Social Interactions in the Demand for Private Health Insurance: Evidence from Linked Employer-Employee Data

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19 March 2024

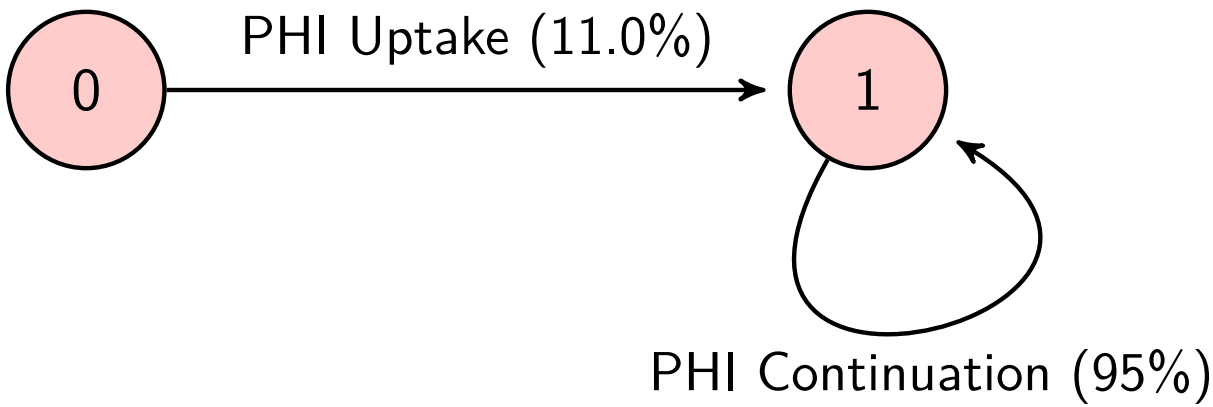
Workshop on Economics of Health and Wellbeing
Macquarie University

Motivation

1. Does peers' health shocks affect the PHI demand?
2. If so, why?

Introduction

- This study investigates the effects of **coworkers' health shocks** on the private health insurance (**PHI**) demand using Australian linked employee-employer data.
- Coworkers as **"free consultants"** in many decisions.
- Peer effects in transitional probabilities:



Data

- The newly available linked administrative data are of high quality, similar to those used in Scandinavian countries.
- Population-based administrative records.
  - Individual tax records + health records + *other*
- Advantages:
  - Australia is larger and culturally distinct from countries in which such data are typically available.
  - Small firms!
    - De Giorgi et al. (2020) investigates peer effects in consumption using Danish data, where the average firm size is 260-330.

Measuring Health Shocks

- Australia has a universal healthcare system called Medicare.

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  - "Expenditure and prescriptions twelve months to 30 june 2016" (Thomas & Marlton, 2016)

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- **Pharmaceutical Benefits Scheme (PBS)**: The PBS is a government-funded program that provides subsidized prescription medicines to Medicare cardholders.
- **Filter:** Patients need a prescription from a physician to utilize the PBS benefits.
  - "Expenditure and prescriptions twelve months to 30 june 2016" (Thomas & Marlton, 2016)
- **Variable:** *The total number of PBS Transactions in the financial year 2015-2016 (PTC)*

