

Health Shocks and Household Allocation of Time and Spending

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INTRODUCTION

Severe health shocks have a major effect on

- the affected person:
 - productivity
 - well-being
 - needs and preferences
- Household behaviour:
 - labour supply and time use of partner and other members
 - Consumption spending

This paper studies how health shocks affect consumption spending and time allocation of the affected spouse and the partner

RELATED LITERATURE

Economic literature has documented the impact of poor health on

- employment, earnings and income (e.g. Meyer & Mok, 2019; Dobkin et al., 2018; Polidano & Vu, 2015);
- Consumption (Finkelstein et al. 2013; Stephens 2001; Meyer & Mok, 2020)
- (to a lower extent) spousal labour supply (e.g. Fadlon & Nielsen, 2015; Wu, 2003; Garcia-Gomez et al., 2013)

Economics of time use has studied how consumption spending and time allocation change in response to

- retirement (Aguiar & Hurst, 2005; 2013)
- wealth shocks (Been & Rohwreder 2020)
- the relation between health and time use (Halliday & Poldor, 2012)

Contribution of the paper:

- Joint analysis of the effects of health shocks on consumption spending and time allocation
- Use longitudinal data representative of the Australian population
- time use changes of the unaffected spouse

MODEL

We build on the theory of allocation of time and spending introduced by Becker & Ghez (1975):

- Consumption of commodity $\mathbf{c}_i = f(x_i, hpt_{i1}, hpt_{i2})$
where x_i is spending on goods and hpt_{i1} hpt_{i2} are home production time of the affected person 1 and unaffected spouse
- The household consumes N **commodities** $\mathbf{c} = (\mathbf{c}_1, \dots, \mathbf{c}_i, \dots, \mathbf{c}_N)$ and maximize the utility function $u(\mathbf{c})$ subject to
 - **(Budget constraint)** $\sum_{i=1}^n x_i = w_1 mt_1 + w_2 mt_2 + a$
where mt_1 is market time (time at work) of the affected person 1 and mt_2 is market time of the spouse 2
 - **(Time constraint of affected person)** $mt_1 + \sum_{i=1}^n hpt_{i1} + l_1 = 1$
 - **(Time constraint of unaffected spouse)** $mt_2 + \sum_{i=1}^n hpt_{i2} + l_2 = 1$
 - **(Non negativity of time at work)** $mt_1, mt_2 \geq 0$

Lagrangian

$$L(x, hpt_1, hpt_2, \lambda, \theta_1, \theta_2, \mu_1, \mu_2) = u(c) + \lambda(-\sum_{i=1}^n x_i + w_1 mt_1 + w_2 mt_2 - a) + \theta_1(1 - mt_1 - \sum_{i=1}^n hpt_{i1} - l_1) + \theta_2(1 - mt_2 - \sum_{i=1}^n hpt_{i2} - l_2) + \mu_1 mt_1 + \mu_2 mt_2$$

First Order Conditions

- $x_i : u_c f_x = \lambda$
- $hpt_1 : u_c f_{hpt_1} = \theta_1$
- $hpt_2 : u_c f_{hpt_2} = \theta_2$
- $mt_1 : \lambda w_1 + \mu_1 = \theta_1$
- $mt_2 : \lambda w_2 + \mu_2 = \theta_2$

After differentiating for health shock HS_1

$$1) \frac{dx}{dHS_1} = a \frac{d\lambda}{dHS_1} + b \frac{dc}{dHS_1} - c \frac{dhpt_1}{dHS_1} - d \frac{dhpt_2}{dHS_1}$$

$$2) \frac{dhpt_1}{dHS_1} = e \frac{d\theta_1}{dHS_1} + f \frac{dc}{dHS_1} - g \frac{dx}{dHS_1} - h \frac{dhpt_2}{dHS_1}$$

$$3) \frac{dhpt_2}{dHS_1} = i \frac{d\theta_2}{dHS_1} + j \frac{dc}{dHS_1} - k \frac{dx}{dHS_1} - l \frac{dhpt_2}{dHS_1}$$

$$4) \frac{d\lambda}{dHS_1} w_1 + \lambda \frac{dw_1}{dHS_1} + \frac{d\mu_1}{dHS_1} = \frac{d\theta_1}{dHS_1}$$

