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Prescription Charges In The United Kingdom: A Critical Review

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PRESCRIPTION CHARGES IN THE UNITED KINGDOM: A CRITICAL REVIEW

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Abstract

This is a critical evaluation of studies of the effects of prescription charges on UK National Health Care revenues. The conclusion reached is that, for several reasons relating to the availability of data and the quantitative methods used, the empirical studies of the effects of these charges were not able to provide a reliable estimate of the elasticity of demand for prescriptions and therefore of the revenue effects of increasing the prescription charges. However, a sensitivity analysis based on a range of this elasticity's values shows that the revenue effect of prescription charges is negligible.

Key words: Prescription charges, Co-payments

Journal of Economic Literature classification numbers: I11, I18

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1. Introduction

The demand for health care can be viewed as any other demand for goods and services, that is a function of its price, the prices of other goods, income and other factors such as tastes. When public or private insurance pays the bill, the effective price to consumers is zero, and they are expected to demand the quantity associated with zero price. Therefore, unless the demand is perfectly elastic, copayments are expected to reduce the quantity demanded. A copayment is here defined as a direct charge on the patient at the time of service for each service consumed. Such charges, which are proportional to the cost or fixed, are also referred to as utilisation fees, cost-sharing, coinsurance, deductibles, etc.

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In insurance-based health care systems, copayments in health care are usually justified as a reduction in "moral hazard." It is argued that if consumers of health services do not contribute to costs, they tend to use more medical care. Therefore, copayment "is intended as an incentive to deter unnecessary or marginal utilization" (Reeder and Nelson, 1985). In National Health Systems (NHS), this type of moral hazard is preventable. However, NHS also introduce copayments but for the sole purpose of generating additional revenue for the health service. Whatever the reason, what is important to know before introducing copayments is:

i. **whether the reduction in utilisation would be substantial;**

ii. whether the reduction would have delayed effects on national health and the future health care budget;

iii. the effect on the distribution of the provision of services to selected population groups, such as the low income, the old etc.;

iv. the effect on the distribution of income, and particularly the income of the sick and the poor.

To study the effect of copayments on the utilisation[1] of health services, we need to know the price elasticity of demand for medical services. A problem associated with the measurement of response to copayments is that different individuals and groups of individuals in the population (identified by age, sex, income, sickness categories, educational level etc.) have different tastes for medical care, different demand characteristics and different responses to price changes. Therefore, it is important to identify the persons, whose use of medical services will be reduced

[1]The term *utilisation* is often used instead of demand to reflect that the latter is generated by the interaction of the patient and his clinical agent, the GP. It is the GP who demands health care on the patient's behalf.

most and least by the policy of copayments so that the overall reduction in utilisation can be evaluated. However, most studies in this field depend on the available data which are mostly national aggregates that do not reveal any allocational information[2].

A major conclusion reached by almost all studies is that copayments affect disproportionally the poorer sections of the population which, besides their low incomes, also display health status which is typically poorer that of the more affluent[3].

In the following we review the methodology and findings of studies concerned with drug prescription copayments (or charges) in the UK which is a typical NHS country.

2. Prescription charges in the UK

The demand for prescriptions is indirectly a demand for medicines. In the highly regulated NHS system of the UK, it is the GP who determines the patient's "need" for drugs which are dispensed by registered pharmacists. Under the NHS system, the supply of pharmaceuticals prescribed by GPs is unrelated to the price faced by the consumers[4]. Therefore, supply in the relevant range is perfectly elastic and the demand can be studied on its own. The demand for prescriptions

[2]Experimental data are also used, mostly in USA studies, e.g. Reeder and Nelson (1985).

[3]Studies have shown that individuals in the lowest fifth of families by income report about twice the level of acute and chronic conditions as the remainder of the population. Beck (1974) found that in Saskatchewan copayment provisions reduced the use of physicians' services by an estimated 18 percent by the poor, which is conciderably greater than 6 to 7 per cent reduction experienced by the entire population.

