The Economics of a Two Tier Health System: A Fairer Medicare?

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Abstract

This paper analyses a recent proposal of the Australian Government to reform the existing Medicare system. It develops models of the physician's behaviour and of a household's demand for medical insurance under the proposed system, and then proceeds to characterise the equilibrium under the new proposals. It argues that those most likely to be made worse off are low income households with children, though a full evaluation of the effects of the proposal requires it to be analysed in a public finance framework.

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1 Introduction

In April 2003 the Federal Government of Australia, in the person of the Minister for Health and Ageing, presented proposals for a far-reaching reform of the Medicare system, with the declared aim of improving access to Medicare services and of making these services, in particular those provided by general practitioners (GPs) and specialist physicians[1], "more affordable". The aim of this paper is to carry out an economic analysis of these proposals, to try to predict and evaluate their likely effects.

The existing system is regarded by many as having worked well, providing universal access to GPs free of charge to the majority of patients, and at an overall cost which compares quite favourably to medical expenditures in other countries. Physicians are self-employed and free to set their own fees. However, the government specifies a Medical Benefits Schedule (MBS) of fees for each kind of treatment. A GP can bill the health service directly for a fee of 85% of the MBS amount, known as "bulk billing". In this case the patient pays nothing. Alternatively, the GP can charge the patient directly whatever she thinks appropriate. In the latter case the patient pays the fee out of pocket and claims back from Medicare the 85% of the MBS fee. Private insurance for the gap between the fee and the amount refunded is not allowed. Under this system, the GP saves costs by bulk billing rather than billing patients directly. At the same time, the obvious advantages to patients and the force of competition among GPs act in favour of bulk billing. Overall, therefore, there are good incentives to restrain costs[2] while providing patients with universal free access to GPs. This holds true as long as the level of fees under the MBS allows GPs to receive adequate remuneration under bulk billing. It is argued, however, that the real value of these fees is being steadily eroded by a failure to adjust them for inflation, and as a result the proportion of physicians choosing to bulk bill is declining. This is particularly the case in areas where population density is low, so that competitive pressures are weaker while costs tend to be higher.

The policy response to this problem has been to propose two key changes, in the context of a new General Practice Access Scheme (GPAS), which GPs are given substantial incentives to join. First, GPs who join the scheme and set a fee higher than 85% of the MBS level will be able to bill Medicare directly for this portion of their fee, which the patient has in the past had to pay and reclaim. Secondly, patients will be allowed to take out private insurance to cover the gap between this and the overall fee, though it is important to

[1]For simplicity all non-hospital physicians will be covered under the term GPs.

[2]Note, however, that the "ex post moral hazard problem", whereby patients for whom treatment is free at the margin have an incentive to expand their demand, and the "supplier induced demand problem", under which physicians have an incentive to advise patients that they should have more treatment than is socially optimal, are not solved by this type of system.

note that the policy proposal specifies a substantial deductible of $1000 per household for these insurance policies. Thus it implies a significant degree of co-payment of the gap between Medicare rebate and physician's fee. At the same time, premiums will be subject to the 30% subsidy that currently applies to insurance premiums for hospital health care. The first measure reduces the cost advantage to the GP of limiting the fee to the bulk billing level. The second, critics argue, drastically weakens the competitive pressures constraining overall fee levels.

In addition, low-income households, holders of a "concession card",[3] will still receive free treatment. The inadequacy of the current MBS fee levels is implicitly recognised by making, to GPs who join the GPAS, a direct payment for each concession cardholder receiving treatment, in effect making a selective increase in the MBS level for these patients only.[4] Rather than raising the fee levels overall and funding this out of general taxation, which would preserve the existing system, the policy envisages that increases in fee levels to non-holders of concession cards will be met by private insurance premium revenue, net of the proposed $1000 deductible. If not immediately, then over time, the control on fee levels represented by the current bulk billing system seems likely to disappear. The policy will essentially create a two-tier health system in non-hospital health care, by privatising provision for non-concession cardholders, to an extent determined by the relative values of 85% of the MBS fee and the excess of the actual fee over this.

