

Testing Taiwan's National Health Insurance Reforms in Internal Cost Control: from Providers' Aspect

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ABSTRACT

Implementation of National Health Insurance (NHI) in 1995 was a significant milestone in the Taiwan healthcare scenario. However, the NHI system also has some problems. As physician providers play a major role in health care, the main purpose of this research is to explore the views of providers on NHI policy reforms relating to demand side and supply side of the health care service.

Multiple regression and logistic regression are used to analyze the acceptability of sixteen NHI reforms and to compare the internal cost control by different hospital ownerships and grades. The conclusions of this study are: (1) the evidence supports that both hospital ownership and hospital grade differed significantly on acceptability of demand-side and supply-side policies, but most of them are on supply side policy. (2) Public hospitals, private for profit hospital, and private non-profit hospital have higher probabilities of controlling their internal cost when compared with local clinics. (3) A higher grade of hospital (e.g., medical center, regional center and district hospital) has higher internal cost control pressure than local clinics.

The findings strongly suggest that future NHI reform efforts in Taiwan should focus on provider behavior. Supply-side policies should be the preferred instruments for cost control. In designing optimal contract policies, the Bureau of NHI should use a combination of economic incentives and monitoring to better influence provider practices and finally improve the effectiveness of the NHI system.

Key words: NHI, supply-side, cost control, health policy, physician provider.

1. INTRODUCTION

All the health care systems in the world are faced with the same challenges; those of improving health, controlling costs, allocating resources, enhancing the quality of care, and distributing health services fairly. The issue of health insurance reforms has remained high on most countries' health policy-making decisions in the 1990s. Those issues such as demand side vs. supply side reforms, risk aversion vs. moral hazard philosophies, and equity vs. efficiency aspects, are continually emerging (Mooney, 1986; Aaron, 1992; Culyer, 1993).

It is recognized that payment instruments on both the demand and the supply side can be used to attain the social goals of efficient utilization and minimization of a patient's financial risk (Ellis & McGuire, 1991; 1993). However, two central findings do stand up well and these are what we are emphasizing here. First, conflict rather than consensus is a part of socially optimal payment systems. An ideal payment system is to achieve the desired balance between protecting consumers from financial risk and controlling costs characterized by generous

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insurance coverage as well as financial incentives for providers. However, consumers' interests conflict with providers', because consumers would like to receive more services than providers want to provide (Ellis & McGuire, 1990). Second, supply-side policies are the preferred instruments for cost control. For example, by using Medicare's resource-based relative value scale (RBRVS), supply-side policies can influence physicians' decisions such as service mix and specialty choice (Pauly, 1991). However, with asymmetry of information,¹ the decision made by health care providers may not always turn out to be of benefit to patients, and so an exclusive reliance on the supply side to determine the quantity of services to be provided poses greater risks. Given profit-seeking physicians, prices that exceed marginal costs may encourage physicians to exploit the agency relationship by creating demand for unneeded services (Feldstein, 1970; Evans, 1991; Labelle, Stoddard & Rice, 1994). Nonetheless, health-policy makers may still find it relatively easy as well as more practical and effective to establish a supply-side model, which can be expected to reduce the risks of asymmetrical information and the costs of mistakes to the minimum, or even to moderate the conflicts among the constituents in the health insurance system (Ellis & McGuire, 1990).

In 1995, Taiwan built her NHI system, it was a significant milestone in Taiwan's health care history. Major components of this program include: compulsory participation in the insurance program by individuals, single-payer system, and sharing of premiums by the government, employers and individuals insured. As mentioned above, physicians and health providers play a key role in the health care program, therefore, the main purpose of this study is to test the NHI reforms in internal cost control from the providers' viewpoints.

1.1 Current Health Care Issues in Taiwan

The NHI beneficiaries are divided into six main categories with reference to factors such as former insurance program affiliation (e.g., Labor Insurance, Government Employees' Insurance, Farmers' Health Insurance) payroll-related insured amount, share of premium borne, and method of calculating the premium. The aim of the enrollment policy of Taiwan's NHI is to avoid adverse selection and achieve risk pooling under a model that takes both self-reliance and mutual assistance into consideration. According to a poll surveyed in Autumn 2000, the grade of satisfaction with the program was 74%. The coverage rate of the NHI program is 96.2%, with 21 million residents under coverage (Please refer to Table 1 column 3 for details). Moreover, the items reimbursable by the NHI program cover most health care services, such as diagnosis, examinations, laboratory tests, consultations, operations, drugs, materials, treatments, nursing cares, and hospital ward charges. Types of services include various health care items such as

¹ As noted by Arrow (1963), uncertainty and asymmetric information are two major distinctive features of the health care market. Health care providers typically have greater knowledge about and information of the nature of illness, treatment choices, and expected outcomes than do patients. As a result, in most cases, physicians are the agents of treatment decisions, acting on behalf of their patients. Supply-side cost sharing is intended to change the nature of the incentives for the providers in treatment decisions.

ambulatory care, inpatient care, care by Chinese medicine doctors, dental care, birth delivery, rehabilitation, disease prevention and health promotion, home care, and rehabilitation of chronic disease, to meet the demands of the insured (Bureau of National Health Insurance [BNHI], 2001).