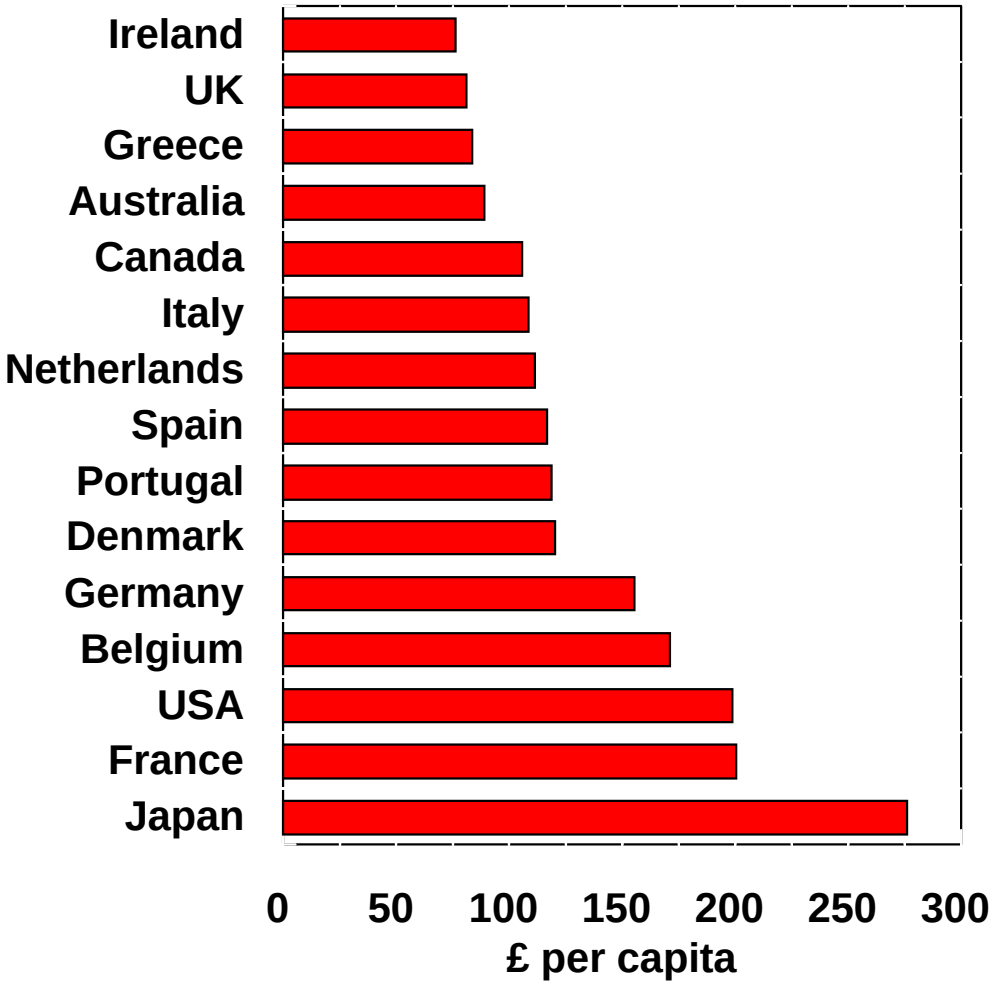
[4] Although, at the margin, the NHS imposes certain constraints on GPs on what they are allowed to prescribe.

depends on the price of prescriptions in real terms, other relevant variables and on the incidence of sickness. Therefore, an increase of prescription charges is expected to reduce the demand.

The copayment/charge is a ***flat rate tax***, that is a fixed amount per prescription, **P**, which is independent of the volume of the medicine prescribed and of its cost, **C**, to the NHS. Therefore, if **P>C**, the drug is subject to high cost-sharing and thus the patient subsidises the NHS; and if **P<C**, the patient is subsidised by the NHS. In general, high cost users of drugs are cross-subsidised by low-cost users. Charges are changed periodically, e.g., in the UK normally once a year.