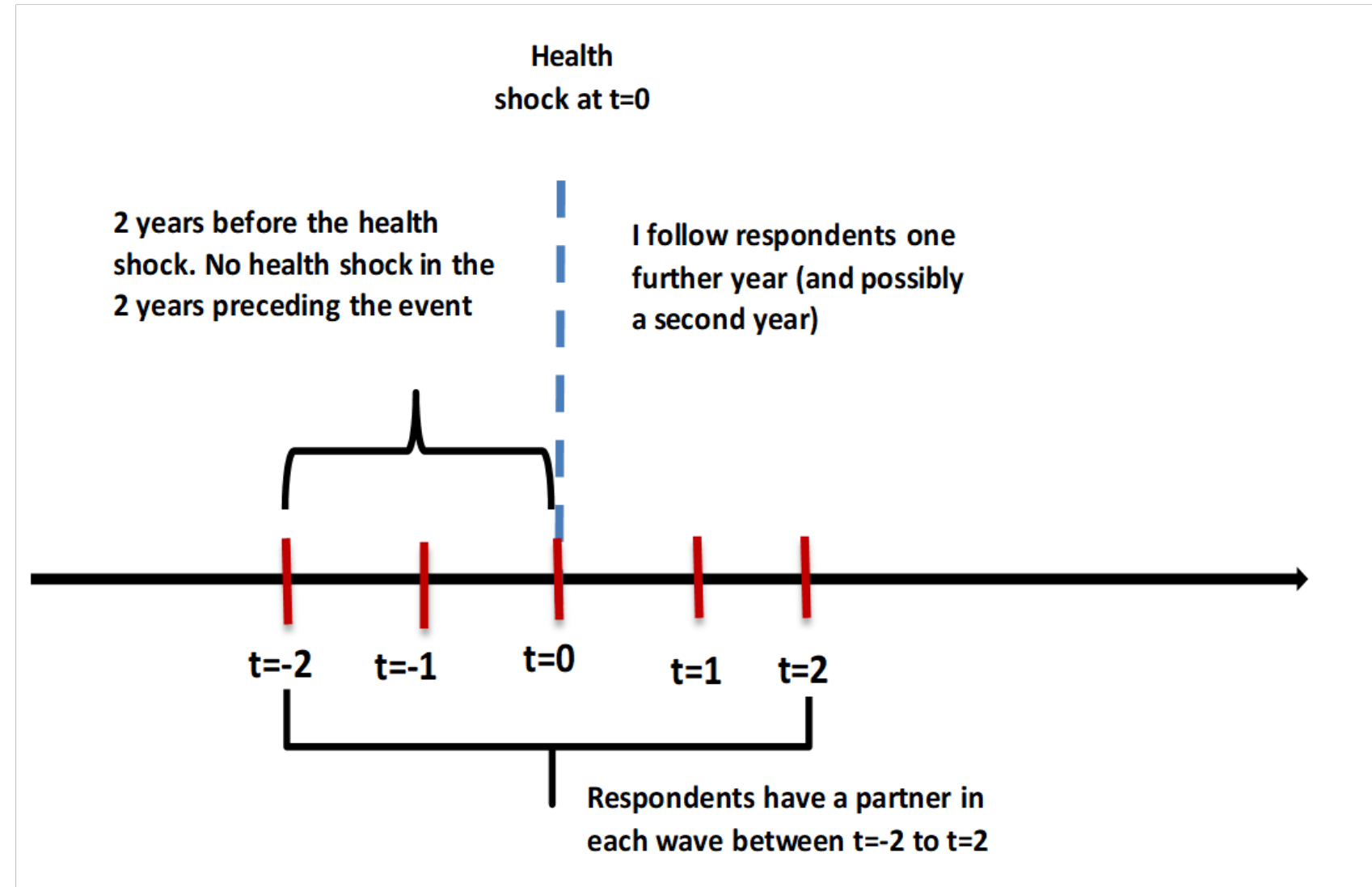
$$5) \frac{d\lambda}{dHS_1} w_2 + \lambda \frac{dw_2}{dHS_1} + \frac{d\mu_2}{dHS_1} = \frac{d\theta_2}{dHS_1}$$

$X, hpt_1, hpt_2, mt_1,$
 $mt_2 \uparrow = \downarrow ?$

DATA

- We use Household, Income and Labour Dynamics in Australia (HILDA) Survey data:
 - collects information about individual health, labour market dynamics, household consumption spending and individual time use.
- Health shock is identified as self-reports experience of a “serious personal injury or illness to self” in the past 12 months

- To preserve the exogeneity of our health shock we focus on the subsample of affected persons who:
 - had no health shocks in the two years prior to experiencing a health shock;
 - spouse does not experience any health shock in the two years prior to the health shock and the two subsequent years



