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Abstract When both physicians and pharmacists in Taiwan prescribed and dispensed drugs, many elderly people considered the two types of health care providers more or less synonymous (i.e., close substitutes). Two policies mandated in the 1990s changed this perception: National Health Insurance (NHI), which provides insurance coverage to all citizens, and a separation policy (SP) that forbids physicians from dispensing and pharmacists from prescribing drugs. The author finds that by providing an economic incentive to the previously uninsured elderly, NHI raised the probability that they would visit physicians, relative to their continuously insured counterparts. In particular, some previously uninsured elderly who once only visited pharmacists were more likely to also visit physicians after NHI was implemented. Following this, the SP made it more likely that all elderly patients would only visit physicians and buy drugs from on-site pharmacists hired by physicians—a result different than its policy goal.

Keywords National health insurance · Drug prescribing and dispensing · Taiwan · Physician visits · Pharmacy visits · Elderly

JEL Classifications I11 · I18 · J14

Introduction

Until the mid-1990s, both physicians and pharmacists prescribed and dispensed drugs in Taiwan, a nation with a special medicine culture that dates back to the Japanese colonial period of 1895–1945 (Unschuld 1976; Peabody et al. 1995; Hsieh 1999, 2003; Chou et al. 2003; Huang, Lee, and Huang et al. 2004).¹ In the eyes of many elderly people accustomed to this culture, physicians and pharmacists were to some extent synonymous (i.e., close substitutes) in that they both prescribed and dispensed drugs.² This article studies two Taiwanese health care policies mandated in the mid-1990s that affected elderly people's choice between physicians and pharmacists: National Health Insurance (NHI), initiated in 1995, which provided insurance coverage for all citizens, and a separation policy (SP), gradually phased in starting from 1997, which forbids physicians from dispensing and pharmacists from prescribing drugs.

Prior to the mid-1990s, many elderly people in Taiwan, especially the uninsured, directly sought care at pharmacies because this was usually less expensive than seeing physicians. Pharmacists generally charged only for dispensing drugs, while physicians charged not only for dispensing drugs but also for diagnosing, prescribing, and other related services. The price difference could be substantial, depending on medical conditions. For example, to treat a common cold, an uninsured patient would have to pay NT\$300 (US\$10) out of pocket if visiting a physician but only NT\$100 (US\$3.3) out of pocket if visiting a pharmacist.³

Not only was their price different, but the quality of physician and pharmacist services was different. While physicians were well trained to diagnose and treat medical conditions, pharmacists were not. In the postwar period (after 1945), due to scarce medical resources and loose law enforcement, many pharmacists were neither well trained nor licensed (Hsieh 2003). Therefore, elderly patients who visited pharmacists could have had received better diagnoses and care from physicians.

In 1995 Taiwan initiated its NHI program, which provides compulsory coverage to the nation's 21 million citizens, including 8 million who were previously uninsured. The implementation of NHI provided an economic incentive for the previously uninsured elderly to visit physicians because NHI paid for their physician visits and prescription drugs.

In 1997 a policy called *yi yiao fen ye*, meaning the separation of drug prescribing and dispensing, was launched in the two biggest cities and gradually phased into all other cities and counties over six years.⁴ Meant to abate drug

¹ Although not *legally* allowed to prescribe in the colonial period, pharmacists often provided free medical consulting and “recommended” drugs to patients (Unschuld 1976). The line between “prescribing” and “recommending” was usually vague. After the Chinese Nationalist Party took over Taiwan in 1945, pharmacists were legally allowed to prescribe drugs for numerous minor medical conditions based on two official prescription books.

² We assume for only less serious medical conditions. It would be difficult to imagine that pharmacists could treat cancer or set broken limbs.

³ Estimates based on personal communications with several clinic physicians and pharmacists who have been practicing for at least 15 years.

⁴ The combination of drug prescribing and dispensing is believed to provide an economic incentive for care providers to prescribe drugs more than medically necessary and is associated with high drug expenditures (Chou et al. 2003).

expenditures, the SP prohibits physicians from dispensing and pharmacists from prescribing drugs. In practice, pharmacists are not allowed to sell drugs to patients without a physician's prescription. Under this legal constraint, patients are forced to first visit physicians in order to get a prescription.

The goal of the SP was to urge patients to first visit physicians and then buy drugs at pharmacies. But the government has made an exception in the case of physicians dispensing drugs to patients aged 65 and older. Also, physicians at clinics are allowed to hire on-site pharmacists.⁵ These exceptions have had critical, adverse effects that counter the policy goal—to be discussed in more detail later.

To avoid confusion, throughout this article the term *pharmacists* refers to those who practice at community pharmacies, while those who are hired by physicians and practice at clinics are specifically referred to as *on-site pharmacists*.

NHI and the SP are two major health care reforms that affect elderly people's choice between physicians and pharmacists in different ways. NHI eliminated the difference in out-of-pocket expenses between visiting physicians and pharmacists for the previously uninsured elderly. The SP forced all elderly patients to first visit physicians in order to get prescriptions. This article empirically studies the effects of these two policies on elderly people's choice between physicians and pharmacists.

These two policies can be seen as natural experiments because their implementation was not contingent on the well-being or health care utilization of the elderly. Exploiting this feature, I adopt a difference-in-differences (DID) method to identify their effects on elderly outpatient and pharmacy visits. I also examine the policies' effects on self-reported health.