Patient charges are increasingly advocated by UK governments as a policy to raise revenue and regulate the utilisation of primary health care. The total NHS prescription cost has increased from £1,351 million in 1968 to £4,470 million in 1998 (at 1990 prices), an increase of 330%. In per capita terms the increase is from £24 in 1968 to £75 in 1998, an increase of 312%. However, the UK has one of the lowest pharmaceutical expenditures per capita among the OECD countries, where Japan comes first: see Figure 1. In the UK, spending on drugs represents 12.6% of the NHS budget, and it is increasing steadily over time. From 1948, the inception of the NHS, to 1952 no charge was levied on prescriptions. In 1952 a charge of £0.05 per item prescribed was introduced. The charge was abolished during 1965-68 and reintroduced in 1968 at £0.13. In 1971 it was raised to £0.20 and remained at a constant level until 1979. Since 1982, the charge has been increasing annually in keeping with the aim of the government to maintain or increase efficiency and equity, reaching £5.90 in 1999: see Table 1. During the period 1980-98, the charge per prescription item has increased by 355% in real terms.

Figure 1 Pharmaceutical expenditure
per capita in OECD countries, 1995



Source: OECD Health Database

Table 1

NHS Precription Charges, 1949-1999

1.	1 June 1952	0.05 per form
2.	1 Dec 1956	0.05 per item
3.	1 Mar 1961	0.10 per item
4.	1 Feb 1965	charges abolished
5.	10 June1968	0.13 per item
6.	1 Apr 1971	0.20 per item
7.	16 July 1979	0.45 per item
8.	1 Apr 1980	0.70 per item
9.	1 Dec 1980	1.00 per item
10.	1 Apr 1982	1.30 per item
11.	1 Apr 1983	1.40 per item
12.	1 Apr 1984	1.60 per item
13.	1 Apr 1985	2.00 per item
14.	1 Apr 1986	2.20 per item
15.	1 Apr 1987	2.40 per item
16.	1 Apr 1988	2.60 per item
17.	1 Apr 1989	2.80 per item
18.	1 Apr 1990	3.05 per item
19.	1 Apr 1991	3.40 per item
20.	1 Apr 1992	3.75 per item
21.	1 Apr 1993	4.25 per item
22.	1 Apr 1994	4.75 per item
23.	1 Apr 1995	5.25 per item
24.	1 Apr 1996	5.50 per item
25.	1 Apr 1997	5.65 per item
26.	1 Apr 1998	5.80 per item
27.	1 Apr 1999	5.90 per item

With the prescription charge increasing through time, the per capita prescription items dispensed increase as a result of a sharp increase in exempt prescription, while the per capita nonexempt items decrease, as shown in Figure 2. Therefore, patients liable to pay the charge do receive considerably fewer prescriptions than those who get it free, e.g., seven times fewer in 1997. This also means that the revenue from prescription charges is necessarily small.

Critics of this policy argue that charging for drugs is contrary to the aim of the NHS since it is just a regressive tax on the sick which reduces the take-up of prescription medicines, and more generally, of primary health care by those who face the charge. The Government's view is categorical:

> ***There is no evidence that increases in charges deter people from getting the medicines they need****. (House of Commons, 1989).*

This clearly means that the Government believes that the price elasticity of demand for prescriptions is very small or even zero at the margin. But not all prescriptions dispensed are subject to charges: from all prescriptions dispensed in 1997, about 86% were exempted. Figure 3 clearly shows that there is a negative relation between the prescription charges in real terms and the ratio of charged to total prescriptions dispensed. The current rules of exemptions are as in Table 2.

When the government increases the prescription charges as the means for saving money, the following may occur:

- The price rise deters the patients from consulting their GP, they consume no health care or they switch to self-medication with "over-the-counter" cheaper drugs;
- The GP responds to the increase in charges by increasing the quantity prescribed per

prescription. Thus the impact of copayment on the patient is diminished by reducing the frequency of prescription dispensing (and there is no much budgetary saving for the health service[5]).

- The GP, taking into account of the economic effects of the charges on the patient, does not prescribe a drug;
- The GP prescribes a drug but the patient does not present the prescription to the pharmacist (i.e., reduces compliance; this could result in inefficient drug use, harming the patient);
- The patient discards the prescription and buys a cheaper alternative to the medicine prescribed (advised perhaps by the pharmacist) which is available for retail sale without prescription(over-the-counter).

The primary reason of the charges is to raise revenue to offset the costs of the medicines dispensed by the NHS. Thus, it operates as a substitute for Government expenditure on the NHS. Therefore, for estimates of the revenue generating effects of the charges, an accurate estimation of the elasticity of demand is essential.