Descriptive Plots: Age & Gender

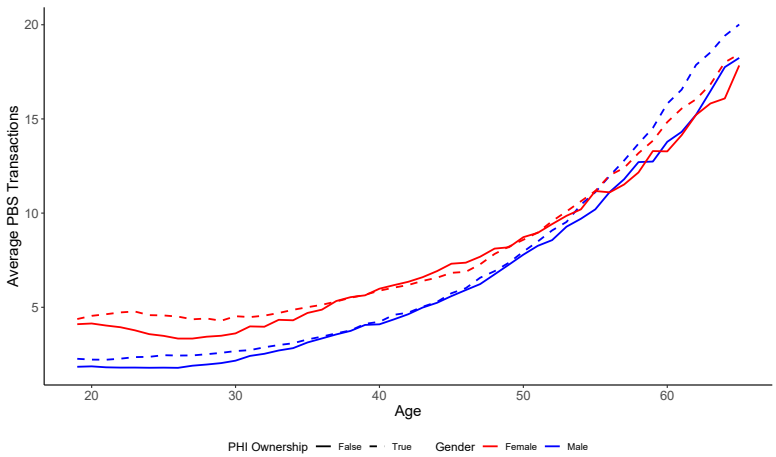

Figure: PTC by Age, Gender and PHI Ownerhsip

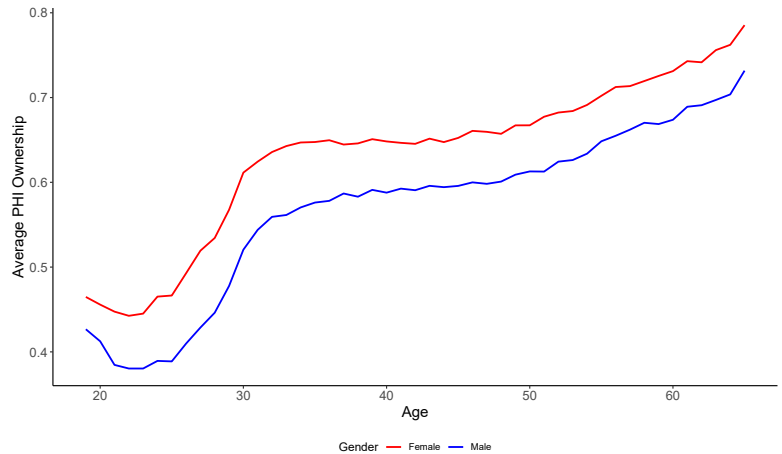

Figure: PHI Ownership by Age and Gender

Econometric Specification

- Linear probability model (Boucher & Bramoullé, 2020).
- Transition probabilities are conditioned on $y_{i,t} = Y \in \{0, 1\}$

$$\mathbb{P}\left[y_{i,t+1} = 1 | y_{i,t} = Y, a_{j,Y}, h_{i,t}, \overline{h}_{-i,t}, \boldsymbol{z}_{i,t}, \boldsymbol{x}_{i,t+1}\right] \tag{1}$$

where

- $a_{j,Y}$: The firm j fixed effects conditional on Y at time t.

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where

- $a_{j,Y}$: The firm j fixed effects conditional on Y at time t.
- h_i: The health shock variable at time t.
- $\overline{h}_{-i}$: Co-workers' average h, excluding i at time t.
  - ***Main interest!!***

Identification (1): Measuring Health Shocks

$$h_{i,t} = \ln(PTC_{i,t}) - \mathbb{E}\left[\ln(PTC_{i,t}) | PHI_{i,t} = y, j, \boldsymbol{z}_{i,t}\right] \qquad (2)$$

- **Health shock**: Deviations from the gender-age norms ($\boldsymbol{z}_{i,t}$).
- We assume Equation 2 linear in $\boldsymbol{z}_{i,t}$.
  - In practice, it is a non-linearized linear model.
- Plugging linearized Equation (2) to the main model, we show that own health shocks and co-worker's health shocks are identified from PTC coefficients ($p_{i,t} = \ln(PTC_{i,t})$),

$$\begin{aligned}&\mathbb{P}[y_{i,t+1} = 1 | y_{i,t} = Y, \dots] \\ =&c_{j,y} + \alpha_y p_{i,t} + \beta_y \overline{p}_{-i,t} + \boldsymbol{z}'_{i,t}\theta_y + \overline{\boldsymbol{z}}'_{-i,t}\lambda_y + \boldsymbol{x}'_{i,t+1}\delta_y.\end{aligned}$$

Identification (2): Endogenous Peer Effects

$$\begin{aligned}&\mathbb{P}[y_{i,t+1} = 1 | y_{i,t} = Y, \dots] \\ &= c_{j,y} + \alpha_y p_{i,t} + \beta_y \overline{p}_{-i,t} + \boldsymbol{z}'_{i,t}\theta_y + \overline{\boldsymbol{z}}'_{-i,t}\lambda_y + \boldsymbol{x}'_{i,t+1}\delta_y. \qquad (3)\end{aligned}$$

- **Firm fixed effects** ($c_{j,Y}$): Allowed to vary with the transitional direction, i.e., $y_{i,t}$.
  1. Sample Sorting: Firm-level correlated effects.
  2. Endogenous Peer Effects: Co-workers average PHI ownership excluding i in the firm.
     - Main identification challenge in peer effects estimations (Manski, 1993; Bramoullé et al., 2009).
     - We exploit the fact that the outcome variable is binary and $\overline{y}_{-i}$ can only take two values within the firm conditional on $y_{i,t-1} \in \{0, 1\}$. Example
- **Source of Identification**: Variation in firm sizes.

