyse the effect of private health insurance on savings and wealth over time, it is important

[6] The HILDA Survey waves begin in 2001, denoted by wave 1 and increases on an annual basis to wave 2021 (wave 21). Waves 6,10,14 and 18 used in this study represents years 2006, 2010, 2014 and 2018.
[7] Tie-breaks are resolved by age, such that the eldest person in the tie-break is selected as the household reference person.

that we observe the same household across the entire sample period (Broadway & Haisken-DeNew, 2019). Hence, we convert our individual level dataset to household-year observations by using the household reference heads that were interviewed in all the target waves (6,10, 14 and 18) as a proxy for each household in the panel. After accounting for attrition, our sample consists of a household-year panel of 2,928 unique households in years 2006, 2010, 2014 and 2018.

2.1.2 Descriptive statistics

Table 1 presents the descriptive statistics for our household sample. Columns 1-6 summarises the mean and standard deviation of the key determinants of savings for our household sample by their private health insurance status. Column 7 presents a t-statistic test for the statistical significance of the difference between the uninsured households in Column (1) and insured households in Column (4).

By comparing the mean values between the insured and uninsured households, we find that insured households have larger savings and net worth compared to uninsured households. This suggests that there is no substitution effect between private health insurance and savings as predicted by the precautionary savings hypothesis. We also find that long-term illnesses are less prevalent in insured households, providing evidence of advantageous selection as opposed to the typical adverse selection issue observed in traditional insurance markets (see Buchmueller et al., 2013). We presume that this relationship arises due to government interventions in the private health insurance market, as the descriptive statistics suggest that insured households are more likely to be subject to the MLS and incur higher tax liability rates compared to uninsured households. Furthermore, the higher levels of public transfers observed in the uninsured households may offset the precautionary motive for savings (Maynard & Qiu, 2009), resulting in the positive relationship between private health insurance and household savings in Table 1.

Column 7 presents the t-statistic test and reveals that the differences between the insured and uninsured groups are statistically significant at the 1% level and that the key determinants of savings listed in Table 1 should be controlled for in our empirical specifications to reduce omitted variable bias.

Table 1: Descriptive statistics by private health insurance status

	Uninsured			Insured			T-test
	Mean (1)	SD (2)	N (3)	Mean (4)	SD (5)	N (6)	Difference (1)-(4)
Dependent variables							
Net worth (log)	11.750	2.091	3348	13.352	1.316	6391	-1.602***
Savings (log)	9.811	1.758	1782	10.983	1.383	3274	-1.171***
Independent variables							
Private health insurance expenditure (log)	0.000	0.000	3617	7.472	0.919	6503	-7.472***
Income							
Disposable income (log)	10.925	0.971	3617	11.528	0.872	6496	-0.603***
Permanent income (log)	10.969	0.527	3617	11.488	0.515	6503	-0.519***
Demographics							
Education (1: Postgraduate – 7: Year 11)	5.229	1.587	3617	4.127	1.804	6341	1.102***
Unemployed (0: No, 1: Yes)	0.044	0.205	3617	0.017	0.128	6341	0.027***
Single (0: No, 1: Yes)	0.278	0.448	3617	0.176	0.381	6339	0.102***
Age (years)	43.436	10.775	3617	45.172	10.331	6503	-1.736***
Number of dependent children	0.790	1.113	3617	0.848	1.103	6503	-0.058*
Health							
Long-term illness (0: No, 1: Yes)	0.250	0.433	3614	0.160	0.367	6500	0.090***
Self-assessed health (1: Poor – 5: Excellent)	3.201	0.961	3572	3.499	0.905	5794	-0.298***
Transfers							
Inheritance/Bequests (log)	0.137	1.184	3614	0.245	1.639	6336	-0.108***
Public transfers (log)	5.004	4.656	3617	2.348	3.819	6503	2.656***
Mechanisms							
Risk preference (1: Low risk – 4: High risk)	1.536	0.702	2630	1.850	0.716	5335	-0.314***
Time preference (1: Short term - 6: Long term)	2.350	1.425	3576	3.266	1.538	5825	-0.916***
Medical fees paid to health practitioners (log)	5.999	1.157	2327	6.724	1.152	6007	-0.725***
Instruments							
Medicare Levy Surcharge Rate (log)	0.001	0.003	3617	0.004	0.006	6503	-0.003***

Notes: T-test were calculated based on the differences in mean values between the uninsured and insured group for each variable listed. *Source:* HILDA Survey waves 6, 10, 14 and 18. ***, **, and * indicate significance at the 1%, 5% and 10% level respectively.

2.2 Variables

2.2.1 Dependent variables: Measures of savings and wealth

2.2.1.1 Savings and net worth

We use two different measures of savings and wealth as our dependent variables of interest. Using the imputed household net worth values [8] derived from information on the household balance sheets (total household assets – total household debt), we construct our savings and net worth dependent variables. Our main dependent variable is the total household net worth which captures the aggregate wealth of each household. This measure allows us to analyse the contemporaneous effect of private health insurance on household wealth across waves 6, 10, 14 and 18. Using the household net worth information, we construct a non-contemporaneous measure of household savings as the change in household wealth over time. For this non contemporaneous measure, we calculate the difference in household net worth between each consecutive wave. Given that household wealth is reported in four-yearly intervals in waves 6, 10, 14 and 18, the measure of savings[9] in wave t is equivalent to the annualised difference between the CPI adjusted (2018 base year)[10] household net worth in wave t and wave $t-4$. This restricts our sample to waves 10, 14 and 18 when analysing the non-contemporaneous measures of household savings and net worth.

Our main results apply the log-transformed variations of the dependent variables, to normalise the distribution of these measures and present a relative change interpretation of the impact of private health insurance expenditure on non-negative savings and net worth. The

[8] HILDA imputed values are estimated using the nearest neighbor method and contains more observations to improve the sample size and statistics power of the analysis.

[9] Household savings is calculated as follows: $S_{it} = \frac{W_{it} - W_{it-4}}{4}$, where W is the total net worth of household i in year t.