The objectives of the study of prescription charges are three:

1. **To estimate the size of the quantitative relationship and elasticity between charges and utilisation;**
2. **To determine which population groups are deterred from using prescription**

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[5]For example, in the UK, an increase the prescription charge in 1961 was associated with a 4% increase in the average quantities per prescription. Some of these complications can be avoided by adopting an appropriate copayment system, e.g., in Germany there is a fixed charge based on the package size of a prescription item plus a proportion on the cost of the drug.

medicines; and

3. **Thus to evaluate whether the policy of charges has deleterious health effects, which may have delayed cost consequences on the health service budget far exceeding the short-run savings.**

The studies of the UK charges concentrate in objective 1. In the following, we review the evidence found by some analytically and methodologically important studies in this field of research.

Table 2: Exemptions from Prescription Charges, 1999

under 16
between 16-18 and in full time in education
60 or over
pregnant, or mother of baby in the last 12 months
entitled to medical exemptions
a war or Ministry of Defense pensioner
entitled to prepayment certificate
in the NHS Low Income Scheme
receiving any of the following:
income support
family credit
Disability Working Allowance (DWA)
job seeker's allowance (income based)

Figure 2:

UK Per Capita Prescriptions Dispensed: Total, Exempt and Nonexempt Prescriptions, 1980-97

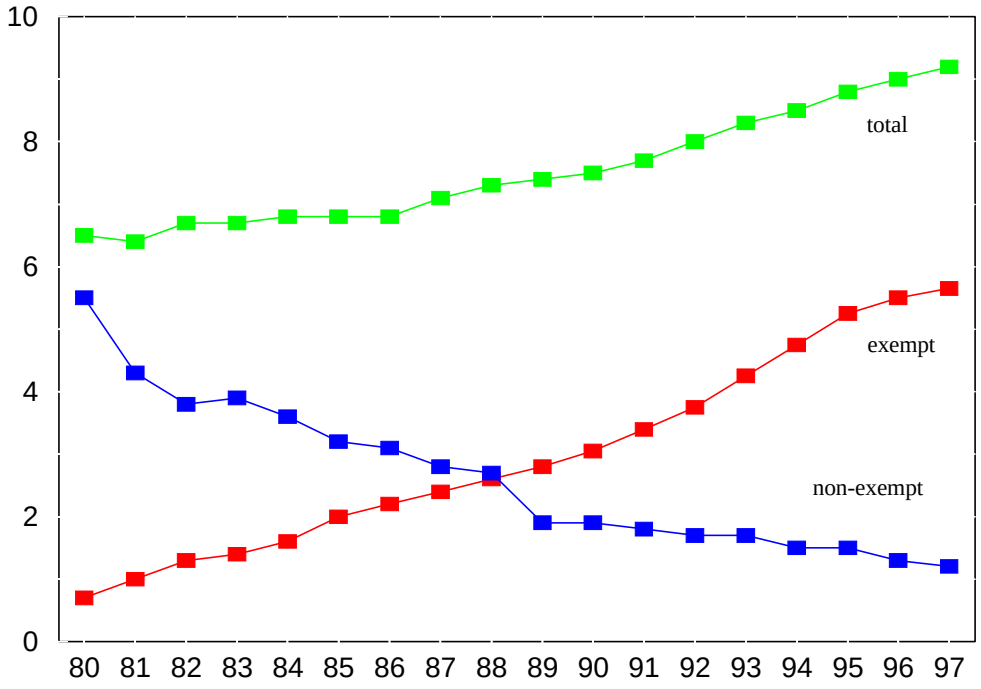
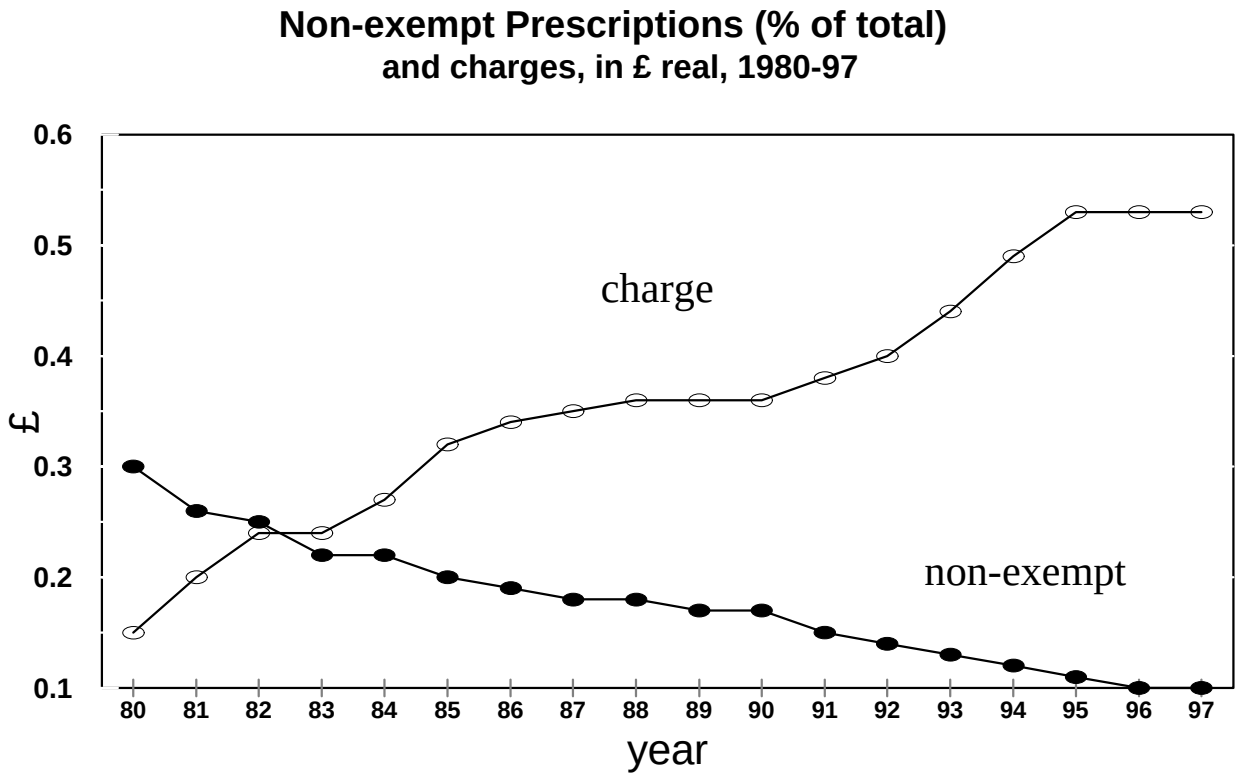