In applying an economic analysis to provide more detailed predictions about the effects of this policy, there are two key sets of decisions that have to be modelled. The first concerns the physician. What determines whether she will respond to the policy by switching from bulk billing for non-concession card holders and raising fees? What determines the extent to which fees will be raised? The second concerns the household. Given that people differ in their income levels and probabilities of needing health care of different levels of cost, how will they respond to physicians' fee increases and the possibility of buying private insurance? In the next three sections we analyse models drawn from the literature on health economics and the economics of insurance markets to suggest some answers to these questions. In section 2 we set up a model of the present system, to examine the determinants of a physician's

[3] Essentially comprising war veterans, retirees and low-income earners.

[4] Thus the GP will receive $1 per visit by a cardholder in capital cities, $2.95 in other metropolitan centres, $5.30 in rural centres and $6.30 in remote areas.

choice between bulk billing and charging a higher fee, in the absence of an insurance possibility, and given the difference in billing costs in the two cases. We then go on to examine the household's reaction to the policy changes, using an expected utility approach. This analysis suggests that the market for a physician's services will in fact consist of four segments - perhaps it would be more appropriate to talk about a *four tier system* as resulting from the policy changes. We then return to the model of the physician to analyse how her fee setting policy might develop in the light of this. The section following presents some empirical information on the characterisitics of households that currently buy private health insurance, to help in the assessment of who will gain and who will lose under the policy. Section 6 concludes.

2 A Model of Physician's Choice

We begin by modelling the GPs decision whether to bulk bill, *i.e.* to set the price for her services at the regulated level[5] p^0, or to set a higher price p. In this section we take the present set-up, in which patients are not allowed to take out private insurance for the gap $p - p^0$.We use the model to clarify conditions under which the GP will or will not bulk bill.

We regard the GP as a particular kind of firm, producing a single output under constant returns and supplying her services under conditions of monopolistic competition. She is motivated in the first place by net income, given by

$$[p - c(q, e) - b]x(p, q)$$

Here, p is the price per unit of service, c is the constant per unit cost, which depends on the quality of service q and the effort expended in controlling costs, e, and b is the unit cost of billing. x is demand for her services, a decreasing function of price and increasing in quality. She is not however motivated solely by net income: the function $g(x, q)$, increasing in both its arguments, expresses in money terms the utility she obtains from treating patients x with care of quality q, while $\gamma(e)$, an increasing convex function, gives the cost involved in controlling service costs. Thus her maximand is

$$u = [p - c(q, e) - b]x(p, q) + g(x, q) - \gamma(e) \quad (1)$$

[5]This is 85% of the MBS fee.

To analyse the decision whether to bulk bill, we solve first the problem of choosing p, q and e, then that of choosing only q and e with $p = p^0$, to maximise u. She will choose to bulk bill if and only if her utility at the second optimum is greater than that at the first. Under bulk billing, the billing cost b^0 is less than that if she does not bulk bill.

The first order conditions for the two problems are, first for non bulk billing[6]

$$u_p = [p^* + g_x - c(q^*, e^*) - b]x_p + x(p^*, q^*) = 0 \quad (2)$$
$$u_q = -c_q x(p^*, q^*) + g_x x_q + g_q = 0 \quad (3)$$
$$u_e = -c_e x(p^*, q^*) - \gamma^{'}(e^*) = 0 \quad (4)$$

where asterisks denote optimal values. The first condition is almost, but not quite, marginal revenue equals marginal cost, since the marginal utility of treating patients works as a kind of subsidy to demand. The second condition equates the marginal cost of quality to its marginal utility, taking account also of its effect on demand, and the third equates the marginal benefit of cost reduction, which depends on the total output, to its marginal cost.