Table 1. Related data of NHI and insurance programs in Taiwan

Year	Number of Insurants	As % of Qualified People	Premium Per Insurant	Outpatients Benefit Payments Per Person	Average Days of Hospital Stay Per Case	Contracted Medical Care Institutions				Number of Medical Care Facilities			
						Medical	Total	Medical Care Institutions	Pharmacies	Others	Hospitals	Area Served Per Medical Care Facility	Population Served Per Medical Care Facility
						Out-patients							
1000 Person	%	N.T.\$	Cases	Days	N.T.\$	Units				Km ²	Persons		
1966	—	—	—	—	—	—	—	—	—	—	1095	32.8	11866
1971	—	—	—	—	—	—	—	—	—	—	7107	5.1	2110
1981	—	—	—	—	—	—	—	—	—	—	11161	3.2	—
1991	—	—	—	—	—	—	—	—	—	—	13661	2.6	1601
1995	19123	92.3	10480	—	—	—	15662	14599	804	259	16109	2.3	—
1996	20041	96.0	12013	13.8	9.0	8293	18338	15429	2608	301	16645	2.2	—
1997	20492	96.3	12042	14.4	8.8	8771	19619	15868	3337	414	17398	2.1	1306
1998	20757	96.1	12554	15.1	8.8	9709	19932	16094	3364	474	17731	2.0	1289
1999	21090	96.1	12889	15.4	8.7	10440	19966	16169	3263	534	17770	2.0	1294
2000	21401	96.2	13536	14.8	8.7	10459	19983	16332	3061	590	18082	2.0	1279
2001	21654	—	13475	14.6	8.8	10758	20071	16558	2860	653	18265	2.0	1271
2002	21869	—	13902	14.6	9.0	11471	20997	16958	3348	691	18228	2.0	1278
2003	21984	—	—	—	9.6	—	21587	17259	3559	769	18777	2.0	1243
2004	22144	—	—	—	9.7	—	22383	17656	3898	829	19240	1.9	1217
2005	22315	—	—	—	9.7	—	22965	17931	4171	863	19433	1.9	1206
2006	—	—	—	—	9.9	—	23207	18289	4036	882	19682	—	1196
2007	—	—	—	—	—	—	23478	18540	4061	877	—	—	—

Note. Source: BNHI (1999; 2003; 2005; 2008).

1.2 Some Issues after the Inauguration of the NHI Program

There have been some problems after the implementation of the NHI program. First, the development among medical specialties is unbalanced. The single-payer system is currently the primary system being used in Taiwan. However, this system fails to fully reflect differences in the consultation time within the same department and especially so in different departments. When the cost differences in the various departments are not considered and are not properly accounted for, an imbalance in the structure of medical expenses will occur, which will significantly affect the quality of medical services (Yaung, 1998). Second, there are lopsided increases in ambulatory and hospital care expenses. The fee-for-service program is the main program used in Taiwan. Owing to the information asymmetry, health care providers can take advantage of medical information and reap profits because medical services are not completely transparent and monitored. There has been a

sharp rise in the number of daily visits since the inauguration of health insurance. The number of annual visits per person has increased from 10.8 to 15.8. The total amount of annual medical expenses has increased, which threatens the financial balance of health insurance. Third, the medical infrastructure was changed with the new classification. After the implementation of NHI, the increase in health care resources and accessibility of health care at all hospital grades has had a great impact on district hospitals, which originally constituted 90% of the total number of hospitals. To date, 15% of district hospitals have been closed because of sharp decreases in the number of outpatients and hospitalized patients, and a substantial loss of physicians. Moreover, the referral system was originally intended to reduce the number of patients seeking medical treatment from medical centers in the hope of achieving reasonable utilization of medical resource (Yaung, 1998). However, it was not adopted well because of opposition from the public who obviously prefer the services provided by medical centers and large hospitals. A lot of medium-sized and small hospitals are having a hard time running their business (ROC, Department of Health, 1997).

In sum, some problems hide explicitly or implicitly in implementation of the NHI program. Therefore, to examine if the NHI reforms could solve these problems is the main purposes of this study. Specifically, this study assesses: (1) the different degrees of acceptability of NHI reforms between public and private health organizations; (2) the different degrees of acceptability of NHI reforms in different hospital grades; (3) the attitudes toward internal cost control by implementing NHI reforms in different hospital grades; and (4) if a higher grade of hospital has a more positive attitude toward internal cost control.

2. RESEARCH DESIGN AND HYPOTHESES

2.1 Research Framework

In order to address the issue highlighted in above section, a conceptual model and research hypotheses are presented firstly. All methodologies we used are selected according to this framework and will be explained later in this paper. Figure 1 presents the conceptualized relationships between the policy reforms, hospital characteristics, and efficacy of policy reforms. Particularly, sixteen policies can be grouped into either demand side or supply side. Also, this study conducts the policy reforms effective on acceptability as well as three indicators: "Change in the number of visits," "Changes in internal cost control," and "Changes in quality of services." To simplify, the above three indicators were replaced by "performance indicators."

2.2 Research Hypotheses

Organization of health care systems refers to the manner in which personnel and facilities are coordinated and controlled in the delivery of health services (Anderson, 1972). Reviewing the studies and trends, it can be assumed that

physicians drive the pattern of health service usage (Ellis & McGuire, 1990; Siegel, 1992). Therefore, providers' acceptability of NHI policies should be carefully assessed. Several studies have shown that differences in medical practice organization often constitute an important source of variation in resource utilization (Kravitz & Greenfield, 1995; Eckerlund, 1989). In so doing, this paper investigates the effectiveness of the NHI reforms from the aspect of physicians who are attached to different hospital ownerships or different hospital grades; where hospital ownership is further divided into "Public hospital" and "Private hospital"; and hospital grade refers to "Medical center and Regional hospital," "District hospital," and "Local clinics." These groups are conceptualized based on existing administrative classification.² A question arises here: "How do providers setting characteristics interact with perceptions of impact on health care services and influence the overall acceptability of the policy reforms?"(Anderson, Rice & Kominski, 1996) Thus, the following hypotheses are proposed:

Hypothesis H₁: *The degrees of acceptability of the NHI reforms are different in accordance with hospital ownership.*

Hypothesis H₂: *"Performance indicators" and Hospital ownership/Hospital grade are significantly related to the degree of "Acceptability of the selected policy reforms."*