Figure 3



Nonexempt prescriptions: % of total number of prescriptions dispensed.

Real charges = nominal charges/ GDP deflator.

3. A Critical Review of UK Studies

In the UK's primary health care under NHS increasing use is made of direct patient charges, such as for dental checkups, sight tests and prescription drugs (see Office of Health Economics, 1999). The increase in charges is expected to have similar effects in all three cases. However, most studies concentrated on the analysis and effects of prescription charges, mostly because the data are more detailed and of better quality. From the many published studies dealing with this issue we present and evaluate the four most original and innovative in the application of estimation techniques.

(1) Lavers: 1971-1982

Lavers (1989) studied the prescription charges of the time series period 1971-82. In his analysis he set the three-equation model:

Demand $\mathbf{Q = b_0 + b_1 P + b_2 E + b_3 Y + b_4 P_s + b_5 M}$ **(1)**

Cost $\mathbf{C = c_1 + c_2 P + c_2 E + c_3 Y + c_4 M + c_1 S}$ **(2)**

Morbidity $\mathbf{M = a_0 + a_1 P + a_2 E + a_3 Y + a_4 B + a_5 S}$ **(3)**

where[6]:

- The Demand, **Q**, is the number (volume) of prescriptions subject to a charge and actually

[6] The symbols ⊖ and ⊕ in front of a variable indicate the author's expected sign of the coefficient of that variable, *minus* or *plus* respectively.

dispensed. It depends on ⊖**P** =price of prescription: charge/index of retail prices; ⊖**E**=% increase of consumers exempted from charges; ⊕**Y**= real income of the population; ⊕$\mathbf{P_s}$ =relative price of substitute drugs; and ⊕**M** =morbidity (=unhealthiness).