For bulk billing we have

$$u_q = -c_q x(p^0, q^0) + g_x x_q + g_q = 0 \quad (5)$$
$$u_e = -c_e x(p^0, q^0) - \gamma^{'}(e^0) = 0 \quad (6)$$

and the GP chooses bulk billing if and only if

$$[p^0 - c(q^0, e^0) - b^0]x(p^0, q^0) + g(x^0, q^0) - \gamma(e^0) \quad (7)$$
$$\geq [p^* - c(q^*, e^*) - b]x(p^*, q^*) + g(x^*, q^*) - \gamma(e^*) \quad (8)$$

To interpret these conditions, note first that if q and e did not enter the problem, the physician would choose not to bulk bill if demand were sufficiently inelastic, that the increase in revenue from increasing price, after allowing for any loss of utility from treating fewer patients, more than offsets the increased billing costs. Thus the lower the degree of competition, and the lower the billing cost differential, the less likely is bulk billing. Introducing e does not complicate this picture unduly. Since x falls with a move from bulk billing, the optimal e will also fall, so that service costs rise with a move from bulk billing. Introducing q could cause complications, depending on

[6] A subscript denotes a partial derivative with respect to the corresponding variable.

the strength of its effect on demand. A fall in x induced by the rise in price reduces the marginal cost of quality and so, other things equal, will increase its amount. This has the effect of increasing demand. Provided however this effect is weaker than the demand reducing effect of the price increase, we have the conclusion that a physician who switches from bulk billing will serve fewer patients at a higher price, a higher service quality and higher unit cost. She is more likely to switch, the lower the elasticity of demand and the smaller the billing cost differential.

We can think of the effect of cost inflation over time, unmatched by increases in the MBS, as a reduction in p^0 (in other words the prices, costs and revenues in the above model are all in real terms). As long as p^0 is above costs, if demand is sufficiently elastic this could actually increase the difference between utility from bulk billing and utility from setting a higher fee, given also that the physician receives utility from an increase in the number of patients. But ultimately, of course, the latter must win out.

The proposed policy measure, allowing GPs to bill Medicare for that portion of their fee that they would have received had they stayed with bulk billing, can be thought of as reducing the difference between b and b_0. Thus for this reason alone we would expect to see a reduction in bulk billing. The second main element in the proposal is the introduction of the possibility of insurance to cover the gap between the fee charged by the physician and the bulk billing rate, subject to the deductible of \$1000. If this reduces the price elasticity of demand, this will provide a further incentive to switch from bulk billing. Thus we have to analyse the relationship between the availability of insurance and the demand elasticity.

Before doing this in the next section, it is worth making three points, which suggest that physicians may well perceive, on the introduction of the policy, that they are faced with low demand elasticity. First, we need to distinguish between the *ceteris paribus* demand elasticity, such as that implicitly analysed above, where the GP is considering the effect of increasing her fee with all other GPs fees held constant, and the *mutatis mutandis* elasticity, where all physicians simultaneously change fee levels. If GPs are aware that, as a result of the policy, their competitors will also be raising their fees, they will be less inhibited by the risk of demand reductions. In other words, the *mutatis mutandis* elasticity is significantly lower than the *ceteris paribus* elasticity.

Secondly, and related to this, it is unlikely that an individual GP would perceive a relationship between an increase in her fees and the insurance premium, even though this premium will of course be affected by physicians' choices of fees in the aggregate.[7] Thus any one GP, in deciding to raise her fees under the new system, is likely to underestimate the actual demand response arising from a general fee increase, which will have a significant impact on insurance premiums.

Finally, the presence of concession cardholders allows a degree of price discrimination based on income in this market. GPs are in effect faced with a demand function corresponding to the two thirds of the market with higher incomes than the concession cardholders. This should also reduce their perceived demand elasticity.

3 Households

Households differ in respect of their net of tax income level, $y \in [y_{\min}, y_{\max}] \subset \mathbf{R}_{+}$, and risk of ill health. There are three possible health states, $s = 0, 1, 2$, In health state 0, the individual is well and requires no health services, in state 1 she is moderately sick and requires treatment, which however costs less than the \$1000 deductible for private insurance, while in state 3 she is sufficiently seriously ill as to incur costs in excess of this deductible. We assume two possible types of patients in respect of their risk levels[8], denoted by the probability of sickness π_{sj}, with $j = L, H$ and $\pi_{2H} > \pi_{2L}$. That is, a "high risk" is someone with a higher probability of making a claim greater than the deductible.