[10] CPI-adjusted figures use 2018 as the base year and the data used to compute the deflator was collected from the ABS website: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/latest-release

objective of this paper is to analyse the effect of private health insurance on the savings and wealth of households with non-negative savings, which is consistent with the literature (Levin, 1995; Starr-McCluer, 1996). We focus on this particular group of interest because the behaviour of savers and borrowers are comparatively different from one another (Lunt & Livingstone, 1991). To test the robustness of our results, we use the non-log values of our dependent variables to render an absolute interpretation of the findings for the full sample. This allows us to explore the effect of private health insurance on household net worth for both borrowers and savers.

2.2.1.2 Components of net worth

We disaggregate our net worth measure into financial and non-financial assets to analyse the effect of private health insurance on the asset allocation decisions of households. Following the method used in Cobb-Clark et al. (2009, 2016) and Spicer et al. (2016), we divide household net worth into the subcategories defined in the HILDA Survey. Based on the pre-defined definitions, financial assets are considered liquid assets that comprises of the total value of: interest earning assets held in banks and financial institutions, stock portfolios, mutual fund holdings and other investments (e.g., life insurance, trust funds, collectibles and others). On the other hand, non-financial assets capture four broad illiquid asset classes that include: total real estate equity (e.g., personal residence, holiday homes and other types of properties registered to the household), total value of vehicles (e.g., cars, trucks, caravans, motorbikes, boats and other types of vehicles), business equity (net asset value of business assets) and total market value of pension entitlements (i.e. superannuation).

2.2.2 Independent variables: Private health insurance and controls

2.2.2.1 Private health insurance variable

The key explanatory variable in our analysis is the total annual household private health insurance expenditure in each wave. Since 2005 (Wave 5), the HILDA Survey has been collecting information on the private health insurance status and total private health insurance expenditure of each household every year. We use the CPI-adjusted value of total household private health insurance expenditure as the primary independent variable in our econometric specification.

2.2.2.2 Control variables

In addition to our independent variable of interest, we include controls for socioeconomic (total disposable income, education, employment, marital status, age, gender, number dependent children), health (long-term illness) and transfer (public transfers and inheritance) factors. This is motivated by the findings of previous studies on savings behaviour, which found that these factors have a significant impact on the saving decisions of households and individuals[11]. Furthermore, we take advantage of the panel dimensions of the HILDA Survey by including additional household, state, and year fixed effects to control for unobserved time-invariant factors.

2.2.3 Instrumental variable: Medicare Levy Surcharge

We extract the data on individual and household income-threshold tests for the MLS from the ATO to create our instrumental variable[12]. By merging this dataset with the HILDA Survey, we determined the actual MLS rate that each household was subject to in every year. Although

[11] Papers by Bloom et al. (2007), Cobb-Clark et al. (2016), Fisher and Anong (2012) and Hong (2012) find that demographic, psychographic, health and social security factors have a significant effect on savings behaviour.
[12] Historical income thresholds and rates for the MLS were web scrapped from the ATO website: www.ato.gov.au/Individuals/Medicare-and-private-health-insurance/Medicare-levy-surcharge/income-thresholds-and-rates-for-the-medicare-levy-surcharge

there were two other government interventions in the private health insurance market (Lifetime Health Cover and Premium Rebate), we selected the MLS to be our instrument because the income threshold tests were available for the entire sample period (2006-2018), while the Premium Rebate (income-tests were only introduced after 2012) and Lifetime Health Cover (age-tested) programs did not satisfy the identification assumptions to qualify as a relevant and valid instrument.

An essential assumption of the instrumental approach is the exclusion restriction condition, which cannot be formally verified in a just-identified model[13]. Since the MLS rate is a legally enforced tax levy at the federal level, we have reasonable grounds to presume that the instrument is applied to all Australian households equitably in accordance with the income-tests that determines the tax liability of each household. Based on the findings of Buchmueller et al. (2021) and Gong and Gao (2018), it is reasonable to assume that systematic tax-avoidance does not exist in the case of the MLS and being subject to the MLS has a positive causal effect on the demand for private health insurance. Since the MLS is an externally imposed tax liability, it only affects savings indirectly through its impact on private health insurance expenditures. For that reason, there is plausible justification that the MLS instrument satisfies the exclusion restriction assumption and allows for a causal analysis of the relationship between private health insurance and savings.

2.2.4 Mediating mechanism

We examine time preference, risk preference and out-of-pocket fees paid to health practitioners as potential channels through which private health insurance influences savings behaviour.

[13] Just-identified model characterises a model where the number of instrumental variables is equal to the number of endogenous variables.

Time preference: The economic literature suggests that patience leads to higher savings because patient households value future consumption more than impatient households. In line with the theoretical literature, a number of empirical studies find that time preference affects savings behavior (see e.g., Choi and Han, 2018). Hence, if private health insurance increases healthcare utilisation (Eldridge et al., 2017; Höfter, 2007; Jeon & Kwon, 2013) and leads to improvements in health outcomes (Hullegie & Klein, 2010; Jerant et al., 2013), then we can expect household savings to increase via the channel of time preference (see Bloom et al., 2003;2007). Following the method used in several studies in the empirical literature, (e.g., Brown & van der Pol, 2014, 2015; Cobb-Clark et al., 2014; Jetter et al., 2020; Khwaja et al., 2007) we use financial planning horizon as a proxy for time preferences. This measure is constructed from the HILDA questionnaire that asks, *"In planning your savings and spending which of the following time periods is most important to you?"*. The responses follow an ordinal scale from 1-6 and represents the shortest planning horizon to the longest planning horizon[14]. According to Brown and Van der Pol (2014,2015), people with short-term oriented planning horizons are described as having a high time preference, while long-term oriented individuals are considered as having low time preference.