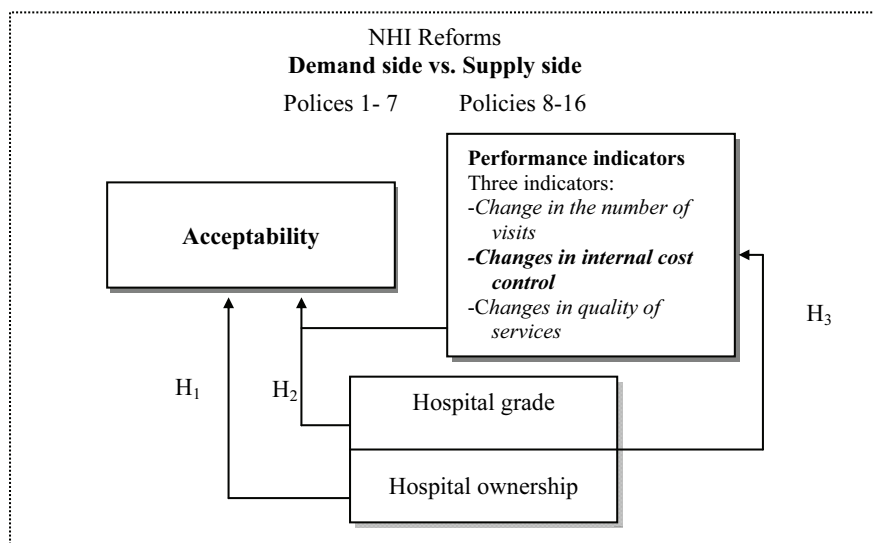


Figure 1. A conceptual framework of this study.

² The classification has brought about a polarization in the medical market. Many medium-sized and small hospitals are having a hard time running their hospitals since the quality of health services is questioned by the public. As a result, people tend to seek medical treatment from large hospitals or general practitioners.

Establishing and maintaining fiscal balance and long-term operational viability is an important task for most Health Insurance Systems in the world. As a result, cost control has become the most important challenge. The initial NHI program is designed to encourage the use of health services and promote social justice. However, when overuse or abuse of health care services began to threaten the financial soundness of the NHI, cost control policies were proposed and introduced to inhibit the growth in the utilization of medical services. Previous literature has shown that smaller hospitals are generally under greater financial pressure than larger hospitals and are expected to reduce Length of Stay (LOS) drastically (Hadley, 1996; Shi, 1996). They also have more flexibility to do so. Health policy reforms and market changes that put more financial pressures on larger hospitals than on local clinics can result in cost containment. By the same token, the private sectors are more vulnerable to internal cost control pressures than the public sectors. The question here is “Which grade of providers would be more sensitive to financial pressure under specific selected policies?” The hypothesis here is:

Hypothesis H_{3A}: *Private hospitals are more sensitive to institutional pressures of internal cost control than public hospitals.*

Hypothesis H_{3B}: *A higher grade of hospital (e.g., medical center, regional center, and district hospital) has higher internal cost control pressure than local clinics.*

2.3 Sampling Design and Data Collection

Data for this research came from the Chung-Hua Institution for Economic Research (CIER), covering the 2000 Health Services Market Stakeholder Survey.³ The population of this sampling covered the whole of Taiwan⁴ containing medical service providers, physicians at public and private hospitals (private for profit), foundation hospital (private non-profit) and private clinics.

An official complete list of members was provided by the Taiwan Doctors' Union, including 29,643 western medicine doctors, 8,600 dentists, and 4,023 Chinese medicine doctors. Using systematic random sampling, 597 doctors were selected as interviewees. The Computer Assisted Telephone Interview (CATT) technique was used as data collection technique. A visual and audio monitoring system was set to monitor interviewing to ensure strict quality control. Every planned interview that was unsuccessful on the first attempt was followed up again, sometimes more than three times, until the specific individual was contacted, to ensure completion of the interview. Such a strict and cautious survey process to acquire a representative sample data can reduce the sample deviation and raise the

³ Because Taiwan's health delivery system is almost a closed type, the population for sampling included all service providers (e.g. doctors) of hospitals and clinics in Taiwan.

⁴ Excluding Penghu County, an offshore island, where the Health Insurance System is a little different from that of the other counties.

credibility of the research results.⁵ At the same time, a questionnaire was mailed to the 100 selected experts and scholars to serve as a cross-reference interviewee group. Forty-eight responses were received. The period of data collection was November 23-January 6, 2002.

2.3.1 The questionnaire

A 16 (16 policy reforms) x3 (three independent variables) x1 (attitude of policy acceptability) design was used for the study. The 16 policy reforms include: (1) Raise the proportion or fixed amount of co-payment. (2) Implement higher partial payment for high-frequency use of medical services. (3) Implement co-payment of medicine charges. (4) Carry out graded medical treatment referral system. (5) Adopt the Medical Savings Account (MSA) System. (6) Implement a system that protects patients with serious disease conditions. (7) Raise the National Health Insurance premium. (8) A multiple insurer system. (9) Implement specific family doctor systems. (10) Restrict the supply of medical equipment. (11) Expand the application scope of a global budget system. (12) Adopt a capitation system. (13) Adopt a Diagnosis-related-Group (DRG) System. (14) Separate medical treatment from medicine supply. (15) Set a Reasonable Visit Number for medical institutions. (16) Strengthen the auditing, monitoring and control of medical institutions. Where the first seven policy reforms belong to “demand side” policies and the rest of the policy reforms are “supply side” policies. The detail contents of the sixteen policies are described in Appendix 1. Next, the three performance indicators are “change in the number of visits,” “change in internal cost control,” and “change in quality of care.” Finally, is the acceptability of selected policies. Each policy was measured along the first three dimensions with a 5-point Likert scale, and along the fourth dimension with a 10-point semantic differential scale. For example, the 5-point scale for the dimension “change in number of visits” included the terms: greatly increased, increased, unchanged, decreased, greatly decreased.