The first finding of this article is that NHI induced more previously uninsured elderly patients to visit physicians, including those who were accustomed to only visiting pharmacists. Moreover, NHI raised overall health care utilization for the previously uninsured elderly, which in turn is associated with an improvement in their self-reported health.

On the other hand, the SP did not increase overall utilization but only redirected elderly patients from pharmacists to physicians. More precisely, the probability of pharmacy visits was reduced by almost the same amount as the increase in the probability of only outpatient visits, which means that once elderly patients visited physicians, they did not come back to buy drugs at pharmacies. This shows that the SP failed to fulfill its policy goal, which was to enable patients to both visit physicians and buy drugs at community pharmacies. A probable reason for this policy failure is that the government allowed clinic physicians to hire on-site pharmacists who dispensed drugs to the elderly.

Moreover, the SP's effect on self-reported health is trivial and not statistically significant, which suggests that before the SP was initiated, patients used to substitute pharmacist services for physician services only for minor medical conditions for which the difference in care quality did not matter much.

The rest of this article is organized as follows. The second section gives a detailed introduction to NHI and the SP and discusses their implications for the behavior of physicians, pharmacists, and elderly patients. The third section lays

⁵ According to the data presented by Chou et al. (2003), about 64 percent of clinics have hired on-site pharmacists in the post-SP period.

out my empirical framework. The fourth section summarizes the data. The fifth section reports estimation results. I discuss my findings and conclude in the last section.

Two health care reforms of the 1990s

On March 1, 1995, Taiwan initiated its National Health Insurance (NHI) program, which provides compulsory insurance coverage to roughly 21 million people, 8 million of whom were previously uninsured. Before NHI was implemented, the insured population was mostly covered by three major social insurance programs: Government Employee Insurance (GEI), Labor Insurance (LI), and Farmer's Health Insurance (FHI) (Peabody et al. 1995; Cheng and Chiang 1997).⁶ These programs all provided comprehensive medical benefits including inpatient, outpatient, dental, and emergency service as well as prescription drugs.

In the pre-NHI period, if the uninsured chose to visit physicians, they had to pay entirely out of pocket for all physician services and prescription drugs. In contrast, if they chose to visit pharmacists, they only needed to pay for drugs. The out-of-pocket expenditure difference between visiting physicians and pharmacists made uninsured people more likely to choose the latter.

Traditionally, private insurance in Taiwan only serves as catastrophic or complementary insurance and generally does not pay for outpatient services and prescription drugs (Cheng 2003).⁷ Therefore, in the pre-NHI period, the privately insured also had to pay entirely out of pocket for outpatient services and prescription drugs.

The implementation of NHI largely eliminated the out-of-pocket expenditure difference between visiting physicians and pharmacists for the previously uninsured because NHI now paid for almost all physician services, including diagnosing, prescribing, and dispensing drugs. In fact, NHI provides a range of benefits similar to that of the former social insurance programs. See Chang (2008) for more details about NHI.

Unfortunately, NHI has been besieged by fast-growing budgetary woes since its inception.⁸ Cheng (2003) points out that one of the biggest contributions to the budget crisis are growing drug expenditures. Many believe that physicians' ability to continue to both prescribe and dispense drugs is one of the major causes of these soaring costs. The government thus initiated the SP to split the two practices.⁹ The SP was first initiated in 1997 in the two biggest cities, Taipei and Kaohsiung, and then gradually expanded to include the remaining 21 counties and cities over 6 years.

The law that requires drug prescribing and dispensing to be separated is called *yao shi fa* in Chinese, or the Pharmaceutical Affairs Act (PAA) in English, which was amended in 1993. Article 50 of the PAA forbids pharmaceutical sellers to sell prescription drugs to consumers without a physician's prescription, with some

⁶ Military personnel and veterans received free and comprehensive medical care benefits from the government.

⁷ For example, private insurance provides benefits such as cancer treatment, hospital bed upgrades, and so on.

⁸ According to Cheng (2003), over the period 1995–2001, NHI revenues increased at an average rate of 4.26 percent, while expenditures increased at 6.26 percent.

⁹ South Korea launched a similar policy in 2000 (Kwon 2003; Park et al. 2005).

exceptions.¹⁰ The exceptions include the sale of prescription drugs among pharmaceutical sellers and medical care and research institutions. In addition, drugs listed in two official collections of prescriptions—*zhong hua yiao dian* (Chinese medicine book) and *guo ming chu fang xuan ji* (National collection of prescriptions)—can be sold to patients without a physician’s prescription.

In general, pharmacists will be fined between NT\$3,000 and NT\$15,000 (US\$1,000–US\$5,000) if they are caught selling drugs to patients without a physician’s prescription. On the other hand, to encourage community pharmacists to fill prescriptions, NHI pays them NT\$20 (US\$0.7) for each prescription they fill (Chou et al. 2003).¹¹

For physicians, Article 102 of the PAA clearly states that physicians are not allowed to dispense drugs except in some special conditions.¹² For example, physicians can still dispense drugs to patients over age 65 and under age 3 who are unable to go to pharmacies by themselves. Meanwhile, to encourage physicians to release prescriptions to patients, NHI pays a NT\$25 (US\$0.8) “prescription release fee” for each prescription that they release to be filled by community pharmacies (Lee, Huang, and Huang 2007).¹³

The implementation date of the SP in each county is determined based on some criteria set up by the Department of Health (DOH). Two of the most important criteria are: (1) the ratio of community pharmacies to clinics contracted with NHI must be at least 1:3 within any given county, and (2) the outpatient department of a DOH-run county hospital has to release at least 3 percent of its prescriptions to patients. Table 1 lists the exact implementation dates in all 23 counties or cities in Taiwan.