Risk preference: The behavioural literature has extended the theoretical interpretation of loss-aversion in prospect theory (Kahneman and Tversky, 1979) to insurance markets (Schmidt, 2016). For example, Hwang (2016) finds that loss-averse individuals have a low ownership rate of private health insurance. Therefore, risk preference is another potential channel through which private health insurance affects savings behaviour. For our measure of risk-preference, we follow the proxy used in several studies (e.g., Brown & Van der Pol, 2015; Kettlewell, 2019; Schurer,2015) that relates to financial risks. Using the responses of the HILDA Survey

[14] Responses are coded on 6-point scale as follows: 1 = next week, 2 = next few months, 3 = next year, 4 = next 2-4 years, 5 = next 5-10 years, 6 = more than 10 years

questionnaire [15] that asks: *"Which of the following statements comes closest to describing the amount of financial risk that you are willing to take with your spare cash? That is, cash used for savings or investment"*. Similar to the time preference measure, the responses follow an ordinal scale from 1-4 representing the highest degree of risk aversion to the lowest degree of risk-aversion (i.e., risk-taking)[16]. Based on the construction of this variable, we can interpret a high risk-preference as risk-loving and low risk-preference as risk-averse.

Out-of-pocket healthcare expenditures: Evidence from the empirical literature has shown that health insurance coverage is negatively associated with out-of-pocket healthcare expenditures (see e.g., Galárraga et al., 2010; Girgorakis, 2017). This suggests that out-of-pocket expenditures on healthcare can potentially be an important channel that mediates the relationship between private health insurance and savings. We use the CPI-adjusted annual household fees paid to health practitioners as a proxy measure for out-of-pocket healthcare expenditures (Callander et al., 2019).

3 Methodology

3.1.1 Fixed effects panel regression

We estimate the following empirical specification:

$$W_{it} = \beta_0 + \beta_1 H_{it} + \sum_j \beta_j \ C_{j,it} + \mu_i + \gamma_r + \tau_t + \epsilon_{it} \qquad (1)$$

where W_{it} represents the contemporaneous measure of net worth for household i in year t. We use H_{it} to denote the total annual expenditure on private health insurance of household i in year t. In terms of our controls, $C_{j,it}$ is the vector of observable covariates for household i in

[15] Financial risk-assessment measure in HILDA Survey is based on the method used in the Survey of Consumer Finances in the US

[16] Responses for risk preference measures follows: 1 = I am not willing to take any financial risks, 2 = I take average financial risks expecting to earn average returns, 3 = represents I take above average financial risks expecting to earn above average returns, 4 = I take substantial financial risk expecting to earn substantial returns

year t that influences savings behaviour. As for the remaining variables, μ_i represents the household-level fixed effect, γ_r denotes the state fixed effect, τ_t captures the time-fixed effect and ϵ_{it} is the error term. The standard errors are clustered at the household level to align with the purview of the analysis.

Equation (2) is used to estimate the non-contemporaneous effect of private health insurance expenditure on household savings $S_{it} = \frac{(W_{it} - W_{it-4})}{4}$

$$S_{it} = \pi_0 + \pi_1 H_{it-4} + \sum_j \pi_j \ C_{j,it-4} + \mu_i + \gamma_r + \tau_t + \epsilon_{it} \quad (2)$$

We use H_{it-4} to represent the total annual expenditure on private health insurance of household i in year $(t-4)$. The lagged explanatory variable is used to capture the non-contemporaneous relationship between private health insurance and household savings under the presumption that wealth takes time to accumulate. By using the lagged explanatory variable, we can mitigate the potential simultaneity bias that may arise from the interdependencies between savings and private health insurance expenditure.

3.1.2 Two-stage least squares regression

We control for endogeneity by instrumenting the Medicare Levy Surcharge liability rates (MLS_{it}) on private health insurance expenditures (H_{it}) in the first-stage estimation of our contemporaneous net worth model:

$$H_{it} = \lambda_1 MLS_{it} + \sum_j \varphi_j \ C_{j,it} + \mu_i + \gamma_r + \tau_t + \theta_{it} \quad (3)$$

To determine the validity of the MLS_{it} instrument, we measure the significance of λ_1 and the joint significance of Equation 3 to ensure that the instrument induces sufficient exogenous variations in H_{it}, whilst being uncorrelated with our dependent variables, W_{it}. As such, we

satisfy the exclusion restriction following the notion that the MLS_{it} can be excluded from our causal model (Equation 1) after controlling for $C_{j,it}$.

Similarly, the first-stage estimation for our non-contemporaneous model of household savings is given by:

$$H_{it-4} = \alpha_1 MLS_{it-4} + \sum_j \phi_j \ C_{j,it-4} + \mu_i + \gamma_r + \tau_t + \mu_{it} \qquad (4)$$

4 Results

4.1 Baseline results

Table 3 presents the results for the baseline Pooled OLS and fixed-effects regressions of private health insurance expenditures on household net worth[17]. In column 1, the Pooled OLS model treats the sample as repeated cross-sections and controls for socioeconomic, health and transfer factors that influence savings behaviour.

In column 2 of Table 3, we introduce fixed effects[18] to account for the following confounding factors: (1) time-invariant unobserved household heterogeneity (e.g., stable preferences), (2) unobserved year-on-year changes that impact household saving decisions and (3) fixed differences between states that affect savings such as geography (Burger, 2014), culture (Ye et al., 2020) and cost of living (Aladangady, 2017). All the coefficients of private health insurance expenditure in Columns 1 and 2 of Table 3 are positive and statistically significant at the 1% level, implying that private health insurance expenditure does not crowd-out household savings. Contrary to the precautionary savings motive, larger household expenditures on private health insurance are associated with higher levels of household net

[17] Table 3 results were estimated using the reg (Pooled OLS) and xtreg (FE) packages of STATA 17. The same packages were used to estimate the same types of models throughout this paper.
[18] The results are robust to alternative panel specifications that use random and mixed effects (see Table C.1 of Appendix).

worth. More specifically, a 1% increase in private health insurance expenditure corresponds to a 4.1% increase in household net worth (Column 2 of Table 3).

The difference between the magnitude of the OLS (Column 1 of Table 3) and Fixed-Effects (Column 2 of Table 3) coefficients for private health insurance are appreciable, implying that the omitted variable bias from unobservable household, state and year characteristics are biasing the estimates upwards. When we examine the coefficients of the covariates that we control for, we find that income, number of dependent children and age are positively correlated with net worth, whereas public transfers, being single and unemployment have a negative impact on household wealth (Column 2 of Table 3). Taken together, these findings along with the concave relationship between age and net worth reflects the fundamental principles of the life-cycle motive, theorising that households will increase savings and accumulate more wealth when their income is high to prepare for a future decline in income during retirement (Modigliani and Brumberg, 1954). Although we find a positive relationship between private health insurance and net worth across both the OLS and FE baseline models, these estimates are likely biased due to omitted variables and reverse causality.