Quantifying health shock

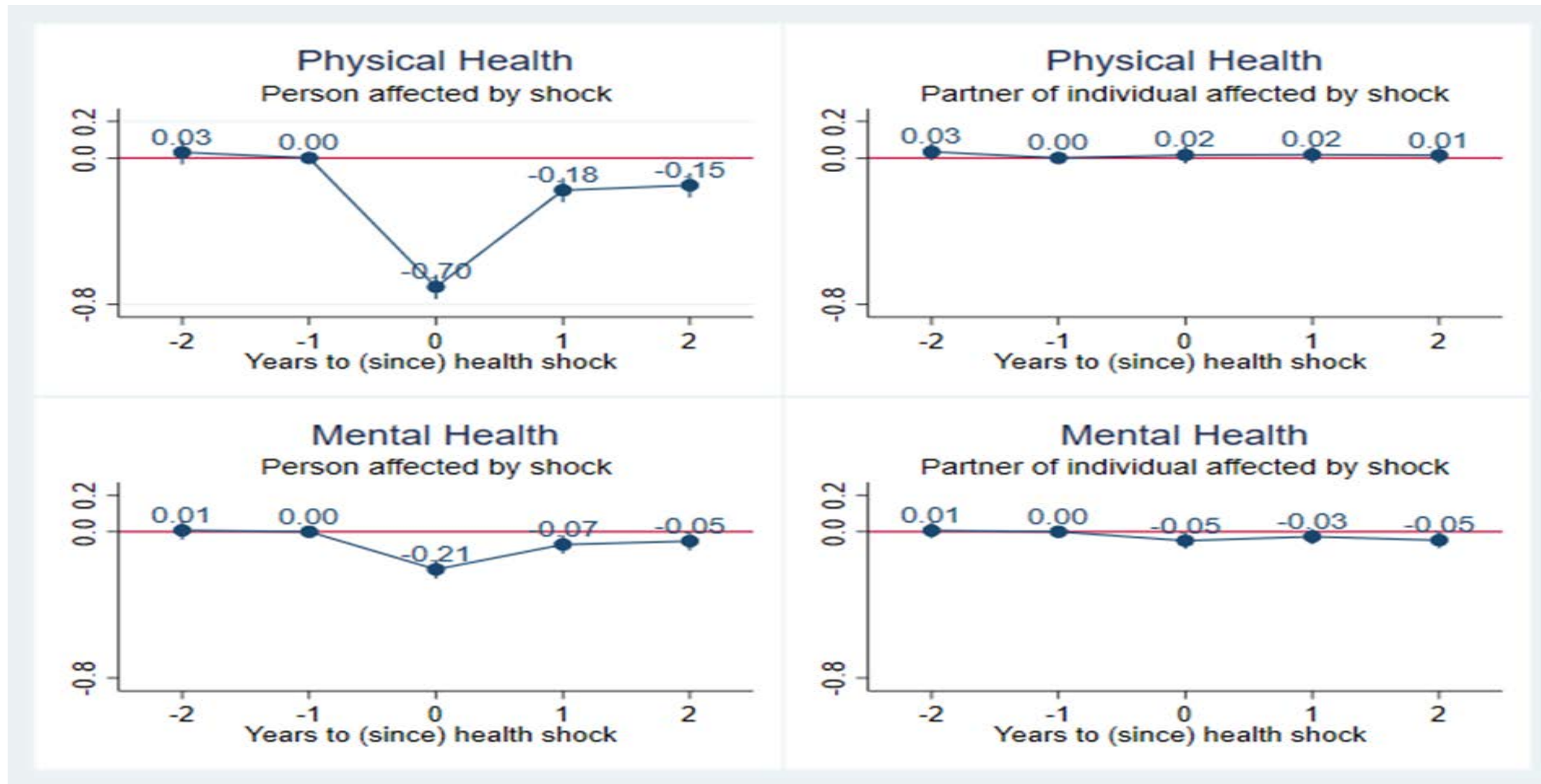


Table 1 Demographic characteristics at the time of the shock.

	Person affected (%)	Spouse (%)
Sample size	1,253	1,253
Age in years at t=0		
20 to 29	7.7	7.0
30 to 39	16.8	18.7
40 to 49	22.4	22.0
50 to 59	25.3	25.9
60 to 69	20.3	20.0
70 to 75	7.5	6.3
Sex		
Women	44.0	56.3
Men	56.0	43.7

Table 2 Evolution of the average outcomes of individuals affected by a health shock and partner.

Outcome	Person affected			Partner		
	t= -2	t= 0	t= 2	t= -2	t= 0	t= 2
Physical Health Index	0.03	-0.73	-0.20	0.24	0.19	0.16
Mental Health Index	0.02	-0.20	-0.06	0.15	0.11	0.09
Time in Market Work (hours)	27.6	25.2	24.3	26.1	25.5	24.9
Time in Home production (hours)	30.3	30.7	30.7	31.4	32.0	31.9
Time Caring	1.0	0.8	0.8	1.4	2.1	2.1
HH Spending (exc. Health)	(weekly, \$)			2507	2501	2422
Health Spending	(weekly, \$)			138	163	143
Household Income	(weekly, \$)			7735	7602	7587