2.3.2 Validity

The content validity was evaluated by experts during early stages of instrument development. The full breadth of content was the result of a series of meetings and panel discussions. Several steps were taken to conduct qualitative interviews, to review the scientific literature, and to refine the instruments for content validity. Based on the literature review and expert opinion, the content validity for the survey instrument was established. The construct adequacy of the measurement instrument was established using correlation analysis and factor analysis. Responses on the acceptability of policies should be systematically related with the other three major dimensions; access of services, the cost of care, and the quality of care (Edward & Richard, 1979).

⁵ The results of the interview were: (1) successful interviews: 208 persons. (2) Refused to interview: 4 persons (3) Incomplete interviews: 56 persons (4) Inapplicable interviews: 308 telephone numbers, including “unapproachable”, no suitable target interviewee, the interviewees not being in during the period of interview, etc.

Table 2. Sample distribution of institutions covered (N=208)

	Sample size	Frequency distribution		Sample size	Frequency distribution
Hospital ownership			Specialty		
Public hospital	56	(27%)	Internal medicine	40	(19.2%)
Private for profit hospital	31	(15%)	Surgery	23	(11.1%)
Private non-profit hospital (Juridical person hospital)	17	(8%)	Ophthalmology	10	(4.8%)
Private clinics	104	(50%)	Urology	7	(3.3%)
Hospital grade			Neurology	2	(1%)
Medical center	33	(16%)	Psychiatry	1	(0.5%)
Regional hospital	37	(18%)	Rehabilitation	19	(9.1%)
District hospital	34	(16%)	Pediatrics	24	(11.5%)
Local clinics or hospital	104	(50%)	Tumorology	2	(1%)
Administrative duties			Osteology	0	(0%)
Yes	137	(65.9%)	Gynecology and obstetrics	10	(4.8%)
No	71	(34.1%)	Otorhinolaryngology	19	(9.1%)
			Dermatology	6	(2.9%)
			Family medicine	28	(13.5%)
			Dentistry	8	(3.8%)
			Chinese medicine	7	(3.3%)
			Others	2	(1%)

2.3.3 Reliability

Internal consistency and Cronbach's α was measured with "acceptability of the selected policies" as the focus. Table 4 shows the reliability coefficients of the total 16 items which yielded a Cronbach's α of 0.86. This is significantly higher than the threshold value of 0.70 of an acceptable level for reliability (Nunnally, 1978).

3. ANALYSIS AND RESULTS

3.1 Preliminary Data Analysis

The sample size and distributions of physician providers surveyed by type and grade of hospital, clinical specialty, and administrative responsibilities are shown in Table 2. The table shows that 27% of sample providers worked for public hospitals and 73% worked in the private sector (15% in private for profit hospitals, 8% in private non-profit hospitals, and 50% in private clinics) (see Table 2).

3.2 Hypotheses Testing

Hypothesis H₁

Table 3 shows the bi-variate analysis and *t*-testing results of the policy acceptabilities in accordance with hospital ownership. It can be seen that the average acceptability on demand side is higher than on supply side (6.29 vs. 5.07 for public hospitals; and 6.29 vs. 5.23 for private health institutions). It is

concluded that, overall, providers have higher acceptabilities on demand side policy reforms than on supply side reforms in both public and private sectors. However, the policy acceptabilities are significantly different between the two groups only on Policies 4, 5, 8, 10, 11 and 15. Therefore, the Hypothesis H₁ is only partially accepted.

Table 3. Differences between public and private sector providers on acceptability of the policy reforms

Policy reforms	Public Hospital		Private Health Institutions		T-test		Cronbach α
	Mean	S.D.	Mean	S.D.	T-Value	<i>pr</i> > T	
(1) Raise the proportion or fixed amount of co-payment	6.04	2.194	6.23	2.758	-0.519	0.6048	0.846
(2) Implement higher partial payment for high-frequency use of medical services	6.18	2.217	5.66	2.662	1.421	0.1581	0.854
(3) Implement co-payment of medicine charges	6.52	1.972	6.04	2.572	1.418	0.1586	0.852
(4) Carry out graded medical treatment referral system	6.46	2.628	8.00	2.141	-3.909**	0.0002	0.863
(5) Adopt Medical Savings Account (MSA) System	6.48	2.561	5.68	2.537	1.952**	0.0538	0.856
(6) Implement a system that protects patients with serious disease conditions	6.04	2.194	6.19	2.764	-0.400	0.6897	0.856
(7) Raise the National Health Insurance premium	6.02	2.211	6.21	2.769	-0.494	0.6220	0.847
<i>Average (Demand side)</i>	<i>6.25</i>	<i>-</i>	<i>6.29</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
(8) A multiple insurer system	5.41	2.735	4.45	2.662	2.244**	0.0271	0.864
(9) Implement specific family doctor systems	5.34	2.837	5.63	2.798	-1.864	0.0640	0.869
(10) Restrict the supply of medical equipment	5.38	2.519	6.34	2.528	-2.437**	0.0166	0.860
(11) Expand the application scope of global budget system	4.37	2.301	5.13	2.392	-2.052**	0.0428	0.856
(12) Adopt Capitation system	4.49	2.292	4.52	2.537	-0.081	0.9360	0.853
(13) Adopt Diagnosis-related-Group (DRG) System	4.67	2.282	5.05	2.405	-1.034	0.3038	0.855
(14) Separate medical treatment from medicine supply	5.07	2.388	4.65	2.728	1.087	0.2796	0.867
(15) Set a reasonable visit numbers for medical institutions	5.19	2.578	6.25	2.762	-2.548**	0.0123	0.855
(16) Strengthen the auditing; monitoring and control of medical institutions	5.73	2.300	5.10	2.590	1.694	0.0930	0.858
<i>Average (Supply side)</i>	<i>5.07</i>	<i>-</i>	<i>5.23</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>

Note. ** indicates $p < 0.05$.