Table 3: The impact of private health insurance on household savings

	Net worth	
	Pooled OLS	Fixed-Effects
	(1)	(2)
Private health insurance	0.126***	0.041***
	(0.006)	(0.006)
Controls		
Household disposable income	0.314***	0.162***
	(0.050)	(0.027)
Public transfers	-0.085***	-0.016***
	(0.007)	(0.004)
Inheritance/Bequests	0.011	0.002
	(0.008)	(0.006)
Postgraduate	0.630***	-0.234
	(0.092)	(0.246)
Graduate diploma	0.682***	-0.441**
	(0.084)	(0.209)
Bachelor	0.503***	-0.400*
	(0.080)	(0.217)
Diploma	0.552***	-0.232
	(0.086)	(0.191)
Certificate III/IV	0.315***	-0.144
	(0.076)	(0.144)
Year 12	0.434***	0.073
	(0.092)	(0.218)
Unemployed	-0.603***	-0.233*
	(0.183)	(0.123)
Single	-0.333***	-0.395***
	(0.071)	(0.083)
Female	-0.122***	
	(0.047)	
Age	0.082***	0.145***
	(0.015)	(0.017)
Age squared	-0.000**	-0.001***
	(0.000)	(0.000)
Number of dependent children	0.167***	0.078***
	(0.025)	(0.019)
Long-term illness	-0.266***	-0.005
	(0.058)	(0.038)
Fixed Effects		
Household FE	No	Yes
Year FE	No	Yes
State FE	No	Yes
Observations	9,556	9,556
Clusters	2,816	2,816
R-squared	0.40	0.17
F-statistic	140.67	37.30

Notes: Robust standard errors in parentheses; standard errors are clustered at the household level; ***p<0.01, ** p<0.05, * p<0.1. The following categories were omitted: 'Year 11 and below' and 'Male'. *Source:* HILDA Survey Waves 6, 10, 14 and 18

4.2 Instrumental results

We control for the potential endogeneity bias in our baseline estimates (Table 3) by using an instrumental framework. In Table 4, we present the summarised results for our two-stage least squares (2SLS) model with and without fixed-effects[19]. The positive coefficients for the MLS instrument in the first-stage estimations are statistically significant at the 1% level for the standard 2SLS (Column 1 of Table 4) and significant at the 5% level for the fixed effects estimation (Column 2 of Table 4), confirming that being subject to the MLS is positively associated with private health insurance expenditures. In addition to this, the Sanderson-Windmeijer F statistic of joint significance in the first stage is well above 10, confirming that the instrument is sufficiently relevant (Staiger & Stock, 1997). As a formal test for underidentification and weak identification, we apply the Kleibergen-Paap rk LM test and Wald F statistic test from Kleibergen and Paap (2006). The LM statistic for underidentification (Column 1 of Table 4) was 67.9 and the Wald F-statistic for weak identification was 74.98. Based on the Stock-Yogo critical values, we were able to reject both the null hypotheses for under identification and weak identification, confirming that the MLS instrument is relevant and the 2SLS model is applicable (Stock-Yogo, 2005).

Our results in Table 4 confirms that the positive association between private health insurance expenditure and household net worth hold even after controlling for endogeneity bias. Comparing the coefficients in Table 4 and Table 3, we find that endogeneity biased our estimates downwards. After controlling for endogeneity, our results suggest that a 1% increase in household private health insurance expenditure is associated with a 30.1% increase in household net worth in the standard 2SLS estimation and a 35.3% increase after adding fixed

[19] Table 4 results were estimated using the ivreg2 (IV 2SLS) and xtivreg2 (IV 2SLS with FE) packages on STATA 17. Weak instrument tests were built-in the ivreg2 and xtivreg2 packages. These packages were used to estimate the same type of models throughout this paper.

effects[20]. Note that the interpretation of the coefficients in Table 4, represent the local average treatment effect (LATE) rather than the average treatment effect (ATE) discussed in Table 3. As a result of this, we can conclude that the estimated effect in Table 4 applies to the subgroup of the sample whose private health insurance expenditure decisions were influenced by the MLS instrument. Thus, the potential endogeneity from omitted variable bias and reverse causality are biasing the initial baseline results downwards, underestimating the actual effect of private health insurance expenditures on household net worth. In contrast to the precautionary savings motive, this positive relationship between private health insurance and wealth accumulation is consistent with the findings of Guariglia and Rossi (2004) and Starr-McCluer (1996). This can be attributed to the availability of Australia's universal public healthcare program (Medicare), which Gruber and Yelowitz (1999) suggests can attenuate the precautionary savings motive in households without private health insurance.

Table 4: Controlling for endogeneity from private health insurance

	Net worth	
	IV 2SLS	IV 2SLS FE
	(1)	(2)
Two-stage least squares		
Private health insurance	0.301***	0.353*
	(0.051)	(0.209)
First Stage		
Medicare Levy Surcharge Rate	77.503***	16.78**
	(8.951)	(7.096)
Controls	Yes	Yes
Household FE	No	Yes
State FE	No	Yes
Year FE	No	Yes
Observations	9,556	9,386
Clusters	2,816	2,646
Sanderson-Windmeijer F statistic (first stage)	74.98	18.16
Kleibergen-Paap rk Wald F statistic	74.98	18.16
Kleibergen-Paap rk LM statistic	67.99	13.64

Notes: Robust standard errors in parentheses; standard errors are clustered at the household level; ***p<0.01, ** p<0.05, * p<0.1. Controls include socioeconomic, health and transfers but Age-squared is omitted in Column 2. *Source:* HILDA Survey Waves 6, 10, 14 and 18

[20] The results are robust to alternative panel specifications that use random and mixed effects (see Table C.1 of Appendix).