Results

Specifications	**PHI Uptake**	**PHI Continuation**
$\ln(PTC_{i,t})$	0.0053***	0.0017***
	(0.0002)	(0.0002)
Co-worker average	0.0029*	0.0007
	(0.0017)	(0.0008)
Obs.	3,791,887	5,893,954
R2	0.080	0.038

Results: By Gender

	PHI uptake		**PHI continuation**	
Gender	*Female*	*Male*	*Female*	*Male*
$\ln(PTC_{i,t})$	0.0067***	0.0035***	0.0016***	0.0016***
	(0.0003)	(0.0004)	(0.0002)	(0.0003)
Co-worker average	**0.0136*** **	-0.0029	-0.0003	0.0002
	(0.0044)	(0.0030)	(0.0018)	(0.0020)
Obs.	1,737,497	2,054,390	3,024,033	2,869,921
R^2	0.079	0.082	0.034	0.040

Results: Nonlinearity

	PHI uptake							
Gender	*Female*				*Male*			
PTC threshold	*10*	*20*	*30*	*40*	*10*	*20*	*30*	*40*
Prop. co-workers exceeding threshold	0.0220*	0.0344**	0.0659***	0.0653**	-0.0023	-0.0022	-0.0096	0.0006
	(0.0115)	(0.0171)	(0.0246)	(0.0307)	(0.0089)	(0.0121)	(0.0155)	(0.0205)
Obs.	1,737,497	1,737,497	1,737,497	1,737,497	2,054,390	2,054,390	2,054,390	2,054,390
R^2	0.079	0.079	0.079	0.079	0.082	0.082	0.082	0.082
	PHI continuation							
Gender	*Female*				*Male*			
PTC threshold	*10*	*20*	*30*	*40*	*10*	*20*	*30*	*40*
Prop. co-workers exceeding threshold	0.0065	-0.0004	-0.0039	-0.0057	0.0095*	0.0102	0.0132	0.0218**
	(0.0045)	(0.0057)	(0.0075)	(0.0102)	(0.0053)	(0.0068)	(0.0082)	(0.0099)
Obs.	3,024,033	3,024,033	3,024,033	3,024,033	2,869,921	2,869,921	2,869,921	2,869,921
R^2	0.034	0.034	0.034	0.034	0.040	0.040	0.040	0.040

Results: Summary

- Co-workers' health shocks increase PHI demand only for females *if they did not own PHI in the past.*
  - Alternative Measures
- We find that effects are stronger for singles and older females.
  - By Family Structure
  - By Age
- Exclusion of large firms increases efficiency and the magnitude of coefficient.
  - Firm Size Restrictions
- Extreme health shocks have stronger effects.

Conclusion

- We estimate contextual peer effects (Manski, 1993) without instrumental variables by exploiting the availability of consumers' decisions in two consecutive periods.
- We find significant heterogeneity, which is often difficult to disentangle due to data limitations.
- Implies Flexible Utility Function – unlike the conventional linear-in-mean specifications.
  - Microfoundations

Thank You!

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Additional Slides

- Microfoundation
- Literature
- Graphs
- Why People Purchase PHI?
- Other Estimations

Microfoundations

- The linear-in-means model implies a quadratic utility function that is very restrictive.
- Boucher et al. (2024) proposes a new approach that implies a more flexible microfoundation for peer effects models. (CES Utility function)
- Our empirical strategy does not impose any restriction of the consumers' utility function (regarding the endogenous peer effects),

$$y = f(\bar{y}) + \beta X + \epsilon.$$

Conclusion

Literature

- Peer effects in health insurance:
  - Lieber & Skimmyhorn (2018) investigate the peer effects in financial decisions such as retirement savings, life insurance, and charitable giving.
    - Peers affect charitable giving decision, but do not affect retirement savings or insurance purchase.
    - Observability of the decision could be critical.
  - Handel et al. (2020) investigate the determinants of choice quality in the Netherlands.
    - People tend to choose similar plans as their peers.
- Our econometric results also relate to the discussions on heterogeneity in peer effects estimations (Lin et al., 2021).

