The Crowding-in Effect of Public Health Insurance for Private Health Insurance Coverage – New Insights from Taiwan

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Motivation

- **Barack Obama's Universal Health Care Plan**
  - President Obama believes a public option (NHI) would not crowd out and ultimately eliminate private insurance

- **Does Public Insurance Crowd out Private Insurance?**
  - Cutler and Gruber (1996; QJE) were the first to examine the crowding-out effect under the Medicaid expansions.

- **The unique data of NHI in Taiwan**
  - The National Health Insurance is a compulsory insurance system that was launched in 1995.
  - Taiwan's health insurance program is ranked No.2 by the Economist Intelligence Unit's "World Health Ranking", only behind that of Sweden, and has even won praise from Paul Krugman, a former Nobel Prize laureate in Economics, in his column in the New York Times.

Previous Literature on the Crowding-out effect

There have been mixed conclusions

- Cutler and Gruber (1996)

- Thorpe and Florence (1998)

- Blumberg *et al.* (2000)

- Card and Shore-Sheppard (2004)

- Finkelstein (2004)

- Long *et al.* (2009) - Massachusetts health care reform

Contributions of the Paper

- **The paper has important contributions:**
  - To our knowledge, this is the first paper to examine "Crowding-out effect" using a long observation period (12 years) before and after implementation of NHI.

  - We test the short-term and long-term crowding-out effects.

  - We investigate the crowding-out effects on the **coverage ratio** and **the changes of insurance premium** expenses for household purchases private health insurance (PHI).

  - We analyze insurers' product-adjustment strategies of PHI to provide more insights for the discussion of crowding-out effect.

NHI and PHI in Taiwan

- **National Health Insurance (NHI) in Taiwan**
  - Was launched in March 1, 1995.
  - By 2010, 99.5% of people has been covered .
  - 92.1% of hospitals in Taiwan join the NHI System.

- **Private Health Insurance (PHI) in Taiwan**
  - Highly developed private insurance market.
  - Insurance penetration rate is 18.51%, the highest in the world.
  - Insurance densities is US$3,296 per person. (ranked number 12th in the world).

Hypothesis Development

H1: The National Health Insurance (NHI) program crowds out Private Health Insurance (PHI) in terms of both coverage and premiums.

H2: The NHI program has a greater crowding-out effect for households who were not covered by any insurance before NHI.

H3: The NHI program has different crowding-out effect on different income households.

Data

- We use data spanning the period from 1993 to 2006 (12 years) which allows us to estimate both short term and long-run effects of NHI.

- Data source: Survey of Family Income and Expenditure (SFIE)
  - Approximately 14,000 households and 60,000 individuals every year.
  - The SFIE has listed the amount of private health insurance purchases since 1993.

- The final sample
  - Before NHI (1993-1994) consists of 27,225 households.
  - After NHI (1996-2005) consists of 106,625 households.

Methodology

- We use Probit and Heckman model that combines propensity score matching (PSM) with the difference-in-difference (DID) method to test related issues.

- Independent Variable:
  - Coverage ratio
  - Private health insurance premium

- Dependent Variable:
  household characteristics (e.g., gender, age, marital status, education, household income level, the number of children under the age of 18, the number of elderly above age 65, the region (Northern, Central, Southern, Eastern) and housing status.

Methodology

- **Probit and Heckman selection model**

$$Y_{it} = \beta_0 + \beta_1 \, Post\_NHI_{it} + \beta_2 X_{it} + \beta_3 \delta_t + \varepsilon_t$$

Y_{it} is a binary indicator

$Y_{it} = 1$ if household i has private health insurance
$Y_{it} = 0$ if household i does not have any private health insurance

Y_{it} is the premium for private health insurance.

$Post\_NHI = 1$ if household i is in the period in which NHI has been enforced

δ_t is a fixed year effect.
X_{it} is the vector of observable household characteristics

Methodology

- **Difference-in-Difference approach (DID)**

  The control group – people covered by insurance before NHI

  The treatment group – people without insurance before NHI

$$Y_{it} = \beta_0 + \beta_1 UNIN_i + \beta_2\, Post\_NHI_{it} + \beta_3 Post\_NHI_{it} \times UNIN_i + \beta_4 X_{it} + \beta_5\delta_t + \varepsilon_t$$

$$\Delta^{NHI} = \left(Y^{after\ NHI}_{Treatment} - Y^{before\ NHI}_{Treatment}\right) - \left(Y^{after\ NHI}_{Control} - Y^{before\ NHI}_{Control}\right)$$

$$= [(\beta_1 + \beta_2 + \beta_3) - \beta_1] - [\beta_2 - 0] = \beta_3 \qquad (3)$$