Empirical framework

To evaluate the impacts of NHI and the SP, it is helpful to first envision the triangular relationship of the physician, pharmacist, and patient. The analysis time involves three periods: (1) before 1995, (2) 1995–1997, and (3) after 1997. These periods are separated by the implementation of NHI and the SP, respectively.

Table 1 Timetable of the SP implementation

Date	City/County
03.01.1997	Taipei City; Kaohsiung City
03.10.1998	Taichung City; Chiayi County; Chiayi City; Keelung City
04.20.1998	Changhua County; Miaoli County
06.06.1998	Kaohsiung County; Hsinchu County; Yunlin County

¹⁰ The law does not apply to over-the-counter (OTC) drugs.

¹¹ This prescription filling fee was changed several times afterwards.

¹² Conditions include: (1) the patient is too young (under 3) or too old (over 65) to go to pharmacies by himself; (2) the patient has some emergency condition and need drugs immediately; or (3) the patient is in some officially announced remote area that has no licensed pharmacists. The latest definition of the third type of exception is that if there is no licensed pharmacist within a radius of 1.8 kilometers (1.1 miles). If so, the physician in the clinic is allowed to dispense drugs.

¹³ This “prescription release fee” was canceled in 2006. This is because the NHI reimbursement for medications was adjusted in 2002 so that the payment to a prescription filled by an on-site pharmacist is lower than by a community pharmacist. In response to this adjustment, some clinic physicians set up their own pharmacies just in front of or next door to their clinics and refer patients to their own pharmacies. This type of pharmacy is called a “gateway pharmacy” (Lee et al. 2007). To tackle this problem, NHI simply canceled the “prescription release fee” in 2006 and now strictly requires clinic physicians to release prescriptions.

07.06.1998	Taichung County; Pingtung County
11.05.1998	Nantou County; Tainan County; Tainan City
12.09.1998	Taipei County
01.28.1999	Taoyuan County; Hsinchu City
06.21.1999	Yilan County
04.01.2001	Hualien County
05.01.2001	Taitung County
12.10.2002	Penghu County

Source: Department of Health,
http://drug.doh.gov.tw/admin/new_file_download.php?Pact=FileDownLoad&Pval=297.

In the first period, both the physician and the pharmacist prescribed and dispensed drugs. In principle, the patient would have received better diagnosis and treatment from the physician than the pharmacist. But the cost of visiting the physician was also higher than visiting the pharmacist if one were uninsured and had to pay completely out of pocket. Therefore, the uninsured patient faced a trade-off between price and care quality.¹⁴

In the second period, everyone was insured by NHI. The physician and the pharmacist still both prescribed and dispensed drugs. However, the out-of-pocket expenditure difference between visiting the physician and the pharmacist was largely eliminated for the uninsured, because NHI paid for most physician services and prescription drugs. This provided an economic incentive for the previously uninsured patient to visit the physician, who would provide better care than the pharmacist. Moreover, the patient could still purchase drugs at the pharmacy without a prescription. But he or she would have to pay out of pocket for drugs without a prescription, because NHI only paid for drugs with a prescription.

In the third period, the pharmacist was not allowed to dispense drugs to the patient without a physician's prescription. But the physician could still dispense drugs to the elderly patient. Besides, many physicians hired their own on-site pharmacists. Keep in mind that every patient was still covered by NHI. Because of the SP, the patient was now forced to see the physician in order to get a prescription. Then, the key question is where the patient chose to buy drugs. Most likely, the patient—whether elderly or not—would want to buy drugs from an on-site pharmacist so that he or she would not have to travel to a pharmacy outside the clinic. In other words, extraneous costs discouraged the patient, elderly or not, from visiting an outside pharmacy once the patient had visited the physician in the clinic.

Empirical strategy

To assess the NHI effect, I adopt a DID method, the same strategy used in Chang (2008). I consider the previously uninsured elderly as the treatment group and the elderly who were covered by the major social insurance programs as the control group.

The validity of the DID method relies on the following two assumptions. First, shifting from social insurance to NHI had little effect on the control group. This

¹⁴ It is also possible that the uninsured patient could choose to see the physician first and then buy drugs at the pharmacy. But, in practice, this is less likely to happen because he or she would have to pay the additional cost of traveling between the clinic and the pharmacy.

assumption is reasonable because the earlier social insurance programs and NHI are very similar in terms of medical care benefits and payment methods. Second, the two groups would have experienced a similar time trend in the absence of NHI.

I use two waves of a longitudinal elderly survey in Taiwan, 1993 and 1996, which just span the period before and after the initiation of NHI in 1995. The two waves are pooled together and used to estimate the following model by pooled OLS

$$y_i = \beta_0 + \beta_1 UI_i + \beta_2 YR96_i + \beta_3 UI_i \times YR96_i + controls_i + \varepsilon_i \quad (1)$$

where i indexes observation; y is an outcome variable; UI is a dummy variable indicating the previously uninsured elderly; $YR96$ is a dummy variable indicating the year of 1996; $controls$ is a set of baseline control variables including basic demographic and economic variables such as sex, age, age-squared, education, ethnicity, marriage, employment, and income evaluated at the baseline year. To account for regional differences in medical resources, I also include three supply-side variables (the number of hospitals, clinics, and pharmacies per 10,000 people in each county); ε is a random error.