METHODS

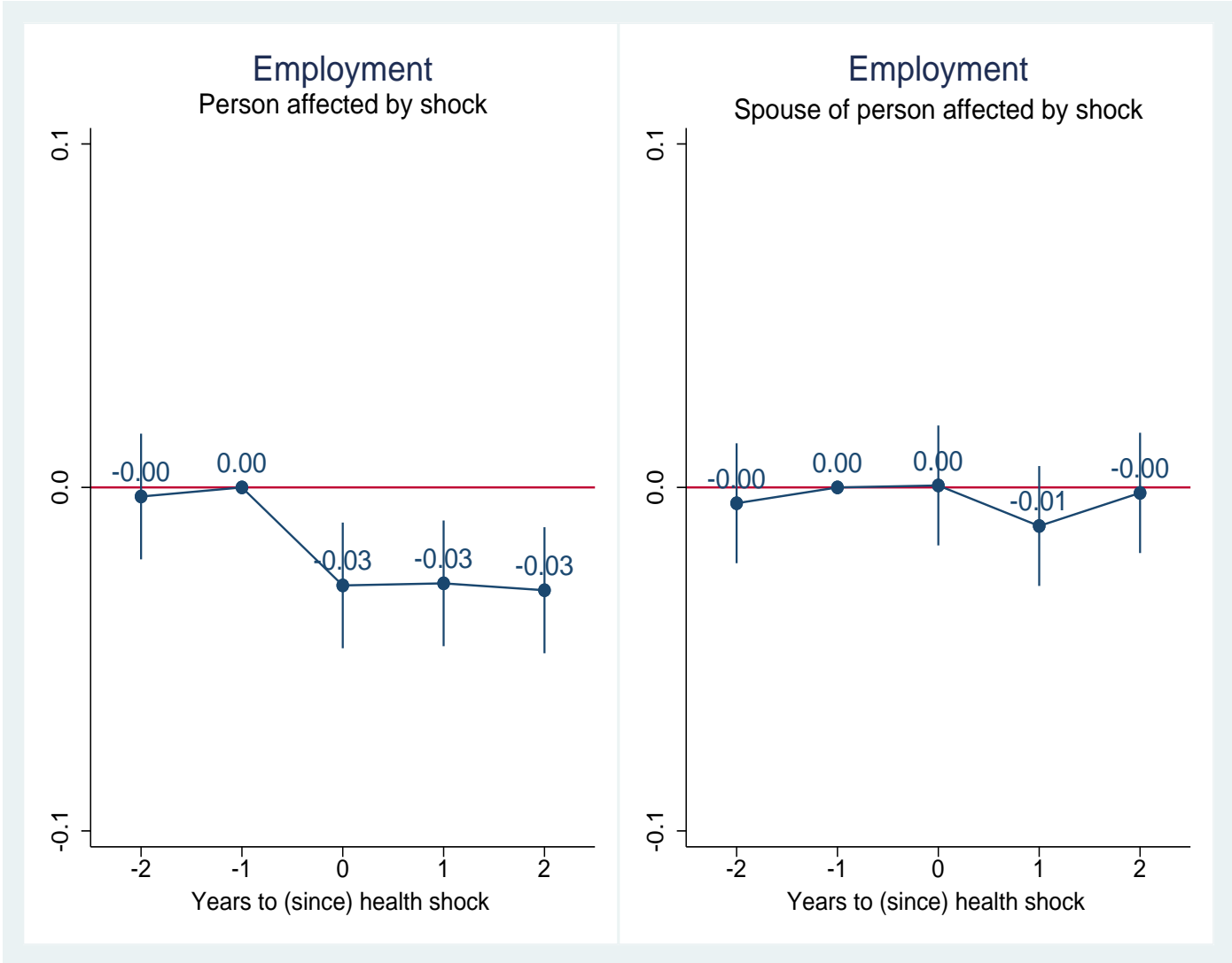
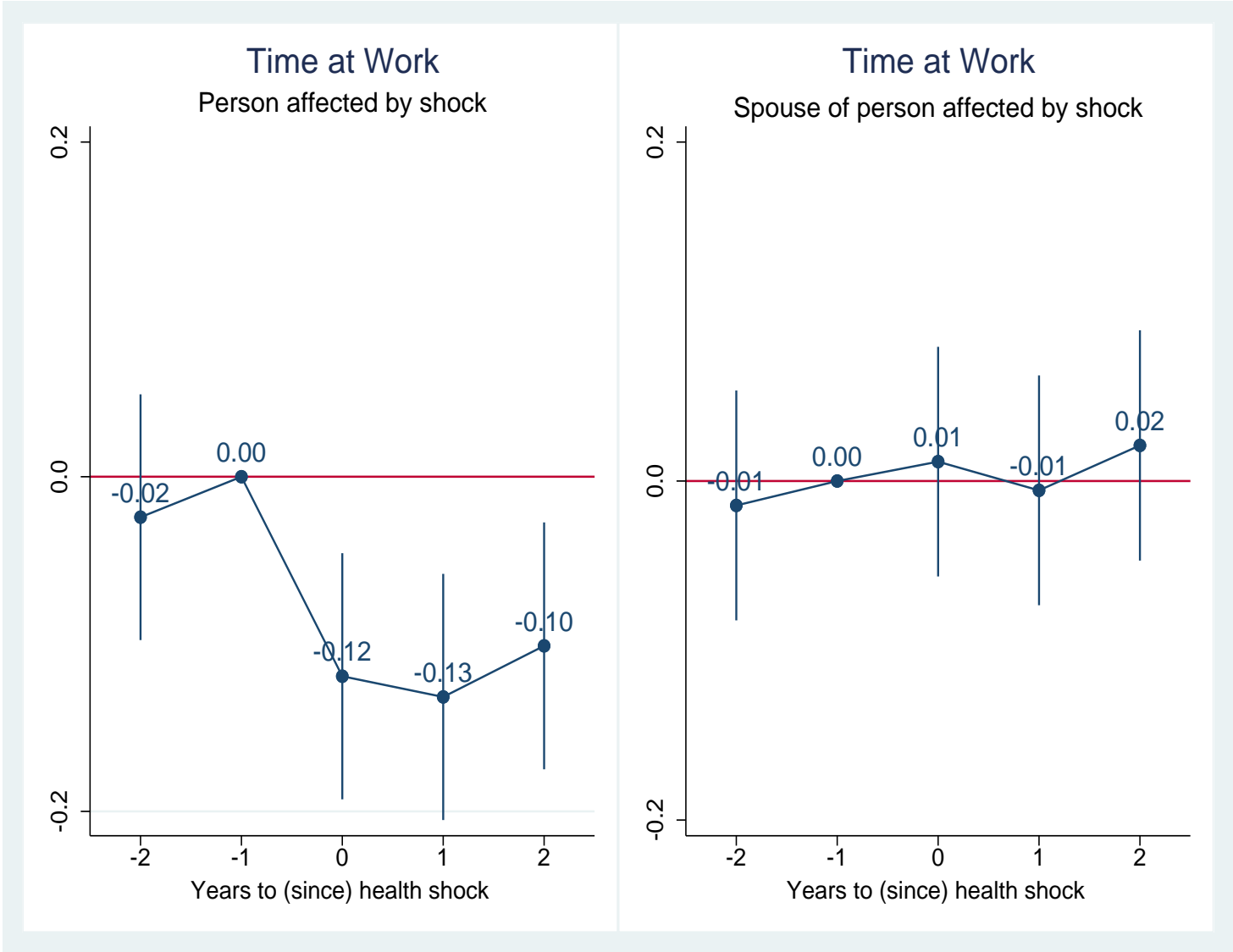
To estimate the effect of the health shock we apply a time-event research design of this form