- **Propensity score matching (PSM)**

  To further control the difference in basic characteristics between the two groups. We should only look for individuals with similar characteristics in the control and treatment groups. We uses the PSM method to resolve the issue that the observations are different.
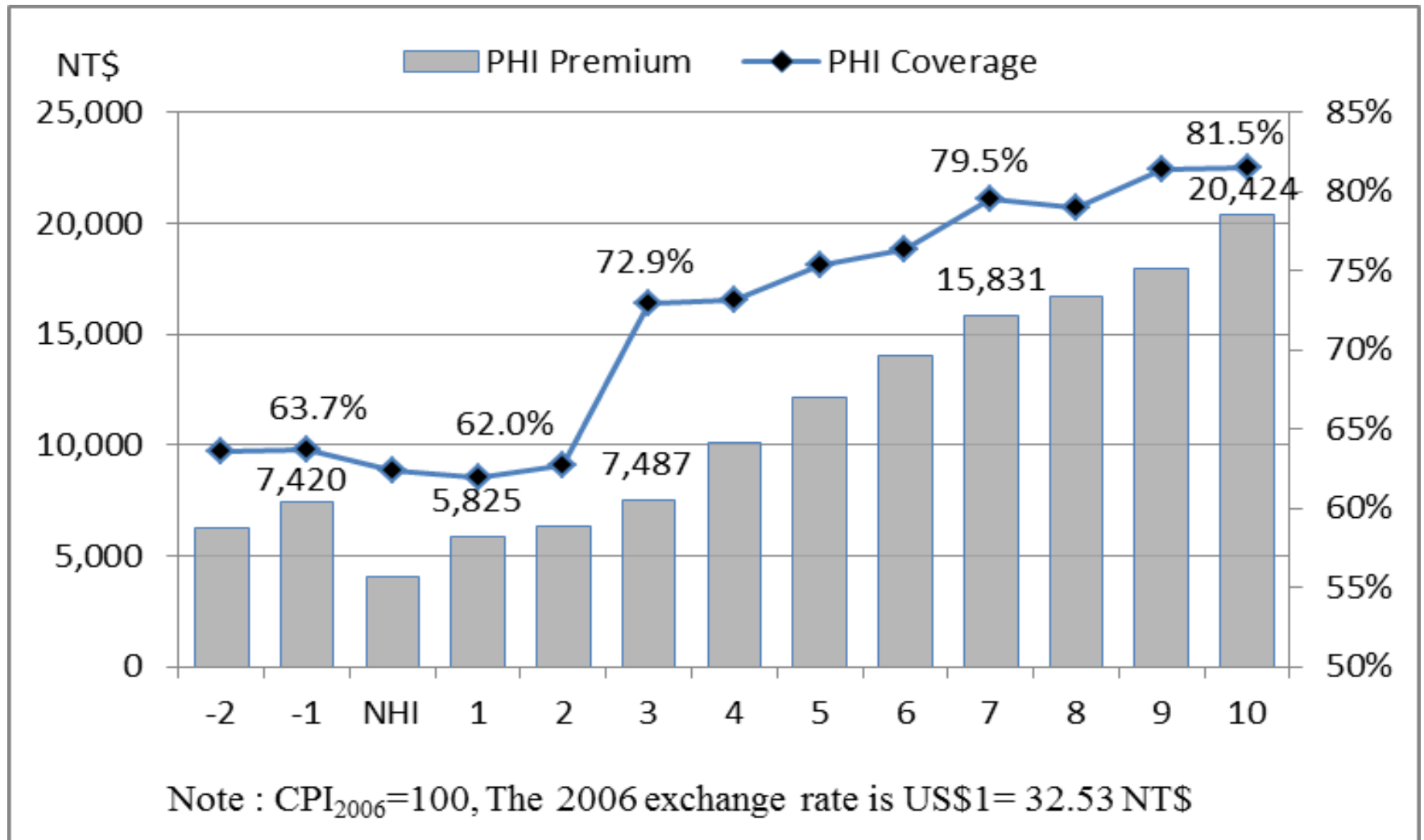
Empirical Results
The Growth of Taiwan Private Health Insurance Market
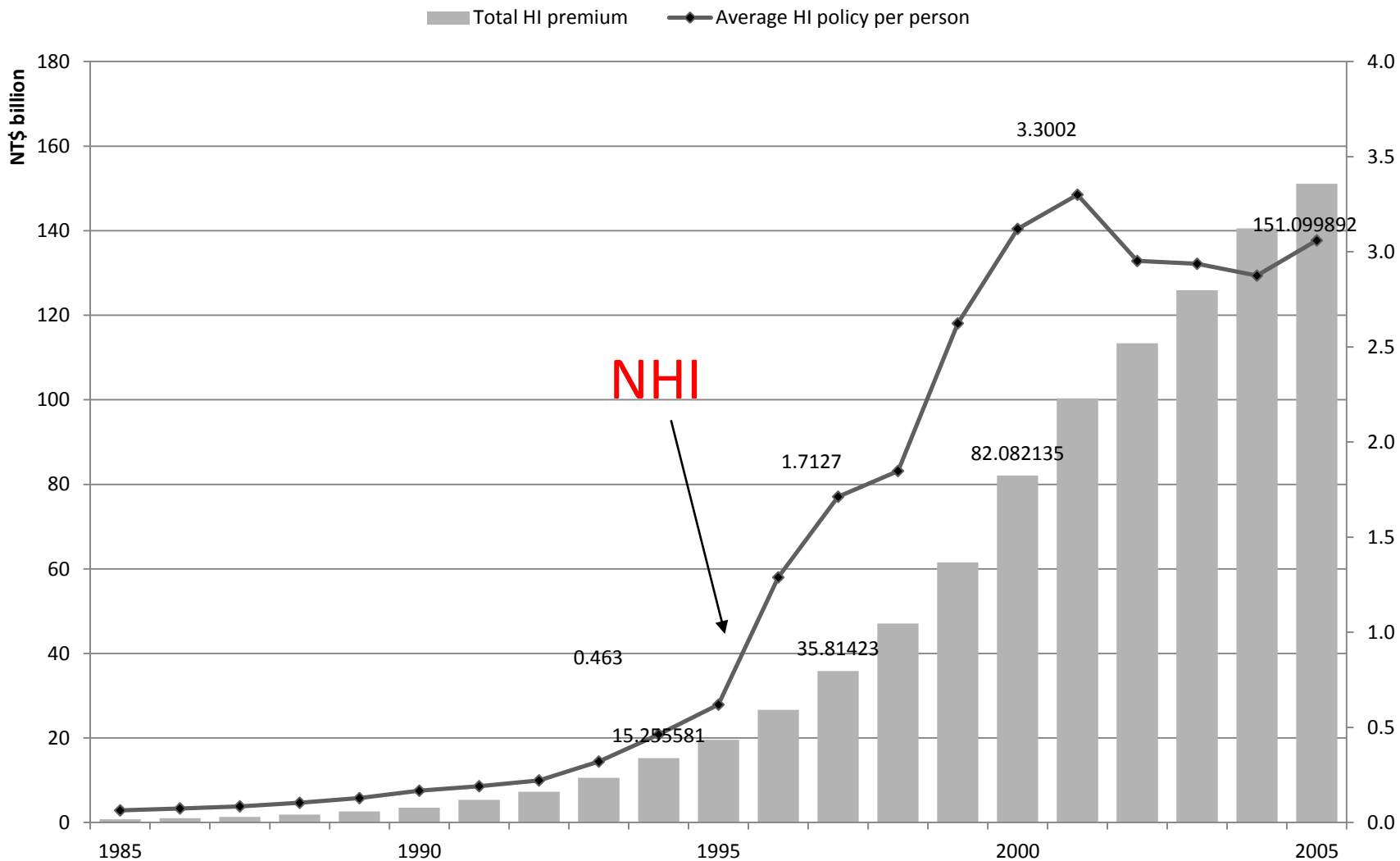
Empirical Results
Time period and crowding-out effect