To estimate the SP effect, I mainly exploit the gradual phasing in of the SP. As mentioned above, the SP was first initiated in 1997 in the two biggest cities and then gradually applied to other counties and cities over six years. In accord with the initiation of the SP, I use the 1996 and 1999 wave of the elderly survey. The two waves were conducted between March and June in each year. I thus use June 1999 as a cutoff point.

By June 1999, 19 out of the total 23 counties and cities had implemented the SP. None of the elderly in the sample lived in Hsinchu County and Penghu County (the former was subject to the SP by June 1999 and the latter was not). Thus, I use the elderly people who lived in the 18 counties and cities that had adopted the SP by June 1999 as the treatment group and those who lived in the other three counties—Yilan County, Hualien County, and Taitung County (or, collectively, the YHT counties)—as the control group. Then I adopt the DID method to estimate the SP effect by assuming that the two groups would have experienced a similar time trend in the absence of the SP.

It is legitimate to question whether some of the elderly people in the treatment group traveled to any of the YHT counties to purchase drugs without a prescription. If many elderly people did so, my identification strategy is problematic. But this chance is minimal because, as shown in Figure 1, the YHT counties are geographically separated from the west part of Taiwan by the Central Mountain Range, which is 1,000–3,000 meters above sea level on average. This geographic segregation imposes a very high transaction cost for the elderly in the west to buy drugs in any of the YHT counties.¹⁵

¹⁵ For example, it would take 1.5 hours to travel from Taipei City to Yilan County by train, one of the most common ways to commute between the two places.

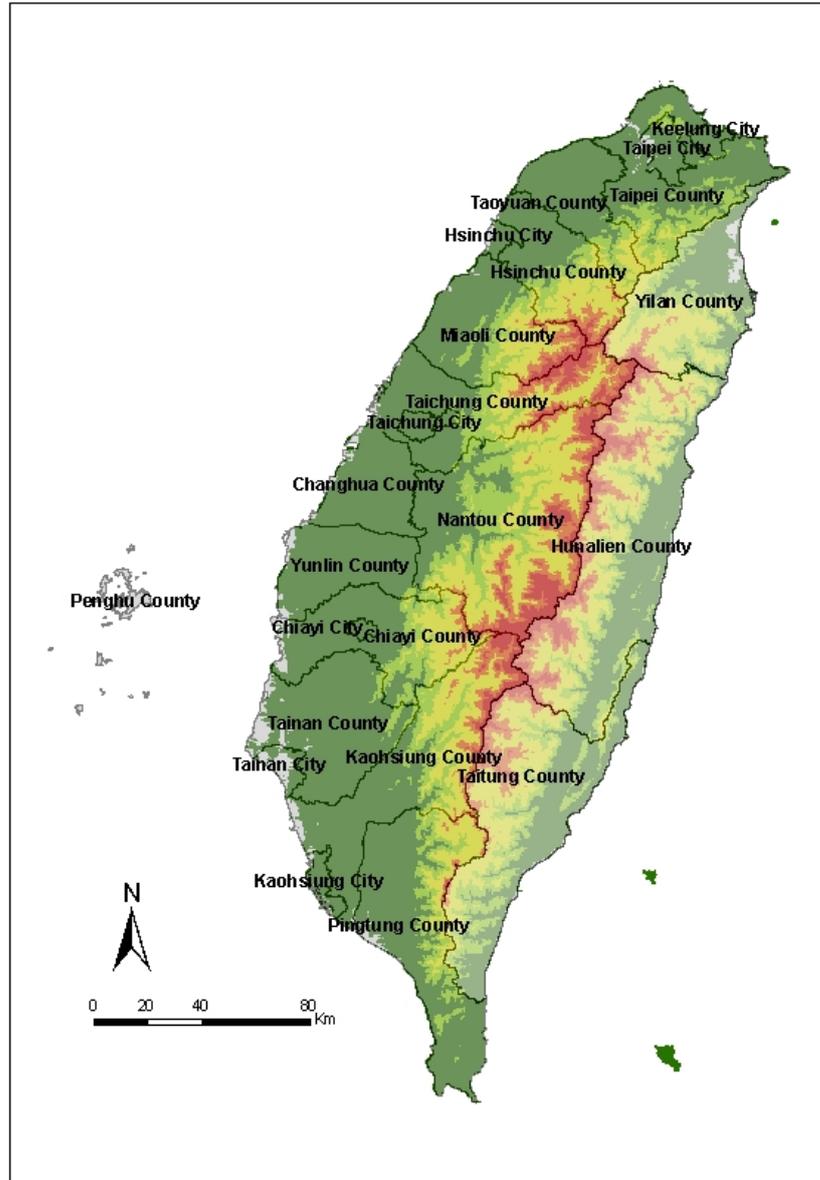


Figure 1 Map of Taiwan (the red and yellow areas represent the Central Mountain Range)

The 1996 and 1999 waves are also pooled to estimate the following DID model by pooled OLS

$$y_i = \beta_0 + \beta_1 SP_i + \beta_2 YR99_i + \beta_3 SP_i \times YR99_i + controls_i + \varepsilon_i \quad (2)$$

where SP is a dummy variable indicating the elderly who lived in one of the 18 counties that had adopted the SP by June 1999; $YR99$ is a dummy variable indicating the year of 1999; all other notations are the same as in model (1).

Key outcome variables

In each wave of the elderly survey, respondents are asked to recall if they made any pharmacy and outpatient visits in the month prior to the interview.¹⁶ Two dummy variables are constructed accordingly to the answers, *pharmacy* and *outpatient*.