4.3 Components of net worth

The main results in Table 4 measures the effect of private health insurance on aggregate household net worth but does not provide additional insight into the types of asset holdings that are affected. To examine the heterogenous effects of private health insurance on financial and non-financial asset allocations, we consider five broad asset types derived from detailed measures of household assets and liabilities.

In Table 5, separate IV 2SLS models are estimated for each component of net worth including: (1) financial assets and (2) non-financial assets.In Columns 3-6 of Table 5, we further breakdown non-financial asset classes into: (3) business equity, (4) real estate, (5) vehicles and (6) pensions. The results in Column 1 and 2 of Table 5, suggests that the positive relationship between private health insurance and net worth is larger for non-financial asset holdings. More specifically, this positive effect is largely attributed to real-estate holdings which are generally considered non-liquid components of net worth. By interpreting the estimated coefficients, a 1% increase in private health insurance expenditures is associated with a 24.3% increase in non-financial assets, while marginally increasing financial assets by 22.5%. In terms of specific non-financial asset types, a 1% increase in private health insurance expenditures corresponds to a 49.5% increase in real estate wealth, while having no effect on business equity, vehicle wealth and pension holdings. Based on these results, we find that the effects of private health insurance are larger for non-financial household assets relative to liquid financial assets. Furthermore, we find that real estate wealth is responsible for driving the larger effect identified in illiquid assets. These findings are unsurprising in the Australian context as real estate investments have generated higher risk-adjusted returns compared to other asset classes (Melser & Hill, 2019) and provides additional tax benefits through negative gearing (Pawson, 2018).

Table 5: Estimating the effect on different types of asset holdings

	Financial assets	Non-financial assets	Business equity	Real estate	Vehicles	Pensions
	(1)	(2)	(3)	(4)	(5)	(6)
Private Health Insurance	0.225***	0.243***	0.215	0.495***	-0.007	-0.069
	(0.053)	(0.093)	(0.141)	(0.177)	(0.089)	(0.088)
MLS instrument	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,935	9,935	9,845	9,849	9,935	9,935

Notes: Estimated using IV 2SLS model with MLS instrument. Financial assets include all interest earning assets in banks and financial institutions, stocks, mutual funds and other investments. Non-financial assets include four illiquid asset components consisting of vehicles (cars, trucks, caravan, boats and others), net business equity, total equity in all property holdings (house of residence, holiday homes, land and other properties) and current value of pension entitlements (superannuation) Robust standard errors in parentheses; standard errors are clustered at the household level; ***p<0.01, ** p<0.05, * p<0.1. Controls for socioeconomic, health and transfer factors. *Source:* HILDA Survey Waves 6, 10, 14 and 18

4.4 Heterogenous effects

Table 6 presents the results of our heterogenous analysis for various subgroups of the sample including: (1) public transfer vs non-public transfer, (2) major city vs regional and remote (3) low health status vs high-health status[21] (4) low education vs high education households[22]. Our results show that there are significant differences between these various subgroups and the effect of private health insurance on household net worth is larger for: households that do not receive public transfers, reside in a major city, have high self-reported health and have completed tertiary education. These results are perhaps unsurprising, as the subgroups with larger estimated effects are more likely to be wealthier than their counterparts, which is consistent with our previous findings. For instance, to be eligible for public transfers in Australia, the applicant must undergo a means-test to access unemployment benefits, low-

[21] Self-reported measures of health from the HILDA Survey coded on an ordinal scale from 1-5 representing: 1=poor health, 2=fair health, 3=good health, 4=very good health and 5=excellent health. We reindex this measure to consider low-health status as people with poor to fair health (1 and 2), while high health status are people with good to excellent health (3-5).

[22] Low and high education are coded based on whether the household head completed tertiary education (i.e., Higher education: Bachelor and postgraduate studies).

income assistance and other social security payments for socioeconomically disadvantage households. Papers by Feldstein (1974) and Hubbard et al. (1995) examined the effect of social insurance programs on savings behaviour and found that being eligible for public transfers discourages savings by offsetting the precautionary motive.

On the other hand, the marginally lower effect observed in remote and regional households are consistent with the findings in Guariglia and Rossi (2004) that suggest remote areas lack adequate access to quality medical healthcare facilities and services. These issues are not exclusive to the UK and also exists in Australia. Beard et al. (2009) finds that rural communities have worse socioeconomic and health outcomes than urban areas as a result of the inaccessibility and underutilisation of healthcare services.

The findings in the literature are consistent with our results for health status, where we find that the effect is larger in households with higher self-reported measures of health. Bloom et al. (2007) suggests that healthier individuals will save more and accumulate more wealth to account for the increase in life expectancy. Furthermore, we find that tertiary education increases the marginal effect of private health insurance on net worth. Reasons for this can be explained by the findings of Van der Pol (2010), which finds that the effect of education on health is partially channeled through changes in time preferences (i.e., education makes people more long-term orientated and forward-looking).

Table 6: Heterogenous effects of various subgroups

	Public Transfers		Major city		Health status		Education	
	No	Yes	No	Yes	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PHI	0.416***	0.252*	0.187***	0.360***	0.207**	0.321***	0.266***	0.302***
	(0.048)	(0.132)	(0.065)	(0.075)	(0.096)	(0.054)	(0.098)	(0.055)
Observations	6,073	3,483	3,174	6,380	1,408	7,575	3,077	6,479

Notes: Estimated using the IV 2SLS specification with the MLS rate as the instrument. The samples were split into the following subgroups and estimated separately. PHI: Private health insurance expenditures. Equality tests were applied to assess the significance of the difference between the pairs. Robust standard errors in parentheses; standard errors are clustered at the household level; ***p<0.01, ** p<0.05, * p<0.1. Controls: socioeconomic, health and transfer factors. *Source:* HILDA Survey Waves 6, 10, 14 and 18

4.5 Mediation analysis

In Table 7, we present the results of our mediation analysis that explores whether time preference, risk preference and out-of-pocket medical expenditures are potential mechanisms that mediate the positive association between private health insurance and savings. Consistent with our results, Starr-McCluer (1996) and Guariglia and Rossi (2004), also find a positive relationship between health insurance coverage and savings. However, these studies do not provide any plausible explanations for the potential channels that mediate this positive relationship. Thus, we take advantage of the pertinent proxies created from the HILDA Survey questionnaire on financial planning time-horizons, financial risk and medical fees paid to health practitioners to analyse the effect of these mechanisms on savings behaviour.

