

行政院國家科學委員會補助專題研究計畫成果報告

藥品成本控制政策及醫師獎勵金制度對全民健保門診  
費用影響之實證研究

計畫類別： 個別型計畫 整合型計畫

計畫編號：NSC-90-2416-H-002-012

執行期間：90年08月01日至91年07月31日

計畫主持人：劉順仁

共同主持人：朱炫璉

計畫參與人員：姜瑞簡，姚毅賢

本成果報告包括以下應繳交之附件：

- 赴國外出差或研習心得報告一份
- 赴大陸地區出差或研習心得報告一份
- 出席國際學術會議心得報告及發表之論文各一份
- 國際合作研究計畫國外研究報告一份

執行單位：台灣大學會計學系

中華民國 92 年 1 月 6 日

## Abstract

This study uses variance cost analysis and regression analysis as tools for investigating the initial effects of Taiwan's outpatient prescription drug co-payment program in the elderly. Under its new National Health Insurance program, Taiwan implemented a prescription drug cost-sharing program August 1, 1999. We compare an elderly population's prescription drug use after the policy was implemented, with an elderly population's prescription drug use prior to the policy change, to describe initial and general consequences of the drug cost-sharing program. Thus the research may be instructive for the US and other countries that struggle with providing prescription benefits to their elderly population within economic constraints.

The significant increase in average drug price per prescription indicates that many prescriptions may move above the upper bound of the cost-sharing schedule. The results suggest that the Bureau of National Health Insurance should increase the upper bound. We do not think that these effects are unique to Taiwan. Rather, these effects should be considered as countries change their outpatient drug benefit programs. We also found a decrease in utilization of essential drugs while an increase in utilization of non-essential drugs for patients subject to co-payments. The results suggest potential adverse effects on patients' health outcome.

**Keywords :** cost-sharing, outpatient prescription drug, Taiwan's National Health Insurance

### 1. Introduction

Taiwan's National Health Insurance [NHI] program was implemented in March 1995<sup>1</sup>. It is a compulsory single payer program that offers medical care coverage to about 98% of citizens. Prior to the implementation of NHI, 40% of the population did not have access to care. Those without access were mostly older adults, women and children. In the pre-NHI era, uninsured older Taiwanese paid for their care, including prescriptions, out-of-pocket. Within the first year of implementation, the access problem was virtually solved. However, the NHI experienced its first operational loss in 1998, mainly because of the rapid increase in medical expenditures, especially its outpatient costs. Furthermore, drug costs have been the most important item of outpatient costs (about 33.3%), with an annual rate of increase of about 13%.

Facing rapidly rising prescription drug costs, the major policy debate has centered on the welfare implication for the elderly, as they usually consume a large share of drug expenses. For example, US seniors constitute 13 percent of the population but they account for 34 percent of all prescriptions dispensed and 42 percent of

prescription drug expenses<sup>4</sup>. As prescription drugs have become an essential part of medical treatment, restrictive drug coverage may deprive the elderly of the benefit of these medical advances. However, comprehensive drug coverage may be either too expensive for the elderly to purchase or jeopardize the financial health of public insurance plans. Recent studies<sup>4-6</sup> have noted that 30%-50% of Medicare beneficiaries did not have reliable prescription drug coverage and obtained such coverage through other supplemental plans could cost more than \$3,000 annually. In contrast, Taiwan's NHI began with a comprehensive and very extensive drug coverage benefit and soon found it financially unsustainable. Thus, prescription drug cost-containment policies were taken. The main purpose of the research is to investigate initial effects of Taiwan's outpatient prescription drug co-payment program in the elderly. We use variance analysis, a widely accepted methodology among accountants, as an attention-directing tool for policy analysis. This is coupled with regression analysis to refine the analysis.

## **2. Research Methods**

About 240,000 patients aged 65 and over representing 1,600,000 outpatient prescriptions were drawn from 21 hospitals in the Taipei area for the study using a stratified random sampling method. Variance analysis, as used primarily in accounting, was applied to decompose overall cost variance of the policy into the sum of variances of several specific factors that are important to policy-makers. The cost variances of each specific factor can be further decomposed into finer factors or sub-levels of analyses. Regression analysis is then applied to better understand co-variates that might influence drug cost variances of significant magnitude.

## **3. Results**

The initial effects of the policy change did not reverse the trend of drug cost increases. Instead there was a significant increase in total prescription drug costs in the cost-sharing group (about 12.86%) and an even higher increase rate in the non cost-sharing group (about 51.42%). The main reason of drug cost increase for the cost-sharing group was attributed to an increase in average drug costs per prescription (explaining 69.20% of the variance). We found physicians seemed to prescribe more expensive drugs and extend the duration of prescription especially when drug costs exceeding the upper bound of the cost-sharing schedule. By contrast, the main factor contributing to the increase in drug costs for the non cost-sharing group was an increase in average prescription duration (explaining 64.98% of the variance). The increase mainly results from the effect of extended prescriptions for chronic diseases that were

designed to reduce unnecessary visits for refills.