$$y_{it} = \eta_i + \gamma_t + \sum_{k=-2}^{k=2} \alpha_k I_{ik} + \beta X_{it} + \varepsilon_{it}$$

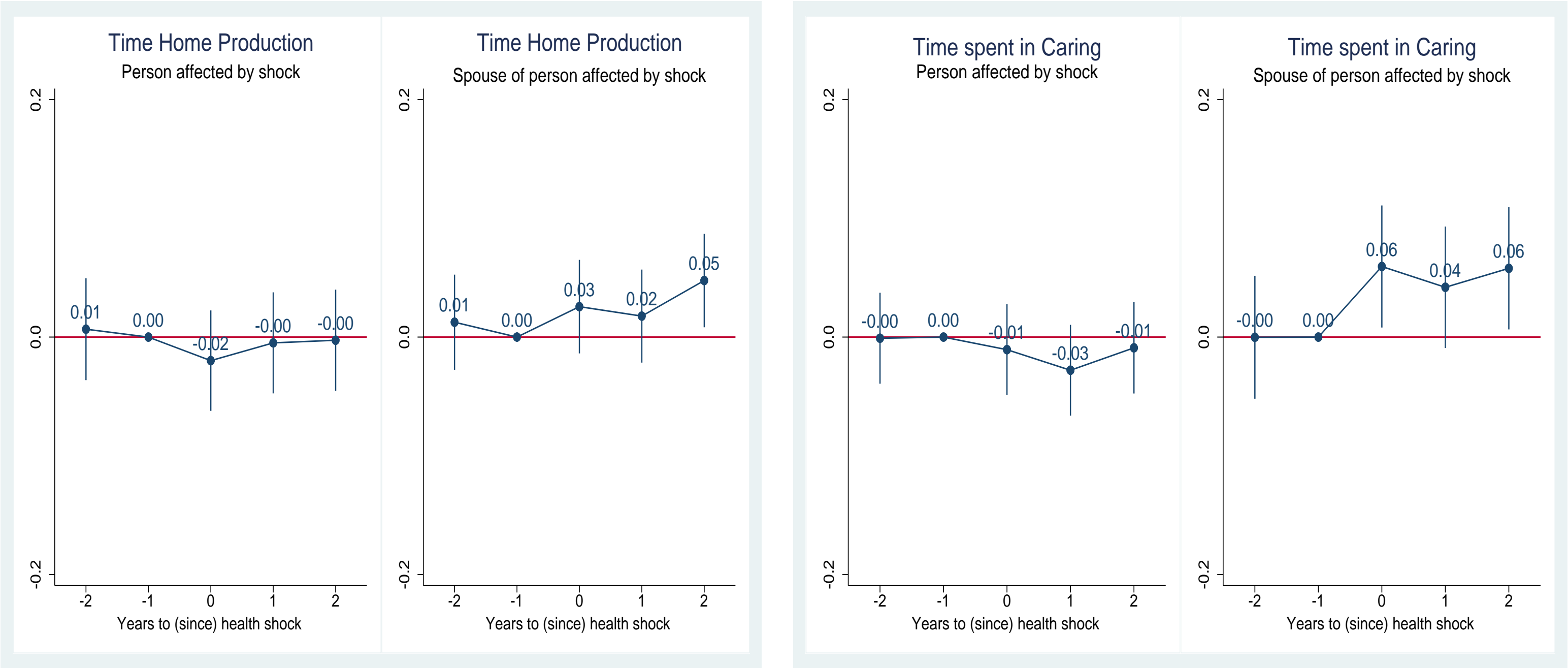
where

- y_{it} is the outcome of person i at time t ,
- η_i is an individual fixed-effect, γ_t is a time effect,
- I_{ik} is an indicator that equals one if individual i is k years from experiencing the health shock and time-varying characteristics X_{it} .
- α_k estimates how the outcome changes if person i is k -years from experiencing the health shock.