Appendix

Firm Sizes

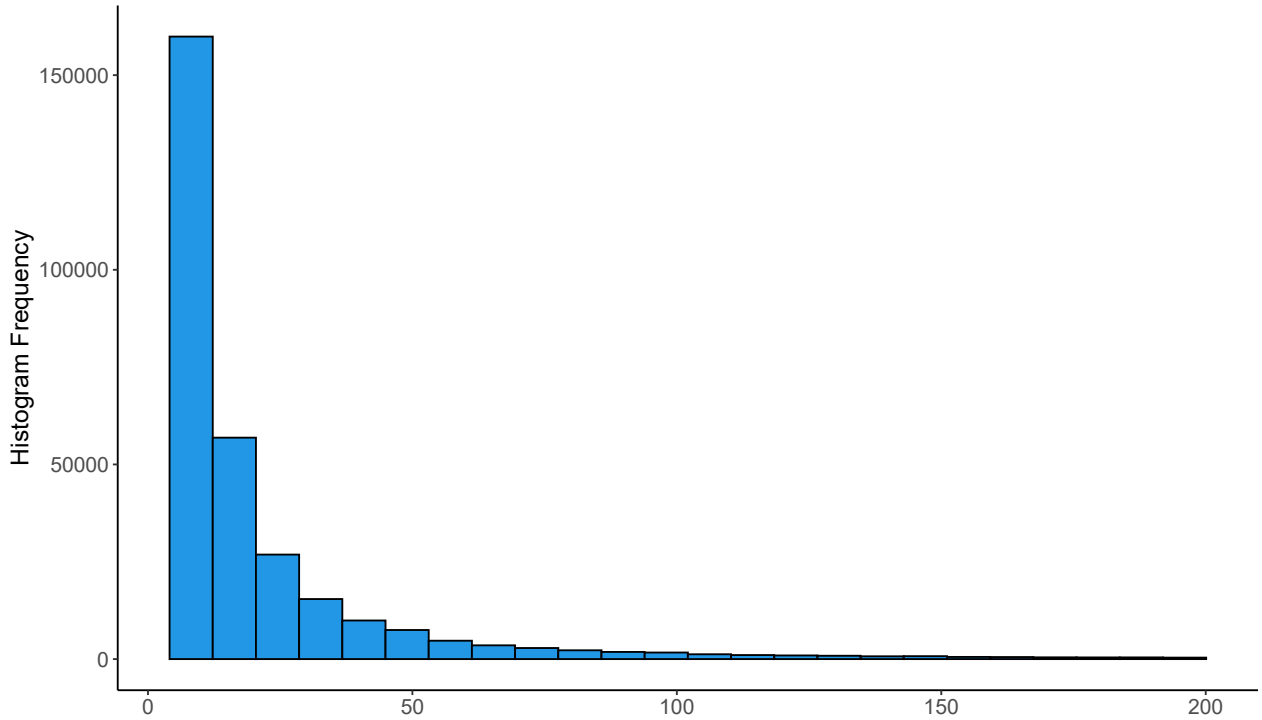
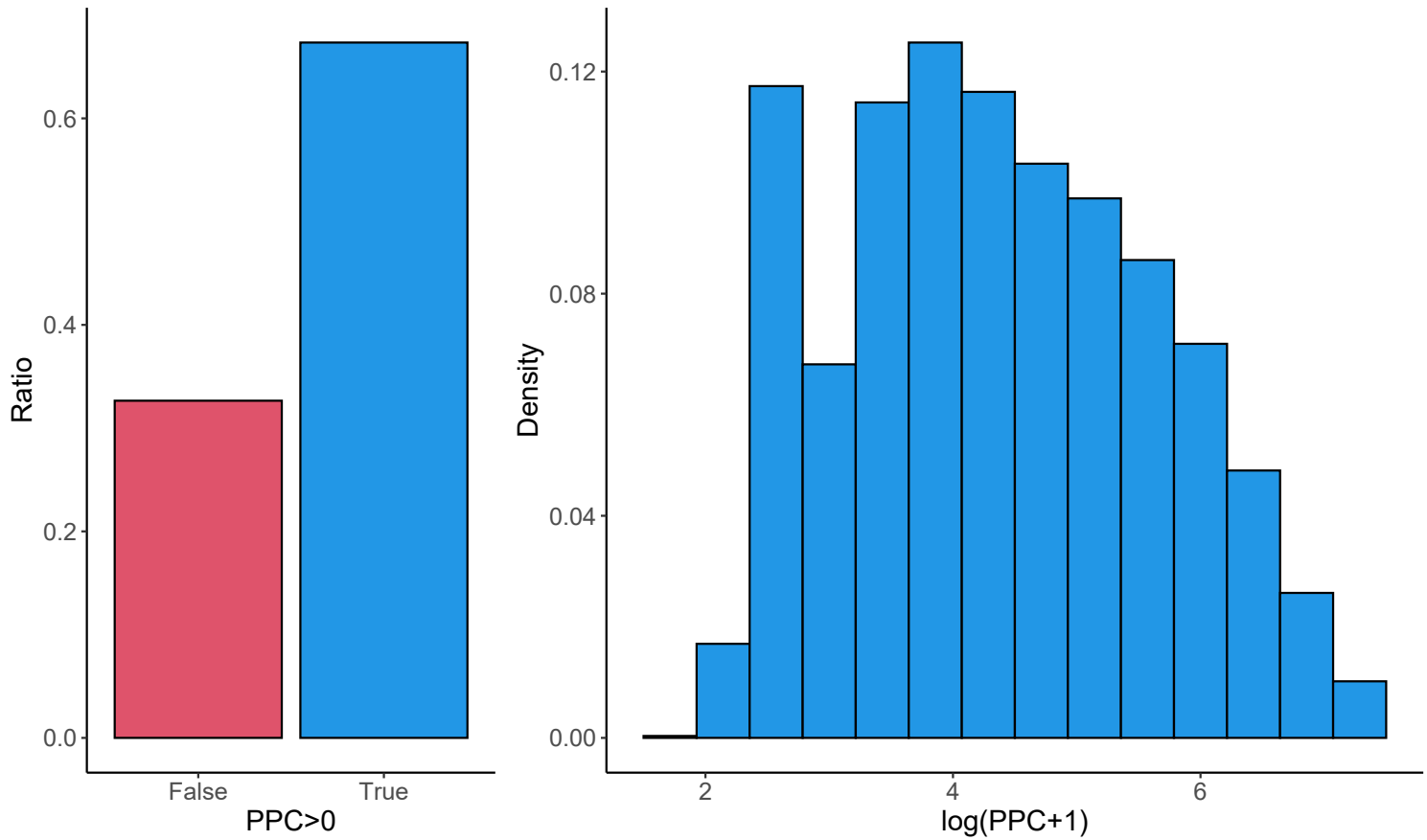