We analyse the decision on whether to buy private health insurance, taking the amount, quality and cost of treatment as given and independent of the insurance decision. Then the decision on whether or not to buy insurance is based on a straightforward comparison of expected utilities. This requires us to specify how a patient behaves if she falls sick but has not bought private insurance. One possibility is that she would pay the fee out of pocket. A second is that she will go to a public hospital to obtain free treatment as an outpatient. Since this will usually involve queueing and waiting costs,

[7] In other words, an increase in any one physician's fees has a negligible effect on the insurance premium and can be neglected by the individual physician, regardless of what the others are doing.

[8] In reality of course there may be many more. For example, patients of each possible age may represent a different risk type, and within each age class there will also be variation in sickness probabilities. The assumption of two types keeps the notation simple while, hopefully, not losing anything of substance in the analysis.

we take it that the patient's utility in this case will be less than if she received treatment free of charge from a GP. Thus we assume that if patients receive treatment by going to a public hospital, they pay nothing and achieve a utility level $u_0(.)$, which is less than their utility level if they do not fall sick, $u_w(.)$. If they buy private insurance, they pay a premium r, net of the government subsidy, which does not depend on risk type[9]. The advantage of private treatment is that they will have the utility[10] $u_w(.)$. We can then define the following expected utilities, for $j = L, H$

$$\bar{u}_j^0(y) = \pi_{0j} u_w(y) + u_0(y) \sum_{s=1}^{2} \pi_{sj} \tag{9}$$

$$\bar{u}_j^P(y, r, d) = \pi_{0j} u_w(y - r) + \pi_{1j} u_0(y - r) + \pi_{2j} u_w(y - r - d)] \tag{10}$$

and

$$\bar{u}_j^I(y, r, d, e) = \pi_{0j} u_w(y - r) + \pi_{1j} u_w(y - r - e_L) + \pi_{2j} u_w(y - r - d)] \tag{11}$$

where $d = \$1000$ is the deductible, e_L is the cost of private treatment in the low cost case.

The first is the expected utility of someone who does not buy insurance and goes to a free public hospital for outpatient treatment if they fall ill. The second is that of someone with private insurance, who goes to the public hospital in the case where private treatment costs less than the deductible, rather than paying these costs out of pocket. Finally there is the household that buys insurance and always goes for private treatment, paying out of pocket where necessary.[11]

Then, defining the differences for $j = L, H$

$$\Delta_j^P = \bar{u}_j^P - \bar{u}_j^0 \tag{12}$$

$$\Delta_j^I = \bar{u}_j^I - \bar{u}_j^0 \tag{13}$$

$$\Delta_j^{IP} = \bar{u}_j^I - \bar{u}_j^P \tag{14}$$

[9] In fact the premium paid depends on age, with a 2% increase for every year over thirty. We ignore this for the moment, but discuss it below.

[10] The assumption that private treatment restores the utility level to that if well is just to simplify notation. The important point is that it is higher than the utility of going to a public hospital because of the absence of costs of waiting for treatment and other time costs.

[11] There is a fourth logical possibilty, that of someone who does not buy insurance but pays for private treatment, in all cases, if they fall ill. We assume that this is always dominated by one of the cases with insurance.

a household's choice is determined by these utility differences.

It is easy to see that the first two utility differences are decreasing in insurance premium and deductible. Of interest is to clarify how the incentive to buy private insurance varies with illness probability and income. We have

$$\frac{\partial \Delta_j^P}{\partial \pi_{0j}} = u_w(y-r) - u_w(y) < 0 \tag{15}$$

$$\frac{\partial \Delta_j^P}{\partial \pi_{1j}} = u_0(y-r) - u_0(y) < 0 \tag{16}$$

$$\frac{\partial \Delta_j^P}{\partial \pi_{2j}} = u_w(y-r-d) - u_0(y) \gtreqless 0 \tag{17}$$

It is of course intuitive that the larger the probability of not falling ill, the less likely it is that insurance will be bought, other things (especially the premium) being equal. Less obvious is the result that, other things equal, the larger the probability of only being moderately ill, the less likely that insurance will be bought. The reason is of course that because of the deductible, insurance brings no benefit, but only incurs a cost, in this case. Thus insurance will be bought only by those with a large enough probability that they will incur treatment costs in excess of the deductible, and moreover, for whom the utility associated with free treatment at a public hospital is sufficiently below that of treatment by a GP. Then, for those for whom this condition is satisfied, the likelihood of buying insurance rises with the probability of being sick enough to incur treatment costs in excess of the deductible. The results for Δ_j^I are essentially similar.