To get a clearer picture of the substitution of physicians for pharmacists and vice versa, I construct four mutually exclusive variables: *outpatient only*, *pharmacy only*, *both*, and *neither*. *Outpatient only* is a dummy variable indicating that the interviewee made only outpatient visits but no pharmacy visits in the past month; *pharmacy only* is a dummy variable indicating only pharmacy visits but no outpatient visits in the past month; *both* is a dummy variable indicating both outpatient and pharmacy visits in the past month; *neither* is a dummy variable indicating neither outpatient nor pharmacy visits in the past month. These four variables together exhaust all possible combinations.

To measure health, I use a 5-point scale of self-reported health, with *very good* at the highest level and *very bad* at the lowest. Because of relatively small proportions at the two tails of the distribution, I combine *very good* and *good* into one group and *bad* and *very bad* into another; *fair* composes the middle group.

Data and descriptive statistics

This study uses the Survey of Health and Living Status of the Middle-aged and the Elderly in Taiwan. The survey offers a wealth of information on demographics, employment, income, health care utilization, health insurance, residence, and so on. I mainly use three waves of the survey: 1993, 1996, and 1999. In particular, the 1993 and 1996 surveys are used to estimate the impact of NHI and the 1996 and 1999 survey are used to assess the SP's effect. The middle-aged sample contains no health insurance information and thus is not used.

In the analysis of NHI, the treatment and control group are defined by the insurance status self-reported by the elderly in the 1993 survey. Those uninsured in 1993 are viewed as the treatment group and the insured are considered the control group.¹⁷

On the other hand, in the analysis of the SP, the treatment and control groups are defined by residence in both 1996 and 1999. Those who lived in counties and cities that were subject to the SP by June 1999 are defined as the treatment group (called "SP" group), and others who lived in the YHT counties are defined as the control group (called "No SP" group). (Note that the terms in double quotes refer to the groups, not the policy itself.)

¹⁶ There are actually two questions asking about outpatient visits to practitioners of (1) Western medicine and (2) Chinese medicine. I define outpatient visits as visits to either a Western or Chinese outpatient service. In addition, outpatient visits can be visits to the outpatient department in a hospital or a clinic because the survey does not make a distinction between the two. The question regarding pharmacy visits is stated as follows: "In the past month, did you or your family member ever purchase drugs at *yao fang* for your use?" Here, *yao fang* is "pharmacy" in Chinese. One may worry about whether respondents may have interpreted *yao fang* to include so-called gateway pharmacies that are actually owned by clinic physicians. But gateway pharmacies only started to emerge after 2000 (Lee et al. 2007), which is outside our analysis period.

¹⁷ Over 99 percent of the insured are covered by various social insurance programs.

To avoid moving between the “SP” and the “No SP” region, I discard those who lived in the “SP” region in 1996 and moved to the “No SP” region in 1999 and those who did the reverse. I also throw out those who missed any of the three waves to make sure cross-year comparisons contain the same group of elderly. As shown in Table 2, the final sample consists of 2,041 individuals with 473 uninsured (23 percent) and 1,568 insured (77 percent); 1,893 subject to the SP (93 percent) and 148 not subject to the SP (7 percent).

Table 2 Decomposition of the elderly sample: Insured versus uninsured and “SP” versus “No SP”

	Uninsured	Insured	Raw total	(%)
SP	448	1,445	1,893	(93)
No SP	25	123	148	(7)
Column total (%)	473 (23)	1,568 (77)	2,041	(100)

Source: Author’s calculations.

Table 3 summarizes the baseline characteristics of the elderly in 1993 by whether they were insured or not and in the “SP” or “No SP” group. Compared to the continuously insured, the previously uninsured are more likely to be women, unmarried, Minnan, less educated, unemployed, and slightly poorer.¹⁸ In contrast, the “SP” and “No SP” groups are very similar except that the elderly in the “No SP” group are more likely to be aboriginal people and slightly poorer.

Table 3 Baseline demographic and economic characteristics of the elderly

	All	Insurance group		SP group	
		Uninsured	Insured	SP	No SP
Age	74	75	74	74	74
Female (%)	45	57	42	45	44
Married (%)	67	52	71	67	68
Ethnicity (%)					
Minnan	61	74	57	62	53
Hakka	15	10	17	15	11
Mainlander	22	15	24	22	22
Aboriginal	1	1	2	0	14
Education (%)					
No education	47	56	44	47	46
1–6 years	33	34	33	33	39
7 years and more	20	10	23	20	16
Region (%)					
North	27	41	24	29	0
East	7	5	8	0	100
Middle	34	28	35	36	0
South	32	26	34	34	0
Employed / Self-employed (%)	23	13	25	23	22
Have enough money for living expenses (%)	86	80	88	87	80
Total	2,041	473	1,568	1,893	148

Source: Author’s calculations.

Note: The baseline year is 1993.

As shown in the first column in Table 4, the overall probability of monthly outpatient visits increases over time from 50 percent in 1993 to 66 percent in 1996 to 72 percent in 1999. The second and third columns show that the increase

¹⁸ There are four major ethnic groups in Taiwan: the Minnan, Hakka, Mainlanders, and aboriginals. The first three groups originated from China but migrated to Taiwan at different times. In particular, Mainlanders generally immigrated from Mainland China in 1949.

between 1993 and 1996 for the uninsured (27 percentage points) is twice as large as that for the insured (13 percentage points), suggesting evidence of an NHI effect. But, relative to 1996, the insured increases another 8 percentage points in 1999, while the uninsured remain unchanged, suggesting differential responses to the SP between the insured and uninsured.