Hypothesis H₂

As mentioned earlier, the policy acceptability of providers should be correlated with their perceptions of the policy's impact on three performance indicators: "overall health services utilization," "changes in internal cost control," and "changes in quality of services." Moreover, it is assumed that there is an association between policy incentives and organization's roles. For example, the

public sector hospitals are assumed to have social responsibility and are subsidized by government. Empirically, if the *t*-test was performed and it was found that there is a significant difference between public sector and private sectors on the acceptability of certain policy reform *i*, then the policy *i* is taken into a further regression analysis. The multiple regressions (Equation 1 and 2) were set up to test Hypothesis H₂:

$$Y_i = b_{0i} + b_{1i}X_{1i} + b_{2i}X_{2i} + b_{3i}X_{3i} + b_{4i}TY_i + \varepsilon_i, \quad (1)$$

where Y_i indicates the “acceptability of NHI reform *P*”; X_{1i} indicates “changes in the number visits (Utilization)”; X_{2i} indicates “changes in internal cost control”; X_{3i} indicates “changes in quality of care”; TY_i indicates “hospital ownership”: with $TY_i = 1$ indicating public sector and $TY_i = 0$ indicating private sector.

$$Y_i = \beta_{0i} + \beta_{1i}X_{1i} + \beta_{2i}X_{2i} + \beta_{3i}X_{3i} + \beta_{4ji} \sum_{j=1}^2 HL_{ji} + \varepsilon_i, \quad (2)$$

where $HL_{1i} = 1$ indicates medical center and regional hospital grades; 0, otherwise. $HL_{2i} = 1$ indicates district hospital grade, 0 otherwise. Local clinics form the reference group. Therefore, if $HL_{1i} = 1$ and $HL_{2i} = 0$ then equation 2 represents the regression of medical center and regional hospital grades; if $HL_{1i} = 0$ and $HL_{2i} = 1$ then equation 2 represents the regression of district hospital grade; and if $HL_{1i} = 0$ and $HL_{2i} = 0$ then equation 2 represents the regression of local clinics.

By using Equation 1, multiple regression analyses were performed on these policies. It can be seen from Table 4 that the coefficients of X_1 (Changes in the number of visits) are negative for all the selected policies indicating an increase in the number of visits and the acceptability of the selected policy increased.⁶ Moreover, the negative coefficients of TY_i on policies 4, 10, 11, 15 indicate that the public sectors have low acceptability on these policies when compared to private providers.

Next, the ANOVA procedure shows that the three hospital grades are significantly different on acceptability of Policies 3, 4, 5, 8, 10, 11, 14, 15, and 16 (the ANOVA results are available upon request from the author). These policy reforms are further examined by regression analysis by using Equation 2. The results are shown in Table 5. It is concluded that the medical centers and regional hospitals have higher degrees of acceptability (compared with District Hospital and Local Clinics) on Policies 5, 8, and 14; while district hospitals have higher degrees of acceptability on policies 10 and 16; and local clinics have higher degrees of acceptability on policies 4, 11, and 15.

⁶ The questionnaire requested respondents to select their responses on a scale of 1-5, with 1 representing greatly increased number of visits or very intensively increased, and 5 representing greatly decreased or very infrequent visits. The higher the rating, the more negative the opinion (or performance) regarding that policy. Therefore, if a score was less than 3, it was classified into the “overall increased” group; if the score was equal to 3, then it was classified into the “unchanged” group; and a score of more than 3 was classified into the “overall decreased” group.

Some useful findings from Table 4 and Table 5 are: first, providers both in the private sector and clinics grade have a higher degree of acceptability on Policy 4 (carry out graded medical treatment referral system). The reason is, in fact, Taiwan's health care system has not incorporated a well-established referral system based on a family doctor system. Patients are free to choose their own physicians, and physicians who practice in clinics are completely independent of hospitals. As a result, hospitals and clinics compete to provide outpatient services to the same group of potential patients. For some reason, patients have no intention of requesting a referral (Liang, 1999) and the medical centers capture the highest percentage of primary care outpatients. That is why most of the providers who are not in the larger hospitals, opined that implementation of these policies resulted in an "overall increase" in the number of visits.

Second, the previous price-oriented controls failed to effectively control the growth of overall expenditures of the Taiwan NHI Bureau. The NHI Bureau hopes to control the overall budgeting within a certain limit by a lump-sum payment system. Currently, the NHI is gradually transitioning from an expenditure-objective system to a maximum-limit system (global budgeting). Therefore, the larger hospitals have a significantly lower degree of acceptance than local clinics on policy 11 (Expand the application scope of global budget system).

Third, the NHI set up a partial user-pay system, in line with the medical network plans, to restrict the growth in the demand for hospitals and high-tech medical services. Meanwhile, the NHI set up a sound auditing system to prevent overstatement and misrepresentation of health-care cases. This is the reason why larger sectors dislike policy 10 (Restrict the supply of medical equipment).