#### **4. Discussion**

The initial effects of the outpatient prescription drug cost-sharing program implemented by the NHI in Taiwan did not reverse the trend of drug cost surge among elderly Taiwanese. However, the program constrained the increase rate in prescription drug costs of the cost-sharing group to a more tolerable degree. Together with the fees collected from the program, it did somewhat help the financing of the NHI program. We also find differential effects of the drug cost-sharing program based on the variance analysis framework. For example, the main reason of drug cost increase for the cost-sharing group is attributed to an increase in average drug price per prescription. By contrast, the main factor contributing to the increase in drug costs for the non cost-sharing group is an increase in average prescription duration. Did patients actually increase drug consumption because of the extended duration? Extant studies have not provided evidence on medications that went unused as a consequence of the drug cost-sharing policy. However, the NHI indicated that 5% of patients did not take drugs prescribed after outpatient visits; 25% of patients only took about 50% of drugs prescribed<sup>26</sup>. The results suggest a low compliance rate and potential wastes for outpatient medications.

Consistent with prior literature, results in our regression analysis suggest that the cost-sharing program (CSP) discourages drug utilization (in term of drug cost per prescription and duration of prescription) in the cost-sharing range (i.e., \$3.125 – \$15.625). However, interaction effects (Upper\*CSP) shown in the regression analysis indicate that for prescriptions with drug costs above the upper bound of cost-sharing schedule, drug cost per prescription and prescription duration both increase significantly for the cost-sharing group in the cost-sharing period. This is the main reason why we observe large unfavorable average prescription cost variance.

Did prices of prescription drug on average become more expensive in the cost-sharing period given the same drug mix? An analysis of the changes in the drug reimbursement list of the NHI in the cost-sharing period: out of 20,138 items of drugs reimbursed by the NHI, 51 drugs (0.25%) experienced prices increases; 232 drugs (1.15%) experienced prices decrease; 602 drugs (2.98%) were added in the reimbursement list; 154 drugs (0.76%) were deleted from the reimbursement list. We believe that an increase in average drug cost per prescription in the cost-sharing period is unlikely because of drug price increases for the following reasons: (1) NHI generally marks down drug prices, (2) the newly added drugs (usually not new drugs) were not necessarily more expensive drugs, and (3) the percentage of changes in drugs status (price changes or addition/deletion) was very small compared to the NHI

drug reimbursement list.

The significant increase in average drug price per prescription indicates that many prescriptions may move above the upper bound of the cost-sharing schedule. The result suggests that the NHI should increase the upper limit of drug co-payments. The cost-sharing program reduces the percentage of drug costs (from 10.44% to 9.33%) and number of prescription (from 35.99% to 34.48%) in the range subject to co-payments for the cost-sharing group; both of them, however, increase significantly for prescriptions over the upper bound of cost-sharing schedule. A follow-up examination reveals that the most significant increase in drug costs came from prescriptions over \$78.125. Thus, revising the upper limit of cost-sharing schedule above \$78.125 can be an option for policy-makers to address the cost control issue more effectively.

Our data only contain information related to outpatient drug utilization. We are unable to infer potential changes in health outcomes by examining consumption of other health care goods (e.g., hospitalization). We believe, however, a useful approximation of health outcomes is to analyze the changes in essential and non-essential drugs. A decrease in the use of essential drug is generally perceived as more likely to be related to adverse health outcomes. Currently, no formal essential vs. non-essential drug classification is readily available in Taiwan. We classify the drugs in our database as essential drugs if they are in the WHO essential drug list<sup>27</sup>; otherwise, the drugs are classified as non-essential drug. We conduct similar regression analysis to investigate how the cost-sharing program affects the drug costs per prescription for essential and non-essential drugs, respectively (detailed statistics are available upon request from the authors). For the cost-sharing group, we found a decrease in essential drug cost per prescription in the cost-sharing period while an increase in non-essential drug costs per prescription. By contrast, for the non cost-sharing group both essential and non-essential drug costs per prescription increase in the cost-sharing period. The evidence suggests a potential substitution effect between essential and non-essential drugs related to the drug cost-sharing program. If so, the co-payments, exerting pressure on patients regardless of their medical necessity, may threaten patients' well-being and create ethical concerns for pharmaceutical benefit management<sup>28</sup>. However, a lack of detailed clinical data makes it difficult to conclude whether the change has any adverse effects on health outcomes in the elderly.

To better control the increase in outpatient prescription drug expenditures, in addition to the cost-sharing program the NHI reduced about 10,000 items (49 % out of total) of the drug reimbursement rates beginning April 1, 2000. The NHI allows patients to fill their prescriptions elsewhere. But, they usually obtain outpatient

prescriptions directly from pharmacies in hospitals because of convenience. To motivate physicians to work harder under the mainly fee-for-service environment, Taiwan hospitals often use physician fee programs that link part of physicians' compensation to medical revenues generated<sup>29,30</sup>. Revenues associated with prescription drugs, however, are rarely included in the incentive programs because of the appearing conflicts with medical ethics. Thus, hospitals capture most of drug related profits and often influence physicians' prescription behavior by limiting their choices to drugs that hospitals purchase at lower prices. The NHI surveys prescription drug prices regularly as references for price adjustments. Hospitals (nonprofit and private hospitals in particular) are reported to work with pharmaceutical manufacturers to conceal true costs with a goal of maintaining favorable reimbursement rates. The aggressive reduction of drug reimbursement rates signals the NHI's determination to squeeze drug profits from hospitals. Further research on the effect of this reduction should be very instructive for health policy researchers in Taiwan and elsewhere.