Note : CPI$_{2006}$=100, The 2006 exchange rate is US$1= 32.53 NT$

Empirical Results
Time period and crowding-out effect

Table 3
Probit and Heckman Selection Regression Results for the Effect of NHI on Purchases of Private Insurance

Difference time period	(-2,-1) vs. (+1,+2)			(-2,-1) vs. (+3,+6)			(-2,-1) vs. (+7,+10)		
Variables	Coefficient	S.E.	M.E.	Coefficient	S.E.	M.E.	Coefficient	S.E.	M.E.
Dependent Variable: Private Insurance Purchasing									
Post_NHI	0.044***	(0.014)	0.013	0.351***	(0.013)	0.099	0.697***	(0.014)	0.173
Dependent Variable: log (Private Insurance Premium)									
Post_NHI	-0.002	(0.017)		0.525***	(0.016)		1.335***	(0.015)	

Note: * Significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level. Post_NHI is a time indicator (Post_NHI=1 if household i is in the period in which NHI has been enforced and Post_NHI=0 if household i is in the period in which NHI has not been enforced). M.E. is Marginal effects.

- There is no evidence of the existence of a crowding-out effect for PHI coverage both in the short-tem and long term.
- for PHI premium, there is no significant evidence of crowd out effect in the short run, but instead we find NHI gives a crowding-in effect in the long term.
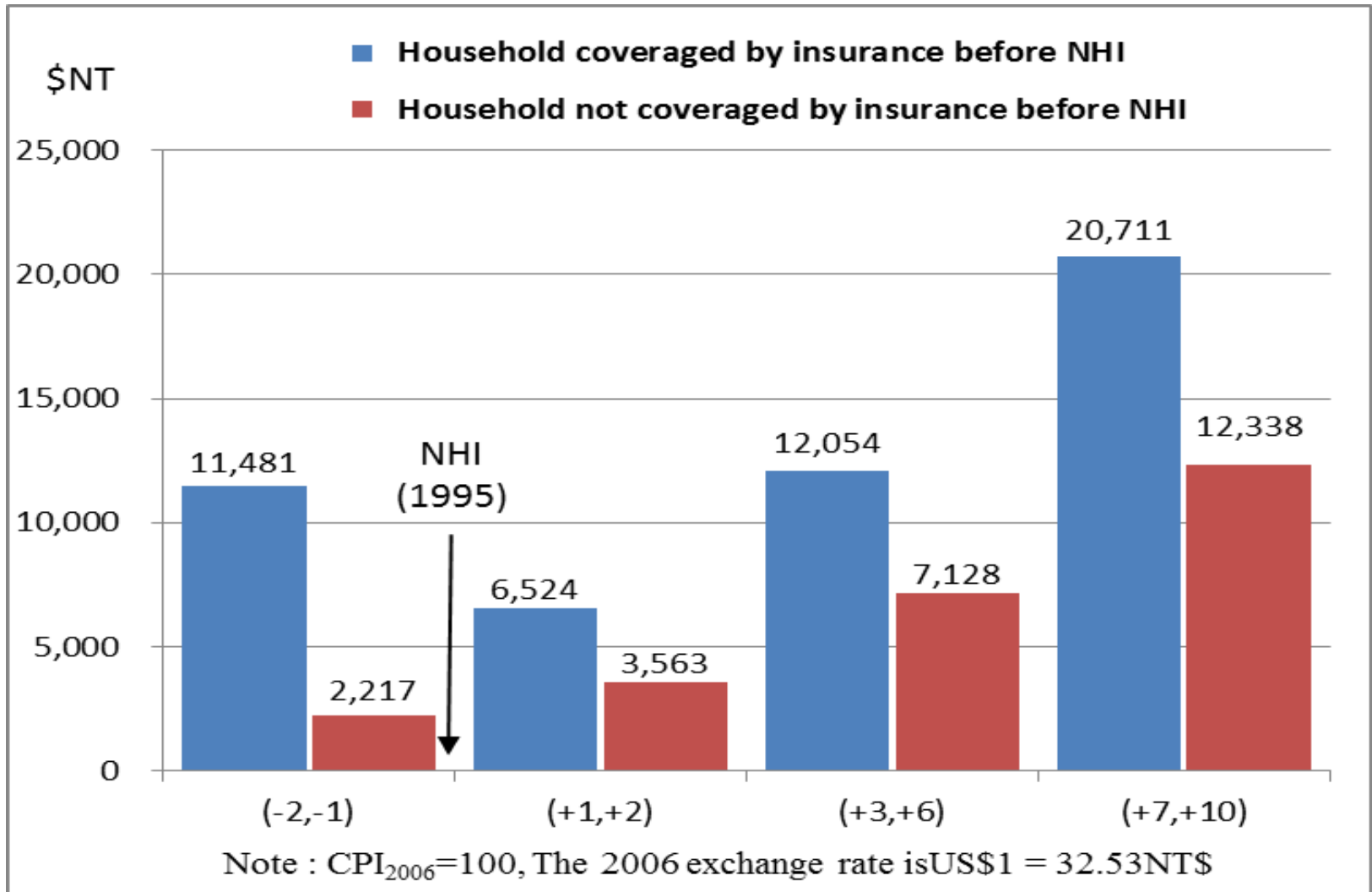
Empirical Results
The Coverage of Different Groups with PHI