We apply the mediation analysis framework used in the empirical literature (e.g., Alesina & Zhuravskaya, 2011; Chuchill & Smyth, 2017; Van der Pol, 201) on all three mechanisms and found that only time preferences had a mediating effect on the relationship between private health insurance and savings behaviour, while risk preference and out-of-pocket medical fees had no mediating effect (see Table B.4 and B.5 in Appendix). In Column 2 of Table 7, we report the estimated effect of private health insurance on household time preferences. The

estimated coefficient is significant at the 1% level and positively correlated with the time preference of the household, such that an increase in private health insurance expenditures will make the households more patient and forward-looking. This can be explained by the potential improvements in health and life expectancy[23], as a result of improved quality and timely access to healthcare services through private health insurance. Given that the effect of private health insurance is significantly associated with time preferences, we estimate the full mediation model in Column 3 by adding time preferences as a covariate.

By comparing the results in Column 3 of Table 7 with our baseline estimates presented in Column 1 of Table 7, we find that the magnitude of the coefficients decreased by 0.044 from 0.301 (Column 1) to 0.257 (Column 3) after including time preferences as an additional covariate. The coefficient on time preferences reported in Column 3 is statistically significant at the 1% level and positively associated with household net worth. Thus, the evidence suggest that time preferences qualify as a partial mediator that channels 17.1% of the direct effect between private health insurance and household net worth. Based on the results of the mediation analysis, we find evidence to confirm that time preferences have a partial mediating effect on the relationship between private health insurance and household net worth, while risk preference and out-of-pocket healthcare expenditures fail to qualify as potential mechanisms[24].

[23] Bloom et al. (2007) finds that increased life expectancy has a positive effect on savings behaviour as people increase savings and accumulate more wealth to account for a longer life-cycle.
[24] The results of the mediation analysis for risk preference and out-of-pocket medical fees paid to health practitioners are available in Table B.4 and B.5 of the Appendix.

Table 7: Mediation analysis of time preference mechanism

	Time preference of household		
	(1)	(2)	(3)
Private health insurance	0.301***	0.365***	0.257***
	(0.051)	(0.059)	(0.053)
Time preference			0.139***
			(0.020)
Controls	Yes	Yes	Yes
MLS instrument	Yes	Yes	Yes
Observations	9,556	9,380	9,018

Notes: Estimated with IV 2SLS model with MLS as instrument. Column 1 reports baseline estimates. Column 2 estimates private health insurance on the mediator (time preferences). Column 3 estimates the full model with the mediator as a covariate. Robust standard errors in parentheses; standard errors are clustered at the household level; ***p<0.01, ** p<0.05, * p<0.1. Controls: socioeconomic, health and transfer factors. *Source:* HILDA Survey Waves 6, 10, 14 and 18

4.6 Robustness test

4.6.1 Non-instrumental estimation

The major challenge with using instrumental variables to control for endogeneity is that the instrument must satisfy the non-testable exclusion restriction assumption. In the previous section, we control for the endogenous private health insurance regressor by using the MLS rate as a valid instrument that we argue, satisfies the exclusion restriction condition. Since the MLS is a national government intervention that is externally imposed on the household, it is reasonable to presume that being subject to the MLS rate only affects savings indirectly through its impact on private health insurance expenditures. Although the intuition and rationale are logical, we are unable to test the exclusion restriction formally within the standard instrument-based framework. However, by using the Kinky Least Squares (KLS) estimator by Kiviet (2013,2020), we can exploit the permissible degree of endogeneity in nonorthogonal conditions and test the exclusion restriction specifically. By using private health insurance as a proxy for insurance against uncertainty in healthcare costs, we expect the endogeneity correlation

between private health insurance expenditure and the error term to be negative based on the downward direction of the bias discussed in the previous sections.

In Table 8, we present the estimated coefficients for net worth within the endogeneity correlation range of -0.7 and 0 to capture the attenuation bias towards 0.[25] The effect of private health insurance on net worth are all positive and statistically significant at the 1% level in the endogeneity range of [-0.7, 0]. Comparing the coefficients in Table 8 with our standard 2SLS instrumental estimates in Table 4, we find that the estimated coefficients (IV: 0.301, KLS: 0.338) are similar between the instrumental and non-instrumental approaches at the endogeneity correlation range of [-0.4, -0.3]. From there, the coefficients decline marginally towards the standard OLS estimates (Column 1 in Table 3) between the endogeneity range of [-0.3, 0], implying that the KLS estimates are sensitive to the endogeneity correlation imposed. In spite of this sensitivity, our main conclusions are robust and remain qualitatively unchanged across a plausible range of endogeneity correlations.

Table 8: Non-instrumental estimation with kinky least-squares inference

	Net worth							
	-0.7	-0.6	-0.5	-0.4	-0.3	-0.2	-0.1	0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Private health insurance	0.700***	0.527***	0.418***	0.338***	0.273***	0.216***	0.164***	0.114***
	(0.068)	(0.033)	(0.020)	(0.013)	(0.009)	(0.007)	(0.005)	(0.004)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,789	8,789	8,789	8,789	8,789	8,789	8,789	8,789