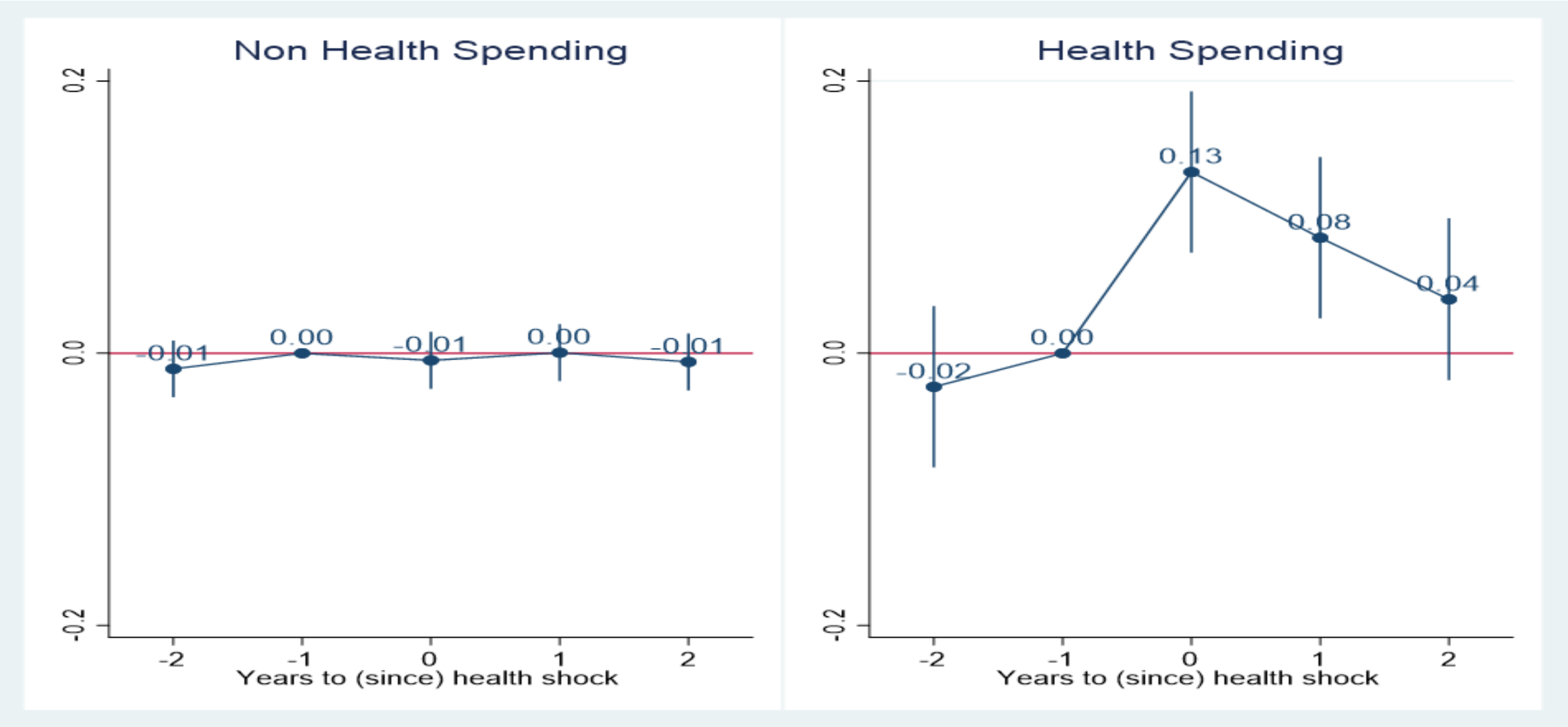
RESULTS 1: Time at work



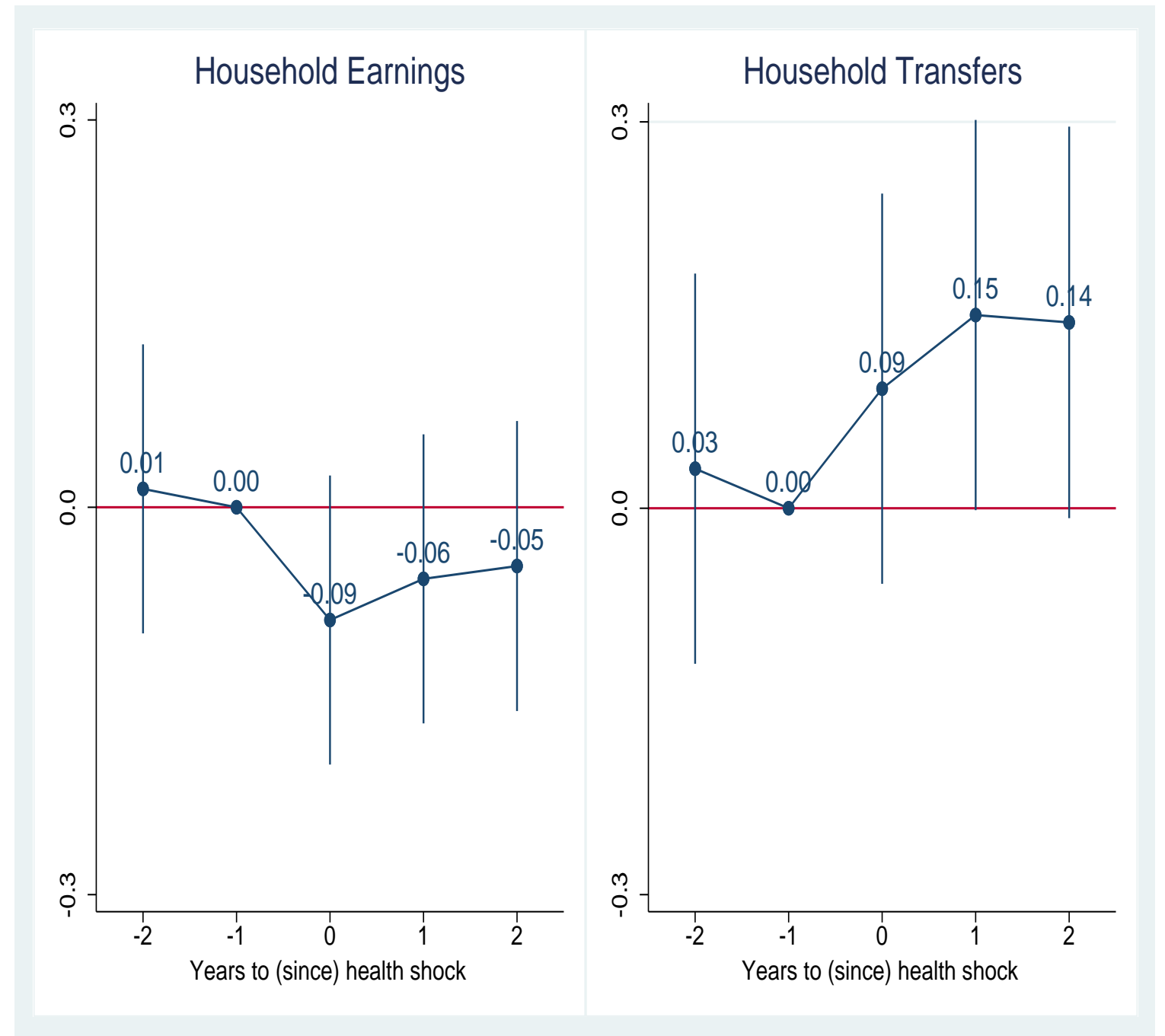