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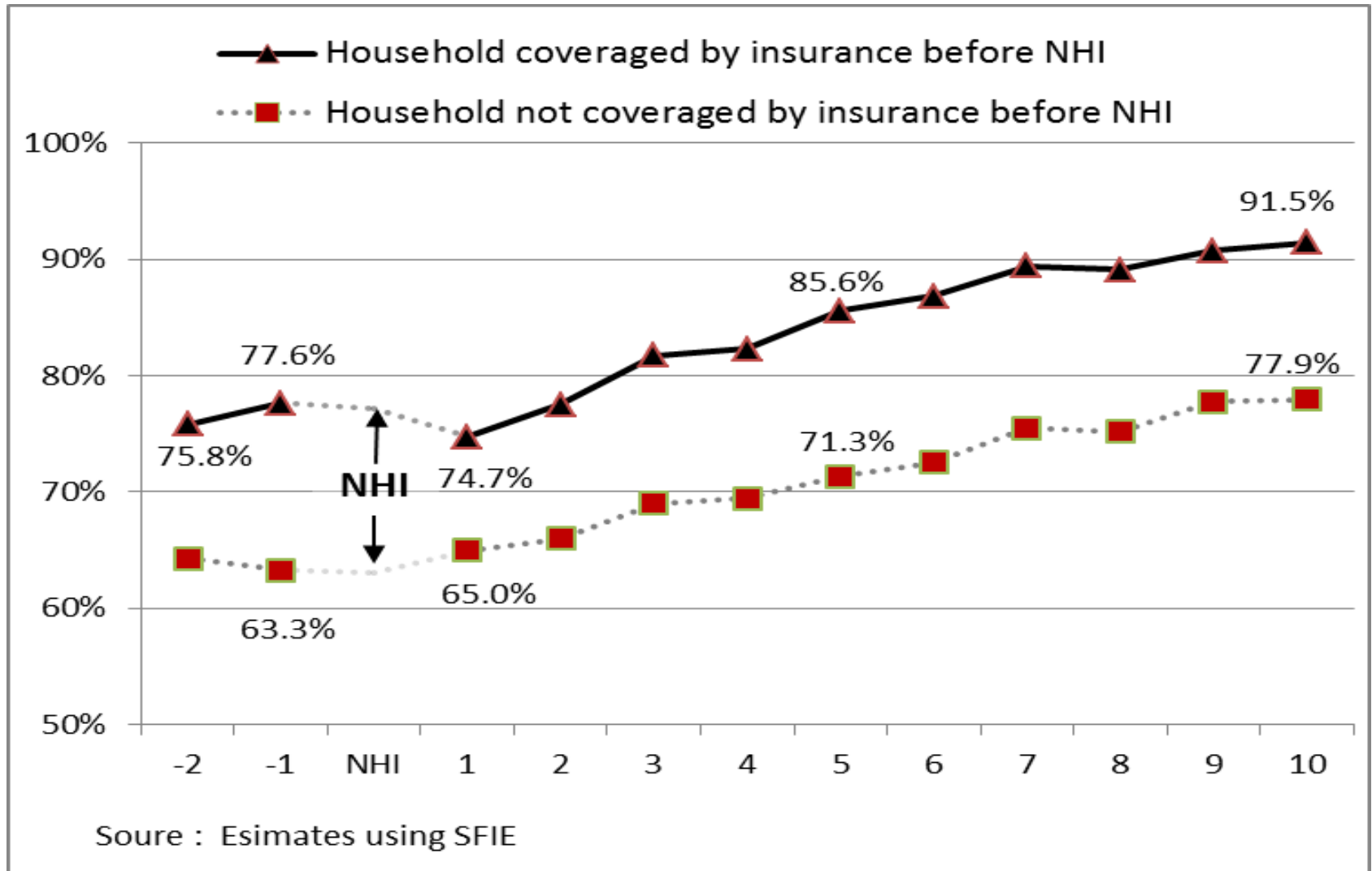
Empirical Results
The Premium Expenditures of Different Groups with PHI

Note : $CPI_{2006}=100$, The 2006 exchange rate is US$1 = 32.53NT$

Empirical Results

Table 4

Probit Regression Result for the Effect of NHI on Purchases of Private Insurance (*Difference-in-Difference* Estimation)