## References

1. Chiang TL, Taiwan's 1995 health care reform. *Health Policy* 1997; 39:225-239.
2. Iglehart JK, Medicare and prescription drugs. *N Engl J of Med* 2001; 344:1010-1015.
3. Health Care Financing Administration, National Health Accounts, 1999.
4. Families USA, Cost overdose: Growth in drug spending for the elderly: 1992-2010, 2000.
5. Kreling D, Mott D, Wiederholt JB. Prescription drug trends: a chartbook, The Kaiser Family Foundation, 2000.
6. Moon M, Storeygard M. Targeting medicare drug benefits: costs and issues, The Urban Institute, 2000.
7. Soumerai SB, Avorn J, Ross-Degnan D, et al. Payment restriction for prescription drugs in Medicaid: effects on therapy, cost, and equity. *New England Journal of Medicine* 1987; 317:550-556.
8. Soumerai SB, McLaughlin TJ, Avorn J. Improving drug prescription in primary care: a critical analysis of the experimental literature. *Milbank Q.* 1989; 67:268-317.
9. Soumerai SB, Ross-Degnan D, Fortess EE, et al. A critical analysis of studies of state drug reimbursement policies: research in need of discipline. *The Milbank Q* 1993; 71:217-253.
10. Leibowitz A, Manning WG, and Newhouse JP. The demand for prescription drugs as a function of cost-sharing. *Soc Sci Med* 1985;21:1063-1069.
11. Manning WG, Newhouse JP, Duan N, et al. Health insurance and the demand for medical care: evidence from a randomized experiment. *The Ame Econ Review* 1987; 77:251-277.
12. Harris BL, Stergachis A, Ried LD. The effect of drug co-payments on utilization and cost of pharmaceuticals in a health maintenance organization. *Med Care* 1990; 28: 907-917.

13. Smith, DG. The effects of copayments and generic substitution on the use and costs of prescription drugs. *Inquiry* 1993; 30:189-198.
14. Lillard LA, Rogowski J, Kington R. Insurance coverage for prescription drugs. *Medical Care* 1999; 37: 926-936.
15. Johnson, RE, Goodman, MJ, Hornbrook MC, et al., and Michael B. The impact of increasing patient prescription drug cost sharing on therapeutic classes of drugs received and on the health status of elderly HMO members. *Health Serv Res* 1997; 32: 103-122.
16. Johnson RE, Goodman MJ, Hornbrook MC, et al. and Michael B. The effect of increased prescription drug cost-sharing on medical care utilization and expenses of elderly health maintenance organization members; *Med Care* 1997;35: 1119-1131.
17. Tamblyn R, Laprise R, Hanley J, et al. Adverse events associated with prescription drug cost-sharing among poor and elderly persons. *JAMA* 2001, 285: 421-429.
18. Schneeweiss S, Walker AM, Glynn RJ, et al. Outcomes of reference pricing for angiotensin-converting-inhibitors. *N Engl J Med* 2002; 346:822-829.
19. Thomas CP, Wallack SS, Lee A, et al. Impact of health plan design and management on retirees' prescription drug use and spending, 2001. *Health Affairs* 2002; 21: 408-419.
20. Horngren CT, Foster G, Datar SM. *Cost accounting – a managerial emphasis*, 10<sup>th</sup> Edition, Prentice Hall 1999.
21. Shank JK, Govindarajan V. *Strategic cost management – the new tool for competitive advantage*. The Free Press 1993.
22. Cook DC, Campbell DT. *Quasi-experimentation: design & analysis issues for field setting*. Houghton Mifflin Company, 1979.
23. Johnston J. *Econometric methods*, McGraw-Hill Book Company 1984.
24. Kupor SA, Liu YC, Lee JW. The effect of copayments and income on the utilization of medical care by subscribers to Japan's national health insurance system. *International J of Health Serv* 1995; 25:295-312.
25. Eisenberg JM. Physician utilization: the state of research about physicians' practice patterns. *Med Care* 2002; 40: 1016-1035.
26. ROC Bureau of National Health Insurance. *National Health Insurance Annual Statistical Report*, 2001.
27. WHO. *Essential drugs*. *Drug Information* 1999; 13: 249-262.
28. Burton SL, Randel L, Titlow K, Emanuel EJ. The ethic of pharmaceutical benefit management. *Health Affairs* 2001; 20:150-163.
29. Chu HL, Liu SZ, Romeis JC. Does the implementation of responsibility centers, total quality management, and physician fee programs improve hospital efficiency? Evidence from Taiwan hospitals. *Med Care* 2002; 40:1223-1237.
30. Chu HL, Liu SZ, Romeis JC. The initial effects of physician compensation programs in Taiwan hospitals: implications for staff model HMOs. *Health Care Manage science* 2003; in

press.