The fourth and fifth columns show that the “No SP” group has a 22-point increase between 1993 and 1996, while the “SP” group has a smaller increase of about 16 points, indicating differential responses to NHI between the “SP” and the “No SP” group. Comparing 1996 with 1999, the “SP” group obviously experienced a much larger increase in the probability of outpatient visits than the “No SP” group, showing initial evidence of an SP effect.

As for pharmacy visits, the overall probability of visiting pharmacies (column 1) rises slightly from 23 percent in 1993 to 25 percent in 1996 and then dramatically drops to 15 percent in 1999. The patterns between the uninsured and the insured are very similar. But there is a very obvious contrast between the “SP” and the “No SP” groups. In particular, the “SP” group shows a 10-point drop between 1996 and 1999, while the “No SP” group remains almost unchanged, suggesting the existence of an SP effect. A summary of the other four constructed utilization variables is not given for the sake of brevity.

Table 4 also summarizes the self-reported health of the elderly. Overall, the probability of reporting very good or good health decreases over time; the probability of reporting fair health remains stable; the probability of reporting bad or very bad health increases over time. The same pattern is also observed across subgroups.

Table 4 Summary of outcome variables

	All (1)	Insurance group		SP group	
		Uninsured (2)	Insured (3)	SP (4)	No SP (5)
<i>Outpatient (%)</i>					
1993	49.88	38.90	53.19	50.18	45.95
1996	66.29	66.38	66.26	66.14	68.24
1999	72.12	67.23	73.60	72.21	70.95
<i>Pharmacy (%)</i>					
1993	23.03	29.18	21.17	22.98	23.65
1996	25.13	31.08	23.34	25.20	24.32
1999	15.43	16.28	15.18	14.69	25.00
<i>Very Good / Good (%)</i>					
1993	44.10	38.90	45.66	44.48	39.19
1996	30.92	29.60	31.31	31.17	27.70
1999	26.41	24.74	26.91	26.78	21.62
<i>Fair (%)</i>					
1993	33.71	33.40	33.80	33.91	31.08
1996	33.07	32.98	33.10	33.44	28.38
1999	33.07	30.44	33.86	33.17	31.76
<i>Bad / Very Bad (%)</i>					
1993	19.75	23.26	18.69	19.33	25.00
1996	29.40	28.33	29.72	29.21	31.76
1999	40.52	44.82	39.22	40.04	46.62

Source: Author's calculations.

Note: About 2.5 percent and 6.6 percent of the cases did not self-report health status in 1993 and 1996, respectively, and are excluded.

Estimation results

NHI effect on utilization

DID estimates of the NHI effect are reported in Panel A in Table 5. In columns (1) and (2), the coefficients of *UI* show that the previously uninsured elderly are less likely to make outpatient visits by 16.2 percentage points but more likely to make pharmacy visits by 7.6 points relative to the continuously insured elderly. The coefficients of *YR96* show that there is a large increase of 13.1 points in the probability of outpatient visits for both groups but very little change in the probability of pharmacy visits. The coefficients of *UI×YR96* are the DID estimates of the NHI effect. As shown, NHI increases the probability of having outpatient visits by 14.4 points for the previously uninsured elderly relative to the continuously insured elderly. In fact, this finding is similar to Chen et al. (2007), who also use the same data. But there seems to be almost no effect on pharmacy visits.

In fact, the coefficient of *UI×YR96* in column (1) can be decomposed into its counterparts in columns (3) and (5). More precisely, the sum of (3) and (5) should equal (1) because (3) and (5) exhaust the possibilities of those who have made outpatient visits. About 9.1 points out of the total 14.4 points derive from an increase in the pool of those who have made only outpatient visits; the other 5.3 points come from an increase in the pool of those who have made both outpatient and pharmacy visits. This shows that some people who only visited pharmacists started to visit physicians after NHI was implemented.

On the other hand, the coefficient of *UI×YR96* in column (4) shows a decrease of 5.6 points in the pool of those who used to visit only pharmacies. This decrease offsets the increase in the pool of those who made both outpatient and pharmacy visits and can explain why we do not observe any NHI effect on overall pharmacy visits. However, we are not able to know whether these people visit both places because they first visit physicians and then take prescriptions to purchase drugs at pharmacies or because they simply happen to visit both physicians and pharmacies depending on their need or ailment.

The coefficient of *UI×YR96* in column (6) shows that the probability of visiting neither place is reduced by 9 points. This shows that NHI raises overall elderly utilization of both outpatient and pharmacy services.

SP effect on utilization

The SP effects are reported in Panel B in Table 5. At first glance, the SP effect estimated by the coefficient of *SP×YR99* on outpatient visits seems to be small (about 3 percentage points) and not statistically significant. But, if we look at the same coefficients in columns (3) and (5), we find that there is an increase of 10.9 points in the pool of those who only visit physicians. This increase is offset by a decrease of 7.6 points in the pool of those who visit both places. This shows that the SP makes the elderly more likely to only visit physicians.

On the other hand, the coefficient of *SP×YR99* in column (2) shows that the SP lowers the probability of pharmacy visits by about 11.2 points. In particular, the same coefficients in columns (4) and (5) show that there is a reduction of 3.6 points in the pool of those who only visit the pharmacy and another reduction of

7.6 points in the pool of those who visit both places. Lastly, the same coefficient in column (6) shows that the SP does not affect the overall utilization.