Dependent Variable : Private Insurance Purchasing									
Difference time period	(-2,-1) vs. (+1,+2)			(-2,-1) vs. (+3,+6)			(-2,-1) vs. (+7,+10)		
Variables	Coefficient	S.E.	M.E.	Coefficient	S.E.	M.E.	Coefficient	S.E.	M.E.
Matching UNIN × *Post*_NHI (DID)	0.164**	(0.035)	0.044	0.059*	(0.031)	0.014	0.095***	(0.034)	0.018
Pre-matching	0.137***	(0.026)	0.041	0.035	(0.027)	0.010	0.008	(0.030)	0.002

Table 5

Heckman Selection Regression Results for the Effect of NHI on Purchases of Private Insurance (Difference-in-Difference Estimation)

Dependent Variable : log (Private Insurance Premium)					
Difference time period	(-2,-1) vs. (+1,+2)		(-2,-1) vs. (+3,+6)		(-2,-1) vs. (+7,+10)
Variables	Coefficient	S.E.	Coefficient S.E.		Coefficient S.E.
Matching UNIN × *Post*_NHI (DID)	0.870***	(0.041)	0.774*** (0.037)		0.785*** (0.034)
Pre-matching	0.865***	(0.027)	0.796*** (0.031)		0.792*** (0.028)

Note: * Significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level. UNIN is a binary indicator (UNIN=1 if individual i is in the treatment group and UNIN=0 if individual i is in the control group).*Post*_NHI is a time indicator (*Post*_NHI=1 if household i is in the period in which NHI has been enforced and *Post*_NHI=0 if household i is in the period in which NHI has not been enforced).

In term of both coverage ratio and insurance premium, there is no evidence of the existence of a crowding-out effect; NHI program has a greater crowding-in effect for households who were not covered by any insurance before NHI.

Empirical Results
The Different Household Income Groups with PHI

		Household Income							
		Income<100% HPL		100% HPL<Income<177% HPL		177% HPL<Income<266% HPL		Income>266% HPL	
		Private Health Insurance (0,1)		Probit Model					
(Pre-Post NHI)	Variables	M.E.	Std. dev.	M.E.	Std. dev.	M.E.	Std. dev.	M.E.	Std. dev.
(-2,-1) vs. (+1,+2)	Post_NHI	-0.033*	(0.019)	0.027***	(0.010)	0.017***	(0.007)	0.032***	(0.006)
(-2,-1) vs. (+3,+6)		0.064***	(0.015)	0.116***	(0.009)	0.100***	(0.006)	0.106***	(0.005)
(-2,-1) vs. (+7,+10)		0.170***	(0.015)	0.201***	(0.008)	0.161***	(0.006)	0.154***	(0.005)
Dependent variable		log (Private Health Insurance Premium)		Heckman Selection Model					
(Pre-Post NHI)	Variables	Coefficient	Std. dev.	Coefficient	Std. dev.	Coefficient	Std. dev.	Coefficient	Std. dev.
(-2,-1) vs. (+1,+2)	Post_NHI	-0.084	(0.080)	0.229***	(0.027)	0.119***	(0.028)	-0.161***	(0.032)
(-2,-1) vs. (+3,+6)		0.095	(0.067)	0.577***	(0.029)	0.676***	(0.027)	0.499***	(0.027)
(-2,-1) vs. (+7,+10)		0.759***	(0.063)	1.376***	(0.030)	1.605***	(0.027)	1.265***	(0.025)

- Household poverty level (HPL) : NT$450,000 ($13,833 for a family of four)