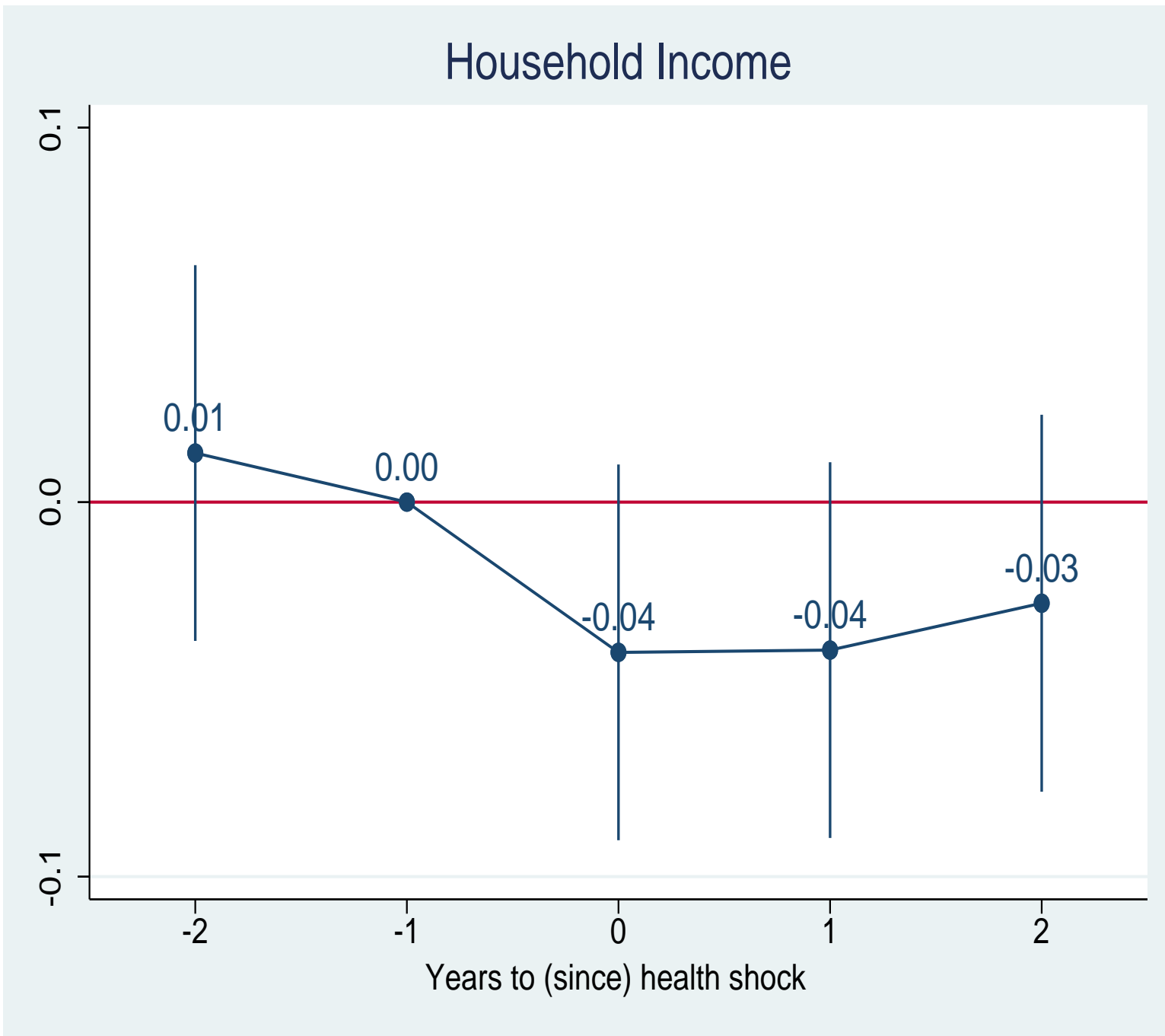
RESULTS 2: Home Production time