- The Average cost (to the NHS) of the items prescribed, **C**, which is not identical with the charge. The cost depends on ⊕**P,** ⊕**E,** ⊕**Y,** ⊕**M** and ⊕**S** =a seasonal factor, dummy=1 for October-March.
- Morbidity is the number of employed certified sick and absent from work. It depends on ⊖**P,** ⊖**E,** ⊖**Y,** ⊕**S** and ⊕**B** =the level of sickness benefit paid to adults absent from work: the higher the benefit, the more reported sick.

The Demand, **Q**, Cost, **C**, and Morbidity, **M**, are endogenous variables, the rest are exogenous. The system of simultaneous equations (1), (2), (3) is ***recursive*** with Demand and Cost as functions of Morbidity and different subsets of the exogenous variables, and Morbidity as a function of a subset of the exogenous variables only. Therefore, if the error term in (1) and (2) can be assumed to be uncorrelated with the **M** variable, the endogenous variables of the system can be estimated sequentially by OLS.

Using monthly data for 1971-1982 and loglinear functional form, the results show that the Demand, **Q**, depends on:

- **Price, P, with elasticity -0.22;**
- **Morbidity, M, with elasticity 0.27;**

- **and the increase in exceptions from charges, E, with elasticity -0.09[7];**
- **income, Y, and the relative price of substitutes, P_s, have no significant influence on demand.**

These results are based on the assumption that the structural model is recursive and that the disturbances in the equations are serially independent. However, this assumption does not always hold. As a consequence, the parameter values are not maximum-likelihood and their variances are underestimated.

(2) O'Brien: 1969-86

In his analysis, O' Brien (1989) uses time series of monthly observations of prescriptions both subject to the charge and exempt of the period 1969-86. Starting from the notion of a consumer investing in the stock of health (Grossman, 1972), the demand for prescription drug utilisation is derived demand for health. Therefore, the demand for drugs has a negative own price elasticity and a positive cross-price elasticity for substitutes (over-the-counter) drugs. The equations for prescriptions subject to charges, **Q**, and exempted $\mathbf{Q_x}$, take the form:

$$\mathbf{Q = b_0 + b_1 P_q + b_2 Y + b_3 P_s + b_4 B + b_5 WP + b_6 S} \quad \textbf{(4)}$$

$$\mathbf{Q_x = a_0 + a_1 P_x + a_2 Y + a_3 P_s + a_4 B + a_5 WP + a_6 OP + a_7 YP + a_8 S} \quad \textbf{(5)}$$

[7]The most important influence on Morbidity, M, is the seasonal factor, S. Price, P, has no significant effects on Costs, C, in contrast to exceptions, E, and the growth of income, Y.

where **Q** is the number (volume) of prescriptions subject to a charge and actually dispensed; and $\mathbf{Q_x}$ exempt prescriptions. The two demands depend on:

- $\ominus$**P** =the price/charge for charged items $\mathbf{P_q}$ and exempt items $\mathbf{P_x}$;
- $\oplus$**Y**= real income of the population;
- $\oplus \mathbf{P_s}$ =relative price of substitute drugs;
- **WP** = the working population, %: $\oplus$ for **Q**, and $\ominus$ for $\mathbf{Q_x}$;
- $\oplus$**OP** =old population, %;
- $\oplus$**YP** =young population,%;
- **S** =monthly dummies.