Figure: Firm Size Distribution

Appendix

Patient Contribution Distribution



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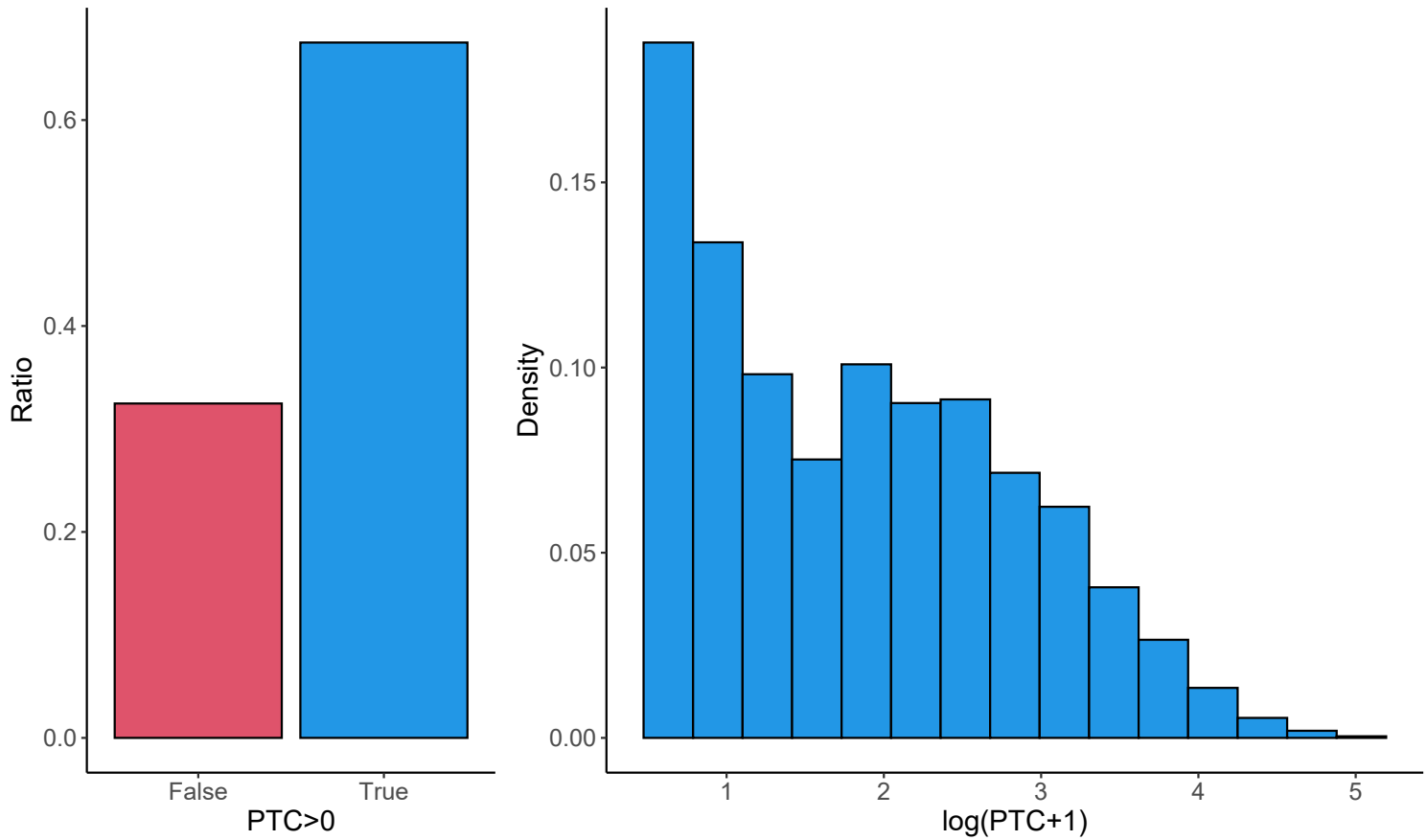
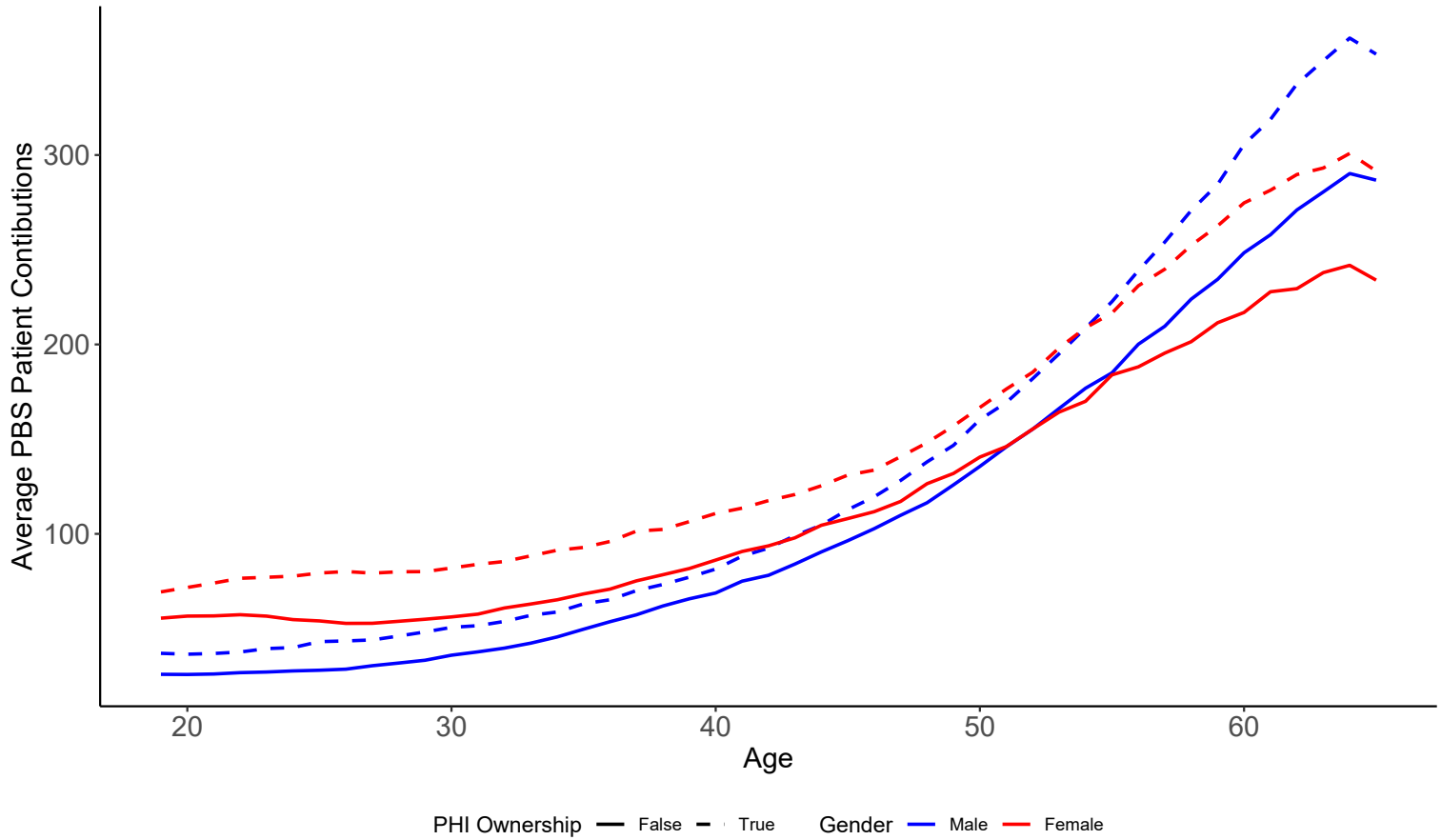