Table 4. *Acceptability of the selected policy reforms with provider opinions on performance indicators -- public hospital vs. private hospital (private hospital is the contrast group)*

NHI Reforms	Constant	Changes in Number of Visits (X_1)	Changes in Internal Cost Control (X_2)	Changes in Care Quality (X_3)	Public Hospital (TY)	F-value
Policy 4	13.179 (19.28)***	-0.458 (-3.37)***	-0.428 (-1.87)*	-1.338 (-7.62)***	-0.412 (-1.22)	29.05***
Policy 5	14.145 (11.75)***	-0.619 (-2.51)**	-0.552 (-2.00)**	-1.767 (-7.78)***	0.607 (1.64)	20.57***
Policy 8	12.170 (16.12)***	-0.742 (-3.83)***	-0.022 (-0.11)	-1.546 (-9.12)***	0.692 (2.01)**	47.16***
Policy 10	13.015 (12.54)***	-0.475 (-1.74)*	0.019 (0.08)	-1.783 (-9.99)***	-1.562 (-1.27)	32.02***
Policy 11	11.542 (12.19)***	-0.476 (-2.38)**	0.093 (0.43)	-1.562 (-9.67)***	-0.238 (-0.70)	31.23***
Policy 15	11.757 (13.62)***	-0.465 (-2.70)***	0.331 (1.45)	-1.744 (-10.82)***	-0.463 (-1.31)	43.70***

Note. 1. *t* values in parentheses; * indicates $p < 0.1$; ** indicates $p < 0.05$; *** indicates $p < 0.01$.

2. R^2 for reform (4) is 0.390; reform (5) is 0.348; reform (8) is 0.549; reform (10) is 0.410; reform (11) is 0.427; and reform (15) is 0.482.

Table 5. Regression results showing the association of acceptability of the selected policy items with performance indicators (Local Clinics is the contrast group)

NHI Reforms	Constant	Changes in Number of visits (X ₁)	Changes in Internal cost control (X ₂)	Changes in Care quality (X ₃)	Medical center & regional hospital (HL ₁)	District hospital (HL ₂)	F-value
Policy 3	14.292 (11.733)***	-1.144 (-4.476)***	-0.417 (-1.1613)	-1.340 (-5.623)***	11.1161 (3.453)***	1.058 (2.534)**	17.942***
Policy 4	13.265 (19.266)***	-0.290 (-1.733)*	-0.526 (-2.288)**	-1.334 (-7.714)***	-0.968 (-2.240)**	-0.887 (-2.380)**	25.228***
Policy 5	13.554 (11.126)***	-0.631 (-2.594)**	-0.474 (-1.733)*	-1.701 (-7.610)***	1.036 (2.782)***	0.574 (1.243)	17.911***
Policy 8	10.608 (12.281)***	-0.601 (-3.206)***	0.184 (0.882)	-1.495 (-9.092)***	1.442 (4.097)***	0.954 (2.251)**	43.110***
Policy 10	12.857 (12.262)***	-0.490 (-1.774)*	0.078 (0.320)	-1.785 (-9.709)***	-0.178 (-0.468)	0.062 (0.148)	25.055***
Policy 11	11.766 (12.219)***	-0.450 (-2.236)**	0.027 (0.117)	-1.575 (-9.367)***	-0.396 (-1.088)	-0.431 (-1.058)	25.278***
Policy 14	14.650 (14.354)***	-0.837 (-3.736)***	-0.576 (-2.435)**	-1.913 (-10.393)***	0.213 (0.686)	0.156 (0.406)	43.694***
Policy 15	11.940 (13.638)***	-0.308 (-1.617)	0.148 (0.606)	-1.748 (-10.943)***	-1.044 (-2.357)**	-0.584 (-1.376)	36.310***
Policy 16	12.839 (9.775)***	-0.566 (-1.799)*	-0.007 (-0.027)	-2.097 (-10.702)***	0.235 (0.675)	0.249 (0.614)	27.407***

Note. 1. *t* values in parentheses.

2. * *p* < 0; ** *p* < 0.05; *** *p* < 0.01.

3. R-square: (3) 0.322; (4) 0.411; (5) 0.369; (8) 0.583; (10) 0.406; (11) 0.431; (14) 0.531; (15) 0.493 (16) 0.4140.

Hypothesis H_{3A}

Hypothesis H_{3A} tests whether or not the private sector are more vulnerable to the pressures of increasing internal cost control pressures initiated in response to government policy than the public sector. Based on this hypothesis, a health provider’s attitude toward internal cost control can be divided into two categories, namely, positive and negative attitudes. Equation 3 shows the binary choice model.

$$\Pr (ICC = 1 | Z_{ki}) = F \left(\beta_{ik} \sum_{k=1}^3 Z_{ki} \right) \quad (3)$$

where Pr (ICC=1) indicates the probability of positive attitude to the internal cost control; and F(·) is the cumulative distribution function (Maddala, 1983); Z_{ki} is an explanatory variable with the response parameter β_{ik} for policy *i*. Z_{1i} indicates public hospital; Z_{2i} indicates private for profit hospital; and Z_{3i} is private non-profit hospital. These variables are defined such that “local clinics” is the reference group. SAS LOGISTIC procedure was performed for the sixteen policies respectively to fit a logistic regression model.

As can be seen in Table 6, (i) private for-profit providers expressed the highest possibility of controlling internal cost with policy 1, 3, 6, 7, and 14 when compared with the other three groups (i.e., the coefficients are significantly larger among the groups); (ii) public hospital provider groups expressed the highest

expectations of internal cost control on policy 10 and 16, if the respective policies were to be implemented; (iii) private hospital providers (for-profit or non-profit) expressed the highest expectations of controlling internal cost in 13 out of a total 16 policies (except for policies 11 and 16). This suggests that private sector providers feel more vulnerable to the effects of reforms and are also subject to greater institutional pressure due to internal cost controls, compared with public hospital providers. Therefore, hypothesis H_{3A} has been supported.

The government subsidy for public hospitals is probably relevant with regards to the results. The observed relationships can be justified by the greater market competition and hospital mission differences among the different types of hospitals.