Since the exempt and nonexempt prescriptions are for the same group of products, equations (4) and (5) bear a closed conceptual relationship. Therefore, it is expected that their error terms are correlated. Consequently, taking account of the correlation between equations, an appropriate method of estimation is that of Seemingly Unrelated Regressions (SUR) for joint estimation of the two-equation system using Generalised Least Squares (GLS). This method was applied to the first-differences of the data to remove the observed first-order serial correlation. The results provided **cross-price elasticity of the substitutes + 0.22**; and **own price elasticity for the nonexempt prescriptions: - 0.33, increasing to - 0.64 in the latest years**. This suggests that utilisation has become more responsible to increasing charges over time. The seasonal factors confirm that the consumption rises in the cold months, mostly in January-March. Income has no significant effect on the demand for drugs. The problem with the formulation of the model is that the demand for drugs exempt from charges, equation (5), is assumed to depend positively on price, the charge imposed on the nonexempt patients, and the estimation yielded a positive and

significant coefficient, with elasticity 0.17. But the explanation offered by the author, that this reveals price discounts by pre-payment purchase and dispensing, is rather far fetched since only 6% of the exempt items benefitted from pre-payment purchase: O'Brien (1989) p. 113.

It is possible that the charges policy has detrimental effects on the NHS. The objective of the policy is to raise additional revenue. However, reduced current utilisation of relatively low cost prescriptions may have adverse health effects leading to higher future health costs for the NHS. However, this point cannot be examined by these types of econometric analysis of aggregate national data[8].

(3) Hughes & McGuire: 1969-1992

In contrast to the two previous studies, Hughes and McGuire (1995) make use of a long-run model based on annual data, because the changes in charges/price occur usually once a year. They also take tests for and account of stationarity. Since the charge/price is determined exogenously (by the NHS), a single equation model is adequate for the estimation. The analysis is applied to the prescriptions which are subject to the charges (nonexempt). The utilisation function is specified as:

$$\mathbf{U = f(P, Y, GP, P_s, M, T)} \qquad \mathbf{(6)}$$

where:

[8] Studies of copayments have revealed an increase in related health care costs such as acute psychiatric services and institutionalisation in nursing homes for elderly people. For example, limiting the reimbursement of drug prescriptions for psychiatric patients in New Hampshire was estimated to cost 17 times more than it saved (Soumerai et al., 1994).

- **U** = utilisation per capita, i.e., the number of prescriptions subject to charges;
- ⊖**P** =prescription charge;
- ⊕**Y** =income;
- $\mathbf{P_s}$ =index of pharmaceutical prices, as a proxy for ⊕**substitutes** or ⊖**complements**;
- ⊕**M** =morbidity rate;
- ⊕**GP** =number of GPs per 100,000 of population to account for supply influences;
- **T** =time trend to capture influences not explicitly specified.

The equation was estimated in linear form. Testing for stationarity, they found that the variables are variant with respect to time[9] but integrated of order two, I(2). This property of the time series data directed the researchers to estimate the relationship as an *error correction* dynamic model with EC=error correction variable and Δ indicating second differences of the data:

$$\Delta U = b_0 + b_1 \Delta P - b_2 \Delta Y + b_3 \Delta GP + b_4 \Delta P_s + b_5 \Delta M + b_6 EC_{t-1} + e \qquad (7)$$

The results of the estimation yielded the following conclusions:

- **The short term elasticity with respect to price/copayment is - 0.32 and the long run - 0.37, with higher elasticity estimates for the latest years.**
- **The variable GP is not significant.**
- **Income, Y, and Morbidity, M, are both positive and significant, as expected.**
- **The coefficient of P_s is negative, indicating complementarity and not**

[9]That is, the data are generated by stochastic processes which are not fixed but time-variant with a mean level changing over time. Many economic nonstationary time series have the property that, if they are differenced one or more times, the resulting series will be stationary.

substitutability. This is an unusual finding which cannot be explained satisfactorily.

The problem with these conclusions is that they are derived from a relatively *small* sample of 23 annual observations, reduced by differencing to 21. Therefore, the stationarity tests as well as the estimated parameters must be deemed suspect.

(4) Smith and Watson: 1979-84 micro-data

Smith and Watson (1990) used a novel approach to modelling the utilisation of NHS prescriptions. They employed micro-data which are available for individual households from the UK Family Expenditure Survey (FES). The potential advantage of using this type of information is that:

- It may be possible to distinguish more effectively the effect of price on utilisation from the effects of other trend variables - unemployment, demographic changes, etc.;
- It allows investigation of the possibility that the effects of prescription charges may differ across the population according to age, health condition etc.