Appendix

Patient Contribution by Age



Appendix

A Simple Example for Identification

A simple example: Consider a firm, j with four employees. Assume $PHI_{1,t} = PHI_{2,t} = 1$ and $PHI_{3,t} = PHI_{4,t} = 0$. The average PHI ownership excluding the focal individual is computed as $\overline{PHI}_{-i,t} = 1/3, \quad i = 1, 2$ and $\overline{PHI}_{-i,t} = 2/3, \quad i = 3, 4$. These terms are captured by $c_{j,1}$ and $c_{j,0}$, respectively.

Appendix Identification (2)

Why do People Purchase PHI in Australia?

1. Financial Reasons
   - Reduced tax liabilities
   - Lifetime health cover
2. Health Reasons
   - Access to private hospitals
   - Choice of doctor and flexibility in selecting treatment options
   - Coverage for extras such as dental and physiotherapy
   - Shorter waiting times for elective surgeries

Appendix Summary

Results: Alternative Measure

Decision	**PHI uptake**			**PHI continuation**		
Gender	*All*	*Female*	*Male*	*All*	*Female*	*Male*
$\ln(PPC_{i,t}+1)$	0.0029***	0.0038***	0.0019***	0.0015***	0.0017***	0.0012***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0002)
Co-worker average	0.0016*	0.0067***	-0.0012	0.0006	0.0000	-0.0003
	(0.0008)	(0.0023)	(0.0014)	(0.0004)	(0.0010)	(0.0011)
Obs.	3,791,887	1,737,497	2,054,390	5,893,954	3,024,033	2,869,921
R^2	0.080	0.079	0.082	0.038	0.034	0.040

Appendix Summary

Results: Relationship

	PHI uptake					
Spouse?	*Yes*			*No*		
Gender	*All*	*Female*	*Male*	*All*	*Female*	*Male*
$\ln(PTC_{i,t}+1)$	0.0025***	0.0043***	0.0009**	0.0073***	0.0085***	0.0057***
	(0.0003)	(0.0004)	(0.0004)	(0.0002)	(0.0003)	(0.0004)
Co-worker average	0.0007	0.0016	-0.0035	0.0037	0.0133**	-0.0005
	(0.0020)	(0.0091)	(0.0056)	(0.0031)	(0.0067)	(0.0044)
Obs.	1,536,854	693,895	842,959	2,255,033	1,043,602	1,211,431
R^2	0.014	0.014	0.013	0.144	0.138	0.152