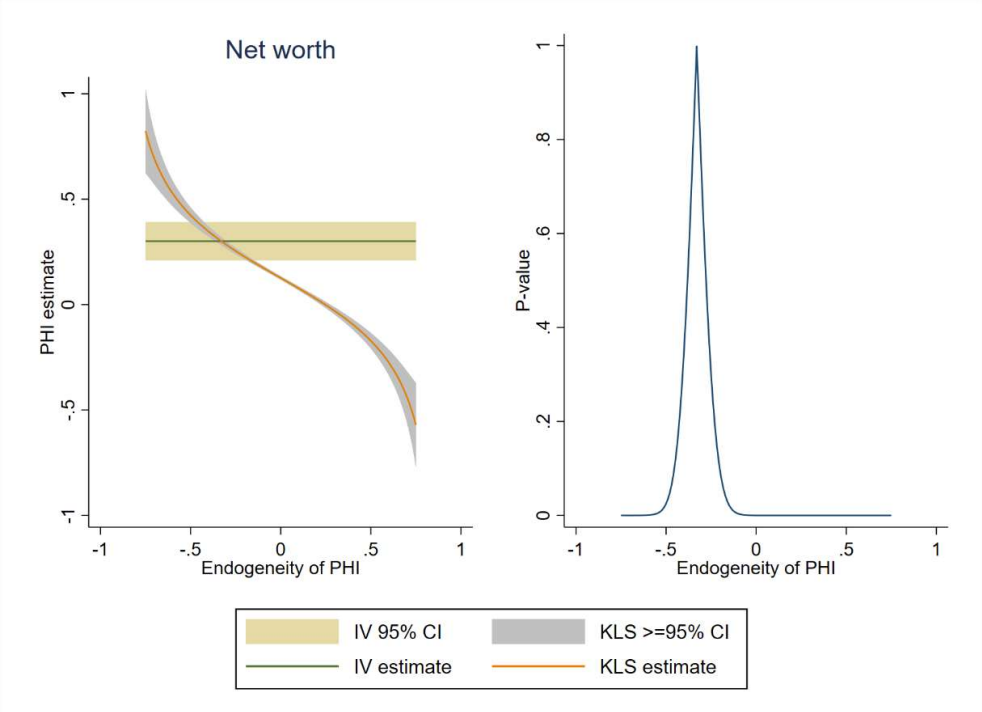
Notes: Standard errors in parentheses; ***p<0.01, ** p<0.05, * p<0.1. Endogeneity range of [-0.7,0] was used for the KLS estimates. *Source:* HILDA Survey Waves 6, 10, 14 and 18

The KLS method allows us to formally test the exclusion restriction for the postulated range of endogeneity between [-1,1]. Figure 1 presents a comparison of the KLS and IV 2SLS estimates with a verifiable exclusion restriction test. The null hypothesis of the exclusion restriction test in the KLS framework is that the instrument can be validly excluded from the

[25] Table 8 results of KLS estimates were estimated with kinkyreg package in STATA 17.

causal model. Based on the 95% confidence intervals of the tests, we do not reject the null hypothesis that the MLS instrument can be validly excluded from the causal model in the presence of low to mild endogeneity correlations between the range of [-0.48, -0.18]. This suggests that the implied endogeneity correlation range of [-0.4, -0.3] where the KLS and IV 2SLS estimates overlap, satisfies the exclusion restriction. Considering the implied direction and magnitude of endogeneity bias from private health insurance, the exclusion restriction test provides additional evidence to support the consistency and validity of the IV results.

Figure 1: Testing the exclusion restriction



	Correlation	95% Confidence Bounds	
Medicare Levy Surcharge Rate	-0.3298	-0.478	-0.177

Notes: Figure on left-hand side (LHS) shows the estimated coefficients for private health insurance expenditures. The thin green line is the IV 2SLS estimate and the shaded yellow region is the 95% confidence interval for the estimates. The KLS estimates are represented by the orange line, where its 95% confidence interval is shaded by the grey region. Figure on the right-hand side (RHS) shows the exclusion restriction tests for the endogeneity correlation range between -1 and 1. The p-value on the y-axis presents the p-values for the test. The table below summarises the main points of the exclusion restriction tests for the null hypothesis that the MLS can be validly excluded from the causal model.

4.6.2 Non-contemporaneous estimations with time-lag

Our main analysis measures the contemporaneous effect of private health insurance on household net worth and thus, does not capture the notion that wealth takes time to accumulate. In Table 9, we check the sensitivity of our main results by presenting the results for the non-contemporaneous effect of private health insurance on household savings and net worth. By applying a 1-period time lag [26] on the explanatory variable and vector of covariates, we estimate the effect of private health insurance expenditures in the previous period on both measures of household savings and wealth in the current period.

In Columns 1-4 of Table 9, the coefficients for all our specifications are positive and statistically significant at the 1% level across both measures of non-contemporaneous household savings and net worth. The baseline fixed-effect models (Columns 1 and 3 of Table 9) underestimate the effect of private health insurance expenditures as the endogeneity biases the results downwards. After controlling for endogeneity (Column 2 and Column 4 of Table 9), the results show that a 1% increase in private health insurance expenditures increases savings by 47.4% and increases net worth by 42.8%. In Table B.2 (Appendix), we test the sensitivity of our results to alternative time lags (1-year, 2-year, and 3-year) and show that the positive relationship holds albeit the size of the effect changes depending on the time-lag used. Furthermore, we assess the persistence of the lagged effect of private health insurance on wealth accumulation and find that the two-year time lag is significant and positive at the 5% level (Table B.3 in Appendix). Even after accounting for a wide range of delayed effects on wealth accumulation, we find that our results are robust and the positive association between private health insurance and savings remain qualitatively unchanged.

[26] 1-period time-lag is 4-years since household wealth measures are reported in 4-year intervals, therefore we apply a lag that is equivalent to this interval.

Table 9: Estimating the non-contemporaneous effect of private health insurance

	Savings		Net worth	
	FE	IV 2SLS	FE	IV 2SLS
	(1)	(2)	(3)	(4)
Private health insurance	0.043***	0.474***	0.027***	0.428***
	(0.012)	(0.102)	(0.006)	(0.074)
Controls	Yes	Yes	Yes	Yes
Household FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
State FE	Yes	No	Yes	No
Observations	4,972	4,972	7,134	7,134

Notes: Robust standard errors in parentheses; standard errors are clustered at the household level; ***p<0.01, ** p<0.05, * p<0.1. Controls for socioeconomic, health and transfer factors (1-period time lag for all independent variables). *Source:* HILDA Survey Waves 10, 14 and 18

4.6.3 Non-log estimations on full sample of borrowers and savers

The objective of our main analysis focuses on measuring the effect of private health insurance on savers and excludes the effect of borrowers. This is consistent with the approach used in the literature[27] and follows the insights from prior research that finds significant differences in savings behaviour between borrowers and savers[28]. In Table 10, we conduct the non-log estimations as a robustness test to see whether our conclusions hold even after including the full sample and accounting for households with negative wealth.