Table 5 DID estimates of NHI and SP effects on utilization

Panel A: NHI effect (1993 versus 1996)						
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Outpatient</i>	<i>Pharmacy</i>	<i>Outpatient only</i>	<i>Pharmacy only</i>	<i>Both</i>	<i>Neither</i>
<i>UI</i>	-0.162*** [0.027]	0.076*** [0.024]	-0.176*** [0.024]	0.063*** [0.018]	0.013 [0.019]	0.099*** [0.027]
<i>YR96</i>	0.131*** [0.015]	0.022 [0.014]	0.103*** [0.016]	-0.006 [0.009]	0.027** [0.012]	-0.124*** [0.015]
<i>UI×YR96</i>	0.144*** [0.032]	-0.003 [0.030]	0.091*** [0.033]	-0.056** [0.022]	0.053** [0.027]	-0.089*** [0.030]
Panel B: SP effect (1996 versus 1999)						
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Outpatient</i>	<i>Pharmacy</i>	<i>Outpatient only</i>	<i>Pharmacy only</i>	<i>Both</i>	<i>Neither</i>
<i>SP</i>	-0.02 [0.042]	0.016 [0.038]	-0.051 [0.045]	-0.015 [0.024]	0.031 [0.032]	0.034 [0.038]
<i>YR99</i>	0.027 [0.052]	0.007 [0.047]	0.007 [0.055]	-0.014 [0.032]	0.02 [0.042]	-0.014 [0.047]
<i>SP×YR99</i>	0.034 [0.054]	-0.112** [0.049]	0.109* [0.056]	-0.036 [0.033]	-0.076* [0.044]	0.003 [0.048]

Source: Author's calculations.

Note: Cluster-robust standard errors are in brackets. All regressions include baseline controls such as sex, age, age-squared, education, ethnicity, marriage, employment, and income evaluated at the baseline year. In addition, three density variables that measure the number of hospitals, clinics, and pharmacies per 10,000 people in each county in the baseline year are also included as controls. But all estimates of the baseline controls are suppressed for brevity.

* Significant at 10 percent level.

** Significant at 5 percent level.

*** Significant at 1 percent level.

Health effect

The NHI and the SP effects on self-reported health are reported in Table 6. First note that in Panel A, the coefficients of *UI* show that the previously uninsured and insured elderly have similar probabilities of reporting these three categories of health status after controlling for baseline characteristics. But, as indicated by the coefficients of *YR96*, the probability of reporting very good or good health declines by about 14.3 points for both groups; the probability of reporting bad or very bad health increases by 11 points for both groups.

Table 6 DID estimates of NHI and SP effects on health

Panel A: NHI effect (1993 versus 1996)			
	(1) <i>Very Good / Good</i>	(2) <i>Fair</i>	(3) <i>Bad / Very Bad</i>
<i>UI</i>	-0.002 [0.025]	-0.002 [0.025]	0.000 [0.022]
<i>YR96</i>	-0.143*** [0.015]	-0.007 [0.016]	0.110*** [0.013]
<i>UI</i> × <i>YR96</i>	0.050* [0.029]	0.003 [0.034]	-0.060** [0.027]
Panel B: SP effect (1996 versus 1999)			
	(1) <i>Very Good / Good</i>	(2) <i>Fair</i>	(3) <i>Bad / Very Bad</i>
<i>SP</i>	-0.03 [0.039]	0.076* [0.040]	0.024 [0.040]
<i>YR99</i>	-0.061 [0.041]	0.034 [0.045]	0.149*** [0.045]
<i>SP</i> × <i>YR99</i>	0.017 [0.043]	-0.036 [0.048]	-0.04 [0.047]

Source: Author's calculations.

Note: See Table 5.

Although the probability of reporting very good or good health declines over time for both groups, the coefficient of *UI*×*YR96* in column (1) shows that the speed is actually slower for the previously uninsured than the continuously insured elderly (about 5 points). The same coefficient in column (3) shows that the increase in probability of reporting bad or very bad health is also slower for the previously uninsured than the continuously insured elderly (about 6 percentage points). These results are both statistically significant. They suggest that increase in utilization of outpatient services, due to NHI, is associated with slowing the decline in health of the previously uninsured elderly, relative to the continuously insured elderly.

NHI also affected other types of care. For example, Chang (2008) finds that NHI largely increased the probability of hospitalization for the previously uninsured elderly. Therefore, the improvement in self-reported health could have also come from increases in other types of care.

In Panel B, the coefficients of *SP* show that the previously uninsured elderly are a little more likely to report fair and bad or very bad health and less likely to report very good or good health in 1996. The coefficients on *YR99* show that the probability of reporting very good or good health declines and the probability of reporting bad or very bad health increases for both groups. Coefficients of the interaction terms are small and not statistically significant, suggesting little evidence of an SP effect on health.

Differential SP effects between the insurance groups

Table 7 reports the DID reestimation results of the SP by insurance group. Panel A is the SP effect among the previously uninsured elderly; Panel B is the SP effect among the continuously insured elderly. Compare Table 7 with Panel B in Table 5. It is obvious that most of the overall SP effects are dominated by the continuously insured elderly. This should not be surprising since the continuously insured elderly amount to 77 percent of the sample.