- For coverage ratio, there a short-term crowding-out effect for household below HPL.
- However, we also find NHI have crowding-in effect for all household above HPL in the long term.
- For PHI premium, there is no crowd out effects, except for high income household in the short term.
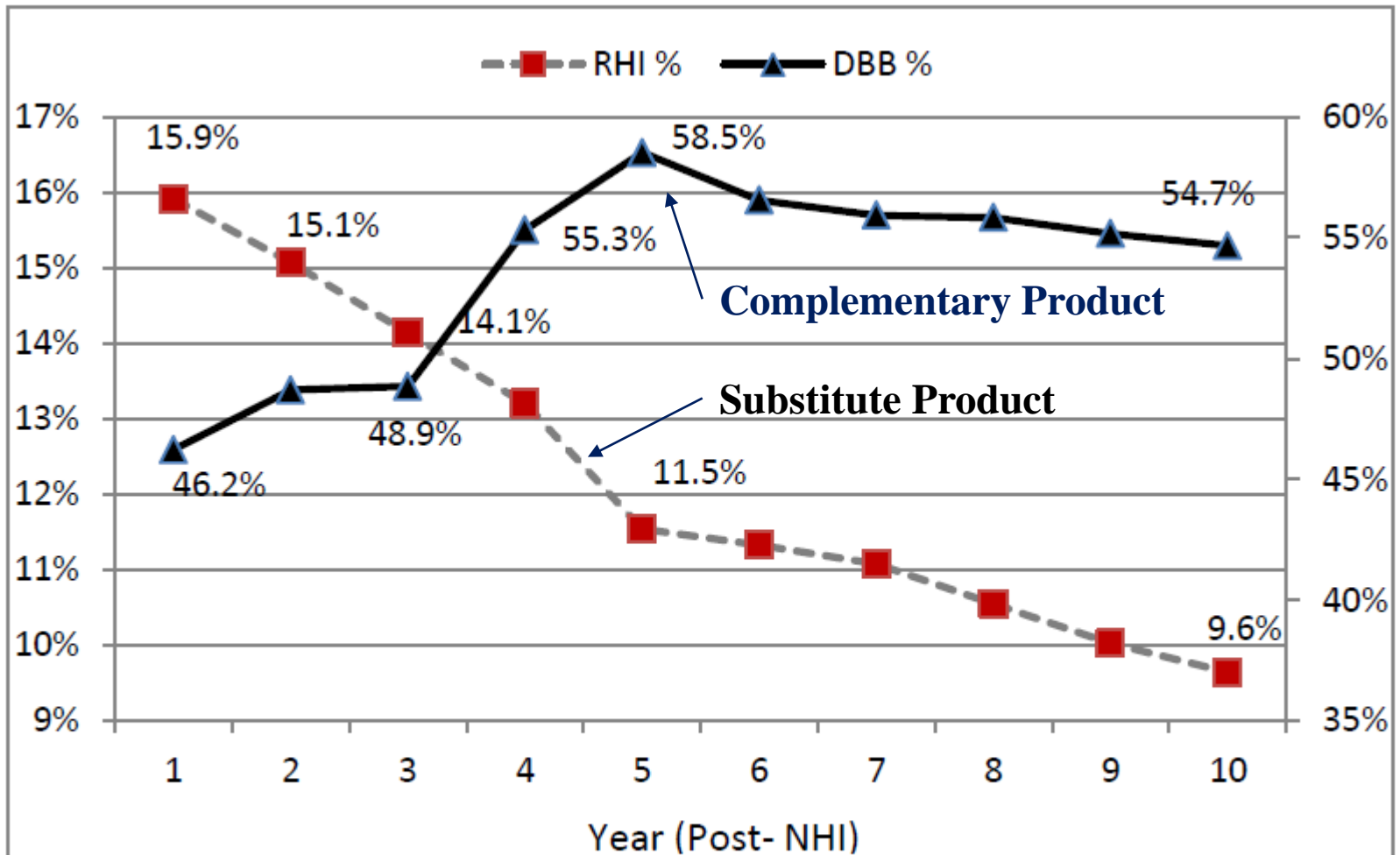
Product–adjustment strategy
Surgical Medical Insurance
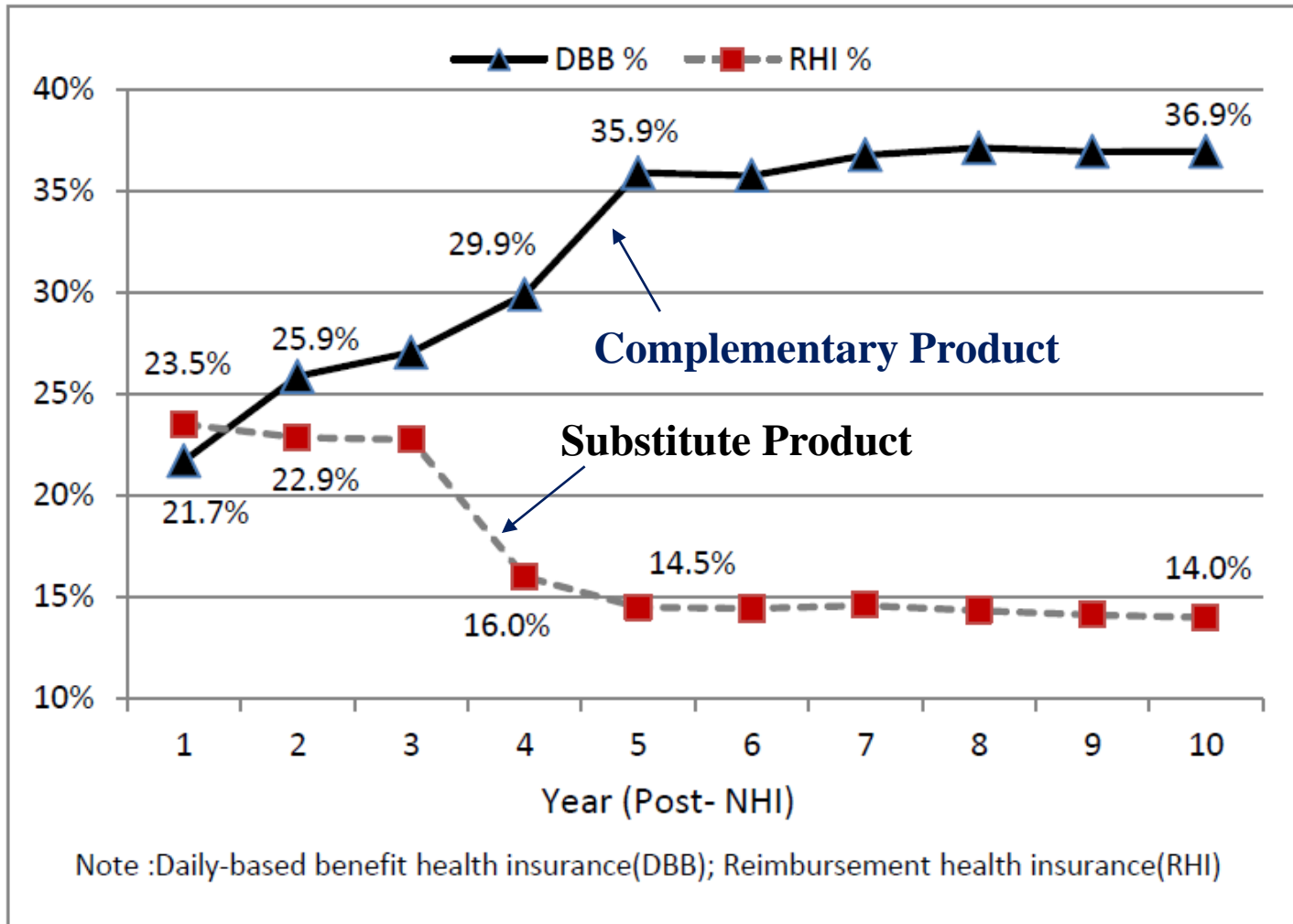
Product–adjustment strategy
Hospital Medical Insurance