Hypothesis H_{3B}

Similar to H_{3A}, this study uses Equation 4 to test Hypothesis H_{3B}.

$$\Pr (ICC = 1 | C_{ki}) = F \left(\delta_{ik} \sum_{k=1}^3 C_{ki} \right), \quad (4)$$

where C_{1i} indicates medical center; C_{2i} is regional center; and C_{3i} is district hospital; “local clinics” is the contrast group.

It can be seen from Table 6 that (i) for the medical center group the coefficients were significantly larger for Policy 1, 15 and 16; (ii) for the regional hospital group the coefficients were the largest for Policy 4, 5, 6, 7, 8, 10, 11, 12, 13 and 14.

These findings suggest that regional hospital providers face higher pressure from internal cost controls than medical centers under these policies. This result also reflects the fact that regional hospitals in Taiwan tend to expand their number of beds as well as equipment to develop themselves into medical centers. In sum, among the 16 policy items, large hospital providers (medical centers and regional hospitals are included) expressed the greatest expectation of controlling internal cost in response to 13 policies. Therefore, hypothesis H_{3B} has been supported.

4. CONCLUSIONS

Physicians’ viewpoints have often been considered to be important and helpful in the explanation of the wide variation in physicians’ behaviors under hospital characteristics. The problems faced by a health care system are inherent in the way the health care services are organized and financed (Ecklerund, 1989). This paper investigated the acceptability of health policy reforms correlated with provider’s perceptions of the policy’s impact on “overall health services utilization,” “changes in internal cost control,” and “changes in quality of services” and examined the internal cost control effects in different hospital grades.

The empirical study found that (1) there are significant differences on the degrees of acceptabilities of policies 4, 5, 8, 10, 11, 15 between public and private hospitals; (2) there are significant differences on the degrees of acceptabilities of

policies 3, 4, 5, 8, 10, 11, 14, 15, 16 among medical center and regional hospitals, district hospitals, and local clinics. The findings generally support the conclusion that both hospital ownership and hospital grade differed significantly on acceptability of demand-side and supply-side policies. But most of them are on supply side policy (i.e., policies 8, 10, 11, 14, 15, 16). It clearly indicates incentive conflicts driven by their attempt to consolidate their positions of power depending on their hospital characteristics and strategies to capture market share; (3) among the 16 policy reforms, larger hospitals (medical centers and regional hospitals are included) expressed the greatest expectation of controlling internal cost in response to 13 policies.

Table 6. Differences in expectation of increase in internal cost control in response to the policy by hospital ownership and hospital grade

Policy reforms (i) Pr(ICC=1)	Hospital ownership and hospital grade	Public Hospital (Z _{1j})	Private for-profit Hospital (Z _{2j})	Private non-profit Hospital (Z _{3j})	Medical Center (C _{1j})	Regional Hospital (C _{2j})	District Hospital (C _{3j})
		Coefficients	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients
(1) Raise the proportion or fixed amount of co-payment		1.2953**	1.4590**	14.2134	1.7714**	1.3721**	1.1148**
(2) Implement partial payment for high volume use of services		0.8981**	1.7544**	2.1180**	1.0761**	1.3072**	1.4016**
(3) Implement co-payment for medicine charges		1.0630**	1.6355**	1.5275**	1.4725**	0.8869**	1.5088**
(4) Carry out graded medical treatment referral system		1.3329**	1.1907**	2.3106**	1.208**7	1.5637**	1.0277**
(5) Adopt Medical Savings Account (MSA) System		1.0747**	1.2021**	1.7885**	1.0320**	1.1408**	1.0695**
(6) Implement a system giving protection from serious disease		1.2758**	2.8927**	2.2667**	1.1399**	2.2726**	1.4618**
(7) Raise National Health Insurance premium		0.6266*	1.4118**	1.0587*	0.2860	1.0423**	0.8274**
(8) Open the multiple insurer system for competition		2.0735**	2.1818**	14.1702	1.7597**	2.2852**	2.2250**
(9) Implement specific family doctor system		1.4173**	1.8564**	2.3935**	1.5108**	1.1423**	1.5445**
(10) Restrict the supply of medical equipment		2.6350**	1.9826**	1.8747**	2.2157**	2.6318**	1.3776**
(11) Expand the application scope of global budget system		14.1683	1.6003**	14.1683	14.0719	2.8267**	1.3237**
(12) Adopt Capitation system		1.6718**	1.6187**	14.2307	1.9556**	2.0199**	0.9729**
(13) Adopt Disease Related Group System		2.9868**	3.0921**	14.3345	3.1011**	3.1907**	2.4084**
(14) Separation of medical treatment and medicine supply		1.0296**	1.5779**	1.1093*	0.4380	1.6973**	1.2238**
(15) Set a Reasonable Change in visit numbers for medical institutions		2.1242**	3.4235**	14.4757	3.4879**	2.4213**	2.3589**
(16) Strengthen the auditing; monitoring and control of organizations		2.3655**	1.9735**	2.0785**	2.7464**	1.8321**	1.7307**

Note. * indicates p < 0.1; ** indicates p < 0.05.

Some policy implications of this study are: (1) providers both in the private sector and clinics have a higher degree of acceptability to the policy 'Carry out graded medical treatment referral system'. This is because people tend to seek medical treatment from larger hospitals or general practitioners. Therefore, the medium-sized and small hospitals advocate implementing the referral system to increase their medical service. (2) Larger hospitals have a significantly lower degree of acceptance than local clinics on "expand the application scope of global budget system" policy. The reason is that the NHI is in the process of transitioning from an expenditure-objective system to a maximum-limit system (global budgeting). (3) The NHI sets up a partial user-pay system, in line with the medical network plans, to restrict the growth in the demand for hospitals and high-tech medical services. Meanwhile, the Bureau set up an auditing system to prevent overstatement and misrepresentation of health-care cases. This is the reason why larger sectors dislike policy 10 (restrict the supply of medical equipment). (4) Ownership structure is another important determinant of the providers' internal cost control, since it affects how the system is managed and controlled. Private-for-profit hospitals are under higher pressure due to internal cost control than private non-profit hospitals. The private hospitals are subject to greater influence by public health policies and are subject to higher pressure under internal cost control than the public hospital. Private hospitals, generally more financially sensitive, are expected to be more responsive to the incentives embedded in insurance systems. As Abel-Smith (1984) argued, public ownership ensures easier cost control since it allows the government to finance the facilities on a budget basis as well as to use direct administrative controls to coordinate health services. A large share of public ownership makes planning more politically feasible.