However, the disadvantages of this approach are also serious, as for example:

- There is no way to distinguish whether a family does not buy the prescription because (i) there is no patient in the family needing the drug or (ii) of the increase in charges.
- Since the observations are per family, while individuals are exempt or nonexempt from prescription charges, it is not possible to study how the nonexempt group will react to an increase in prescription charges.

- If a family pays for more than one prescriptions, there is no way to distinguish whether: (i) a particular household member was sick more than once; (ii) more than one family members were sick; or (iii) a particular member of the family was sick but needed more than one kind of drug.

Despite these problems, one study used a Poisson regression model to fit the available data of a sample of 42,091 households for the period 1979-84. During this period, prescription charges were increased by 500% and the volume of prescriptions fell by 40%. The utilisation of prescriptions, U, was regressed on three groups of variables:

i. ***composition of household***: number of children, pensioners, exempt adults, other adults.

ii. ***pattern of sickness***: number of individuals reported absent from work, the age of household head, individuals receiving income supplement, seasonal factors.

iii. ***income and other characteristics of the household***: level of income relative to poverty line for exception from charges, dummy variables for occupation and economic conditions, price of substitutes.

The result of the estimation provided own price coefficient significant and negative, giving for the **average household elasticity - 0.5.** This seems to suggest that 'the entire 40% fall in the number of charged prescriptions issued and dispensed between 1979 and 1984 could be accounted for by the approximately fivefold increase in the real level of the prescription charge' (p. 91).

3. Some estimates

The studies we have reviewed suffer from several problems which make their estimates of the

demand for prescriptions in the UK suspect. However, the empirical evidence confirms that increasing the prescription charges does decrease the number of chargeable items dispensed. The range of estimated elasticities yielded is rather wide, from -0.22 to -0.50 (increasing to -0.64 in later years), but two of the studies have reached an almost identical, and from an economic theory viewpoint, a reasonable middling value of about -0.35. Using these elasticity values as a base, we arrive at the following calculations:

- **In 1997, a total of 454.3 million prescriptions were dispensed in the UK of which 46.7 million were chargeable at £5.65 per item, bringing a revenue of £263.9 million to the NHS.**
- **The total NHS expenditure for prescriptions in 1997 was £5,448 million at current prices. Therefore, the revenue generated by the charges was 4.8% of the total NHS expenditure for prescriptions.**
- **A 10% increase in prescription charges would raise the copayment to about £6.20 per item.**
- **Therefore, other things being equal, the increase in the charge would reduce the number of dispensed chargeable prescriptions by (46.7x0.35) = 1.6 million prescriptions, leaving 46.7-1.6=45.1 million of nonexempt prescriptions. The revenue from these prescriptions will be: 45.1x£6.20=£279.62 million, i.e a net increase of £279.62-£263.9=£15.82 million.**
- **Therefore, the increase in prescription charges will raise the revenue generated from 4.8% of the NHS total expenditure on drugs (£5,448 million in 1997) to 5.1%.**
- **If the elasticity of demand for prescriptions is zero, as the Government seems to**

believe, then the revenue generated by the increase in charges would be 5.3% of the total, that is by 0.2 percentage points higher than under the -0.35 average elasticity. This certainly is a very small increase in revenue both in absolute terms and as contribution to total NHS expenditure on drugs.

- **But it is also possible that the increase in charges may increase the price of over-the-counter substitutes, reducing their purchases by patients.**
- **Some patients who are deterred from utilising drugs by the increase in the charge and the increase in the price of substitutes may develop more serious conditions the cost of which would fall on the NHS.**
- **Therefore, although the exact overall welfare effect of the increase in charges is difficult to calculate, it may very well be negative.**

4. Conclusions

Prescription charges have an inverse effect on the demand for drugs by patients liable to pay the charge. Increases in charges are associated with a significant reduction in utilisation of prescribed drugs among nonexempt patients. The often cited rationale for the charges policy is to raise additional funds for the NHS, from those patients able to pay more, to offset partially the cost of the service. However, there is also evidence that the short-term target of using charges to raise revenue is pursued at the expense of the long-term health of persons, and this may cost more to the NHS than the increase in revenue. Therefore, the introduction of copayments is not an efficient policy.

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