	PHI continuation					
Spouse?	*Yes*			*No*		
Gender	*All*	*Female*	*Male*	*All*	*Female*	*Male*
$\ln(PTC_{i,t}+1)$	0.0010***	0.0011***	0.0009***	0.0032***	0.0031***	0.0032***
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0004)
Co-worker average	0.0011*	0.0019	0.0010	0.0000	0.0021	-0.0018
	(0.0007)	(0.0019)	(0.0023)	(0.0031)	(0.0056)	(0.0053)
Obs.	3,613,842	1,797,295	1,816,547	2,280,112	1,226,738	1,053,374
R^2	0.023	0.022	0.023	0.037	0.033	0.040

Appendix Summary

Results: By Age

	PHI uptake					
Age	*Less than 35*			*35 or Older*		
Gender	*All*	*Female*	*Male*	*All*	*Female*	*Male*
$\ln(PTC_{i,t}+1)$	0.0086***	0.0106***	0.0067***	0.0033***	0.0044***	0.0023***
	(0.0003)	(0.0005)	(0.0005)	(0.0003)	(0.0003)	(0.0005)
Co-worker average	-0.0015	0.0103	-0.0053	0.0041**	0.0154***	-0.0003
	(0.0048)	(0.0101)	(0.0064)	(0.0019)	(0.0058)	(0.0042)
Obs.	1,895,073	859,243	1,035,830	1,896,814	878,254	1,018,560
R^2	0.062	0.061	0.064	0.104	0.097	0.109

	PHI continuation					
Age	*Less than 35*			*35 or Older*		
Gender	*All*	*Female*	*Male*	*All*	*Female*	*Male*
$\ln(PTC_{i,t}+1)$	0.0059***	0.0063***	0.0050***	0.0004**	0.0001	0.0007***
	(0.0004)	(0.0004)	(0.0005)	(0.0002)	(0.0001)	(0.0002)
Co-worker average	-0.0004	0.0065	-0.0045	0.0009	0.0001	0.0030
	(0.0043)	(0.0088)	(0.0075)	(0.0006)	(0.0016)	(0.0020)
Obs.	1,914,289	1,004,482	909,807	3,979,665	2,019,551	1,960,114
R^2	0.029	0.027	0.031	0.017	0.016	0.019

Appendix Summary

Results: Firm Size Restrictions

	PHI uptake					
Gender	*Female*			*Male*		
Maximum firm size	*50*	*200*	*1000*	*50*	*200*	*1000*
$\ln(PTC_{i,t}+1)$	0.0079***	0.0073***	0.0072***	0.0045***	0.0040***	0.0037***
	(0.0008)	(0.0005)	(0.0004)	(0.0005)	(0.0004)	(0.0003)
Co-worker average	0.0206***	0.0176***	0.0169***	0.0020	0.0005	-0.0010
	(0.0053)	(0.0048)	(0.0045)	(0.0032)	(0.0029)	(0.0028)
Obs.	457,083	714,344	991,399	658,552	1,016,928	1,376,536
R^2	0.098	0.095	0.088	0.096	0.097	0.092
	PHI continuation					
Gender	*Female*			*Male*		
Maximum firm size	*50*	*200*	*1000*	*50*	*200*	*1000*
$\ln(PTC_{i,t}+1)$	0.0015***	0.0019***	0.0019***	0.0012***	0.0016***	0.0017***
	(0.0004)	(0.0003)	(0.0002)	(0.0004)	(0.0002)	(0.0002)
Co-worker average	-0.0006	0.0006	0.0010	-0.0007	0.0004	0.0004
	(0.0021)	(0.0019)	(0.0018)	(0.0021)	(0.0019)	(0.0018)
Obs.	748,841	1,101,305	1,555,456	793,805	1,203,204	1,730,320
R^2	0.043	0.040	0.037	0.049	0.046	0.043

Appendix Summary

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