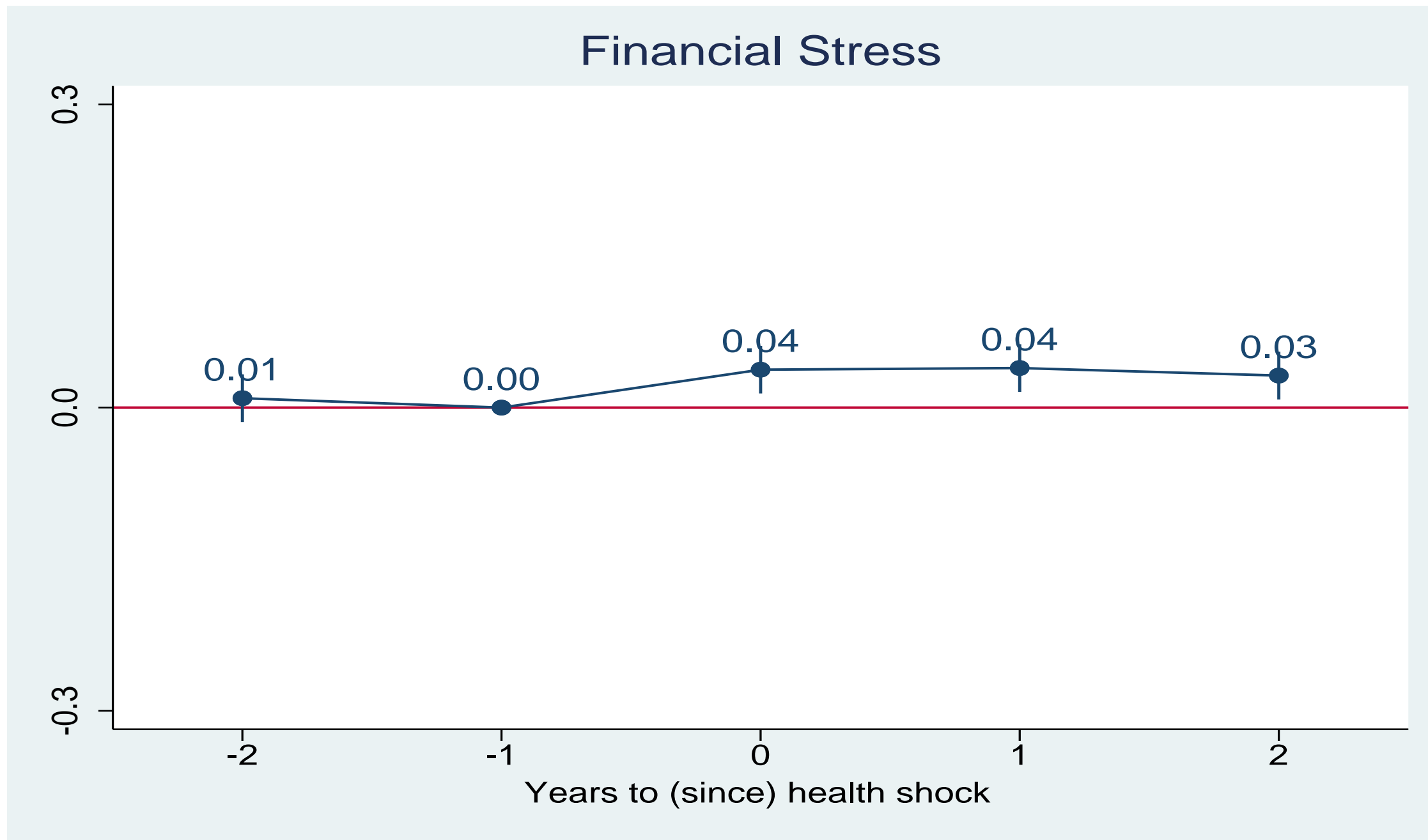
RESULTS 3: Consumption spending



Household Income



Financial Stress



CONCLUSIONS

- The paper highlights the importance of considering behavioural responses to health shocks for both affected and unaffected persons.
 - Substitution away from work of the affected person;
 - Consumption of commodity health increases (Health spending and time spent in caring rise)
 - Small decrease in non-health spending and increase in time spent in other home production activities
- From a policy perspective, the paper highlights the importance of entitlements such as carer's leave.

Effect of health shock on time use and spending categories

	Person affected by the health shock	Spouse	Spending category	t= 0
Time use category	t= 0	t= 0		
Market Time	-.13*** [-.23; -.03]	.01 [-.06; .08]	Health Spending	.13*** [.07; .19]
Home Production	-.02 [-.06; .02]	.03 [-.01; .07]	Non Health Spending	-.01 [-.03; .02]
Household errands	.002 [-.05; .05]	.06** [.03; .12]	Food at home	.004 [-.03; .04]
Housework	-.01 [-.06; .04]	.03 [-.01; .08]	Food out	-.04 [-.14; .05]
Outdoor tasks	-.07** [-.12; -.01]	.03 [-.02; .09]	Alcohol &Tobacco	-.12** [-.21; -.02]
Caring	-.02 [-.06; .02]	.06** [.01; .11]	Bills	.05* [-.01; .11]
			Transportation	-.02 [-.07; .02]
			Clothing	-.02 [-.11; .07]