Future research may focus on: (1) evaluating the utilization of health care performance; (2) assessing fairly the need versus demand issue, what constitutes optimal care, and (3) finding a point of equilibrium in producing the optimal system of health care for the public, and to construct the "Global Budgeting Pie" of Taiwan's National Health Insurance.

APPENDIX 1

The sixteen policy instruments are described in detail as follows:

(1) Raise the proportion or fixed amount of copayment

Proportion or Fixed Amount of Copayment: To closely control medical expenses for every patient seeking medical services, the Health Insurance Bureau sets the patient's share or fixed amount of insurance premium to be paid out-of-pocket by health care consumers (e.g. currently, an outpatient of a foundation hospital has to pay NT\$50 for each visit, and an outpatient of a medical center, NT\$150).

(2) Implement higher partial payment for heavy user of medical services

Higher Partial Payment for Heavy Users of Medical Services: A higher sharing proportion or fixed amount is charged for those who use the health

insurance for more than a certain number of times within a year (For example, when a patient has used health insurance for 49 times or more, the partial payment to be shared by that patient for further services at the foundation hospitals and medical centers will increase by NT\$50 per visit).

(3) Implement co-payment of medicine charges

Partial Payment of Medicine Fee: Each time a patient seeks medical treatment, the Health Insurance Bureau requires that a shared proportion of, or a fixed amount for, the medicine fee be paid by the user (e.g., according to the current system, when the medicine fee exceeds NT\$100, the patient has a co-pay NT\$20.).

(4) Carry out Graded Medical Treatment Referral System

Graded Medical Treatment Referral System: According to the regulations of the government, whenever a citizen wants medical service, he/she must seek initial care from a local hospital (clinic). Depending on the health condition, the patient may be referred to hospitals at higher grades (in the order of district hospital - regional hospital - medical center).

(5) Adopt Medical Savings Account (MSA) System

Medical Savings Account (MSA) System: The method of payment for premium remained unchanged. However, on the basis of age, sex, risk factors, etc., the Health Insurance Bureau appropriates a certain amount of money and pools it into a "Personal Medical Savings Account" to pay for his/her medical expenses or for his/her kin. Surplus balances can be retained for future use, or can even become a legacy for dependents.

(6) Implement a System That Protects Patients with Serious Disease Conditions

A System That Protects Patients with Serious Disease Conditions: Individuals are not required to pay any premium. The government will set a certain amount of money as the maximum amount (e.g., NT\$10,000 per year), which the insured person has to pay. Each year the BNHI will pay the rest.

(7) Raise the National Health Insurance premium

Raise the Premium of National Health Insurance: Raise the monthly premium to be paid by every citizen.

(8) A Multiple Insurer System

Multiple Insurer System: For the same rate of premium to be borne by the insured, all private insurance companies are allowed to compete and bid for the business now operated by the Bureau of Health Insurance. To meet their individual needs and preferences, individuals can choose a specific insurer to buy insurance from and seek medical service from a hospital under contract with that insurance company.

(9) Implement specific family doctor systems

Family Doctor System: The government requires all citizens to choose one family doctor from whom they seek medical service whenever needed. If an illness cannot be treated/cured by the family doctor, the patient will then be transferred elsewhere, usually to a specialist.

(10) Restrict the supply of medical equipment

(11) Expand the application scope of Global Budget System

Global Budget System: A certain grade of budget is first negotiated and decided on between the insurance organization and suppliers of medical services, for each category of medical care specified as required for a particular type of illness for a certain period of time. That budget is then appropriated to the organization of the medical service suppliers, which in turn will carry out their internal allocation of the budget. Currently this system is implemented in the dentistry and Chinese medical departments. This system is still under planning for the western medical departments.

(12) Adopt Capitation System

Capitation System: Based on the number of the insured and the medical needs of the insured in terms of their attributes (e.g. age, health condition and sex, etc.), the Health Insurance Bureau decides the total amount of medical services for the year to be paid to the medical service suppliers in advance.

(13) Adopt Diagnosis-Related-Group (DRG) System

Disease-Related Groups (DRG) System: The payment of medical expenses to medical service suppliers, by the Health Insurance Bureau, is based on the number of medical cases with medical treatment completed. The payment contents and the standard of payment are classified according to the case-mix.

(14) Separate medical treatment from medicine supply

(15) Set a reasonable visit numbers for medical institutions

Reasonable Numbers of Visits: The Health Insurance Bureau specifies a limit to the number of daily outpatients permitted for each doctor. If the limit is exceeded, the payment for the excess patients will be reduced. For example, according to the currently drafted policy, in the future each and every doctor of a “regional hospital” can provide medical services to only 18 patients per day, and every doctor of “medical center” can provide medical services to only 5 patients per day. The payment for the excess patients will be reduced to half.

(16) Strengthen the auditing; monitoring and control of medical institutions

Auditing, Monitoring and Control of Medical Organizations: The Health Insurance Bureau will periodically examine the reports on the process of medical services provided by medical organizations in order to make sure patients receive the most suitable medical treatment and that the misallocation of medical resources is avoided.

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