Our initial baseline result (Column 1 of Table 10) is statistically significant at the 1% level, showing that a $1 increase in private health insurance expenditure corresponds to a $65.89 increase in household net worth after accounting for household, year, and state fixed effects. In Columns 2-3 of Table 10, we control for endogeneity with our instrumental model and find that a $1 increase in private health insurance expenditures increases household net worth by $453.44 and $400.25 after including fixed effects. Although the level of statistical significance declines to 10% after adding fixed effects, it does not change the qualitative

[27] Levin (1995), Starr-McCluer (1996), Choi et al. (2003) and Gruber and Yelowitz (1999) used log-transformed measures of wealth and only included observations with non-negative wealth (i.e., savers).
[28] Lunt and Livingstone (1991) found significant differences in saving behaviour between borrowers and savers.

conclusions of our results in the previous sections. Note that for our non-log specification, we control for the covariates used in the previous sections with the addition of permanent income. According to the permanent income hypothesis (Friedman, 1957), individual and household saving decisions are based on long-term income as opposed to the transitory income of the current period. Our results suggest that the positive relationship between private health insurance and household savings holds even after easing the sample restrictions, modifying the controls, and expanding the estimation to capture both savers and borrowers.

Table 10: Non-log estimations

	Net worth		
	FE	IV 2SLS	IV 2SLS FE
	(1)	(2)	(3)
Private health insurance	65.892***	453.442***	400.251*
	(17.973)	(117.740)	(230.579)
Controls	Yes	Yes	Yes
Household FE	Yes	No	Yes
Year FE	Yes	No	Yes
State FE	Yes	No	Yes
Observations	9,942	9,942	9,950

Notes: Robust standard errors in parentheses; standard errors are clustered at the household level; ***p<0.01, ** p<0.05, * p<0.1. Controls for socioeconomic, health and transfer factors. However, the disposable income control was replaced by permanent income for Columns 1-3. *Source:* HILDA Survey Waves 6, 10, 14 and 18

5 Conclusion

Over the last century, growth models have accentuated the importance of household savings for sustained economic growth over the long-run. Household savings is an imperative domestic source of funds that shapes the level of investments required to accumulate capital. Despite the extensive body of literature that has investigated the underlying motives for savings and the factors that influence savings behaviour, there remains mixed empirical evidence and significant variations in household savings and wealth accumulation that are not addressed in the empirical literature.

This paper analyses the relationship between private health insurance and household savings using longitudinal data from the HILDA Survey. Most of the empirical studies that test the precautionary savings motive, examines uncertainty in income, expenditures and employment but few have explored the effect of healthcare expenditures. Since the precautionary savings motive postulates that private health insurance would crowd-out savings by reducing uncertainty in out-of-pocket healthcare costs, we address the existing knowledge gap in the empirical literature by estimating the causal impact of private health insurance on various measures of household savings and wealth.

We find that private health insurance expenditures increase household savings and wealth accumulation in Australia, even after controlling for endogeneity. The positive relationship between private health insurance and savings is contrary to the interpretation of the precautionary savings motive but consistent with the findings in Guariglia and Rossi (2004) and Starr-McCluer (1996). The size of the positive effect is accentuated in households that do not receive public transfers, reside in a major city, have better health or have completed tertiary education. Furthermore, we find that time preference is a mechanism through which private health insurance affects household savings by making households more patient and forward-

looking. This result is supported by our component analysis of the effect on various financial and non-financial asset classes. We find that the positive effect is larger for non-financial asset holdings compared to more liquid asset types that are traditionally associated with precautionary savings. The evidence shows that this effect is largely driven by real-estate wealth, coinciding with the time-preference mechanism that partially mediates the relationship between private health insurance and savings behaviour. Since real estate wealth is highly illiquid, these findings provide additional evidence to support the premise that private health insurance makes households more future-oriented.

Taken together, the results imply that private health insurance does not crowd-out household savings behaviour, instead it has a positive effect on savings and wealth accumulation by decreasing the time-preference of households (i.e., making households more future oriented). Although our findings suggest that household are not saving as a precautionary measure for uncertainty in healthcare costs, it does imply that the savings behaviour of households in Australia are motivated by other reasons such as the life-cycle motive.

Our findings have important policy implications in Australia surrounding the role of private health insurance, the economic impact of healthcare policies and the effect of future healthcare reforms on the savings behaviour of households. Many countries including Australia, rely on a combination of incentives and economic policies to promote savings on the basis that it contributes to investments and ultimately, economic growth (Schmidt, 2010). In addition to promoting private savings, many of these countries also use healthcare policies to alleviate the burden on the public healthcare system by incentivizing private health insurance uptake. Our mediation analysis of out-of-pocket medical expenses reveals a concerning symptom of the private health insurance market in Australia. We find that insured households are spending more on out-of-pocket medical fees paid to health practitioners when compared to uninsured households. These findings shed light on the potential inefficiencies of the private

health insurance market, such that the value added from purchasing private health cover may not necessarily amount to the costs paid for this coverage by consumers. Previous studies have shown that the demand for private health insurance in Australia is largely driven by the effect of government intervention[29], suggesting that consumers are purchasing private health cover to be exempt from the additional tax levy rather than the expected value of having private health cover. This raises the question of whether government intervention in the private health insurance market is discouraging competition and contributing to the higher healthcare costs that consumers have to pay. Future policy reforms should reconsider the role of private health insurance in Australia's healthcare system and take steps to improve the value of private health insurance for consumers. In addition to this, our findings may help policymakers design policies that could potentially increase both private health insurance and savings. This is particularly important in Australia's aging population as a higher life expectancy will require greater old-age health expenditures and consumption in the later stages of the life-cycle.

[29] The empirical studies include: Bilgrami et al. (2021), Buchmueller et al. (2021), Gong and Gao (2018), Palangkaraya and Yong (2005, 2007), Stavrunove and Yerokhin (2014), amongst others.

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