Note :Daily-based benefit health insurance(DBB); Reimbursement health insurance(RHI)

Conclusion

H1: The NHI program crowds out PHI in terms of b
coverage and premiums? **Rejected**

- Our empirical evidence reject H1.

- For PHI coverage ratio, there is no evidence of the existence of a crowding-out effect both in the short-tem and long term.

- For PHI premium, there is no significant evidence of crowd out effect in the short run. But instead we find NHI gives a crowding-in effect in the long term.

Conclusion

H2: **The NHI program has a greater crowding-out effect for households who were not covered by any insurance before NHI.** **Rejected**

- Our empirical evidence reject H2.

- The NHI program is no evidence of the existence of a crowding-out effect for households who were not covered by any insurance before NHI.

Conclusion

H3: **The NHI program has a greater crowding-out effect on low-income households. Support**

- For coverage, there a short-term crowding-out effect for household below Household poverty level.

- We find NHI have crowding-in effect for all household above Household poverty level in the long term.

- For PHI premium, there is no crowd out effects, except for high income household in the short term.

Conclusion

■ **Taiwan Insurers simultaneously adjusted their product strategies following the implementation of NHI.**

- The sales of complementary DBB product continued to increase.

- The sales of substitute RHI product continued to decrease.

- The product innovative strategy serves to offset the crowding-out effect that would originally have been likely to result from NHI.

The END
Thanks for Your Attention!!

Yes, I believe Taiwan's experience because it prove that Public Health Insurance (NHI) would not crowd out and ultimately eliminate private insurance.

Crowding-in effect, not Crowding-out effect!