However, it is interesting to notice that the SP effects (the interaction terms) are very different among the previously uninsured elderly. Among them, the SP effect on the probability of outpatient visits is huge (about 17.8 points in column 1), and its effect on the probability of pharmacy visits is trivial (in column 2). Although both results are not statistically significant, the increase of 17.8 points in outpatient visits is practically substantial. And there is a corresponding reduction in the probability of making neither outpatient nor pharmacy visits (in column 6). One possible explanation for this finding is that there is a late surge of the NHI effect on outpatient visits that is reinforced by the SP. But it is not clear why this late surge would have happened. Besides, the control group in this case has only 25 elderly people. Hence, there is a chance that this finding has resulted from sampling errors.

Table 7 DID estimates of the SP effect on utilization by insurance group						
Panel A: SP effect among the previously uninsured elderly ($n=473$)						
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Outpatient</i>	<i>Pharmacy</i>	<i>Outpatient only</i>	<i>Pharmacy only</i>	<i>Both</i>	<i>Neither</i>
<i>SP</i>	-0.098 [0.093]	-0.044 [0.102]	-0.121 [0.108]	-0.066 [0.070]	0.022 [0.087]	0.166** [0.072]
<i>YR99</i>	-0.16 [0.124]	-0.16 [0.110]	-0.04 [0.134]	-0.04 [0.090]	-0.12 [0.104]	0.200** [0.099]
<i>SP</i> × <i>YR99</i>	0.178 [0.127]	0.013 [0.113]	0.172 [0.137]	0.007 [0.091]	0.006 [0.107]	-0.182* [0.102]
Panel B: SP effect among the continuously insured elderly ($n=1,568$)						
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Outpatient</i>	<i>Pharmacy</i>	<i>Outpatient only</i>	<i>Pharmacy only</i>	<i>Both</i>	<i>Neither</i>
<i>SP</i>	-0.006 [0.048]	0.038 [0.041]	-0.043 [0.050]	0.001 [0.026]	0.037 [0.035]	0.005 [0.044]
<i>YR99</i>	0.065 [0.057]	0.041 [0.052]	0.016 [0.060]	-0.008 [0.034]	0.049 [0.046]	-0.057 [0.052]
<i>SP</i> × <i>YR99</i>	0.009 [0.059]	-0.133** [0.054]	0.095 [0.062]	-0.047 [0.035]	-0.086* [0.047]	0.038 [0.054]

Source: Author's calculations.

Note: See Table 5.

Moreover, the SP seems to also have differential effects on health between the two insurance groups. Table 8 shows that among the previously uninsured elderly, the "SP" group has a slower decline in the probability of reporting very good or good health than the "No SP" group, while the time trend is going down for both. In addition, the "SP" group also has a slower increase in the probability of reporting bad or very bad health than the "No SP" group, while the time trend is going up for both. Again, the results are not statistically significant but practically meaningful.

Table 8 DID estimates of the SP effect on health by insurance group

Panel A: SP effect among the previously uninsured elderly ($n=473$)			
	(1)	(2)	(3)
	<i>Very Good / Good</i>	<i>Fair</i>	<i>Bad / Very Bad</i>
<i>SP</i>	-0.131 [0.104]	0.072 [0.095]	0.129 [0.095]
<i>YR99</i>	-0.200* [0.114]	0.12 [0.104]	0.2 [0.140]
<i>SP</i> × <i>YR99</i>	0.16 [0.117]	-0.153 [0.108]	-0.037 [0.143]
Panel B: SP effect among the continuously insured elderly ($n=1,568$)			
	(1)	(2)	(3)
	<i>Very Good / Good</i>	<i>Fair</i>	<i>Bad / Very Bad</i>
<i>SP</i>	-0.015 [0.043]	0.073 [0.046]	0.012 [0.045]
<i>YR99</i>	-0.033 [0.043]	0.016 [0.050]	0.138*** [0.047]
<i>SP</i> × <i>YR99</i>	-0.012 [0.046]	-0.009 [0.053]	-0.047 [0.049]

Source: Author's calculations.

Note: See Table 5.

Conclusion

This paper studies the effects of NHI and the SP on elderly people's choice between physicians and pharmacists and reaches the following conclusions. First, NHI induced more previously uninsured elderly patients—including those who previously only visited pharmacists—to visit physicians by providing them an economic incentive. NHI also raised their overall utilization of care, which is further associated with an improvement in their self-reported health.

Second, the SP shifted the elderly patients from pharmacists to physicians. More precisely, their probability of pharmacy visits was reduced by almost the same amount as the increase in their probability of making only outpatient visits, which means that once the elderly patients visited physicians they did not come back to pharmacies to buy drugs. Instead, they bought drugs from on-site pharmacists who were hired by the clinic physicians. The result shows that the SP failed to fulfill its original policy goal, which was to urge patients to visit physicians and buy drugs at community pharmacies.

Third, the SP effect on self-reported health is trivial and not statistically significant. This is somewhat surprising because one would expect that patients would have received better care by visiting physicians instead of visiting pharmacists, which in turn should have resulted in better patient health. A possible explanation for this finding is that in the past, patients substituted pharmacist services for physician services only for minor medical conditions for which quality did not matter much.

Last, it is worth noting that the two policies are actually intertwined. In particular, the SP would have had a much different impact were it not preceded by NHI. For example, the out-of-pocket expenditure difference would still have been substantial for the uninsured in the absence of NHI. It is thus possible that implementing the SP without NHI could have led some poor uninsured patients to simply forego the care they needed because they could not afford to visit a

physician to get a prescription, which is needed in order to buy drugs from a pharmacist.

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