In the case of income, we have

$$\frac{\partial \Delta_j^P}{\partial y} = \pi_{0j}[u_w^{'}(y-r)-u_w^{'}(y)]+\pi_{1j}[u_0^{'}(y-r)-u_0^{'}(y)]+\pi_{2j}[u_w^{'}(y-r-d)]-u_0^{'}(y)] \tag{18}$$

Given risk aversion, the first two terms are certainly positive, the sign of the third depends on how public and private treatment affect relatively the marginal utility of income. It seems reasonable to assume that this is unlikely to offset, and could well reinforce, the effect of the income difference, and so the expression is assumed to be positive overall: the higher the household's income, the more likely private insurance is to be bought[12]. Again, the results for Δ_j^I are essentially similar.

[12]This is supported by the empirical evidence presented in Section 5 below.

Finally, we have

$$\Delta_j^{IP} = \pi_{1j}[u_w(y - r - e_L) - u_0(y - r)] \tag{19}$$

The sign of this is independent of the probability and depends only on whether the higher utility from private treatment is "worth the money". We then have

$$\frac{\partial \Delta_j^{IP}}{\partial y} = \pi_{1j}[u_w^{'}(y - r - e_L) - u_0^{'}(y - r)] \tag{20}$$

Given risk aversion, this is most likely to be positive. It will then also be decreasing in the insurance premium and out of pocket expenses. Thus we would say that of the set of households that buy insurance, those who do not go to their GP's when costs are below the deductible will be the lower income households in this set.

Following from all this, we can confirm the intuition that the subset of households who buy private treatment can be expected to contain the higher risk, higher income households, while the subset not buying private treatment, if not empty, must contain the lower income, lower risk households. Moreover, if a subset of households with given income buy private insurance, then so must all households with higher income and the same risk level, or higher risk level with the same income. We define y_j^* as the critical income level at which households of risk type $j = H, L$ buy private insurance, with risk type being defined as above by π_{2j}.Thus the y_j^* satisfy the condition

$$\Delta_j^P = \bar{u}_j^P(y_j^*, r, d) - \bar{u}_j^0(y_j^*) = 0 \tag{21}$$

The subsets of households not buying insurance are those with $y_j \leq y_j^*$. Clearly this subset will be larger for low risks than for high risks, and both are increasing in the premium and deductible. Figure 1 illustrates, on the assumption that all these subsets are non-empty, and y_C is the income level such that households with income below this level receive the concession card, *i.e.* free treatment.

Figure 1 about here

We conclude this section by considering the determinants of the insurance premium, since the level of this will play an important role in determining the sizes of the uninsured subsets of households. Let λ denote the proportion of low risk households[13] in the population, assumed the same at each income

[13]That is, those with the lower probability of having a doctor's bill in excess of the deductible, *i.e.* less likely to make a claim on their insurance.

level y, and $F(y)$ the income distribution function.[14] We derive the premium in three steps:

(i) Assume there is no differentiation according to risk class, so that the premium will be based on the pooled probability of an insurance claim. To calculate this, note that the proportion of the population buying insurance is

$$\begin{aligned} \beta &= \lambda \int_{y_L^*}^{\infty} dF + (1-\lambda) \int_{y_H^*}^{\infty} dF \qquad (22) \\ &= \lambda[1 - F(y_L^*)] + (1-\lambda)[1 - F(y_H^*)] \qquad (23) \end{aligned}$$

Then, defining

$$\mu \equiv \lambda[1 - F(y_L^*)]/\beta \qquad (24)$$

as the proportion of insurance buyers who are low risks, the pooled probability of an insurance claim is

$$\bar{\pi} = \mu\pi_{2L} + (1-\mu)\pi_{2H} \qquad (25)$$

Note the dependence of this on the critical income levels at which the respective risk groups buy insurance.

(ii) Denote the claim per contract net of the deductible by c, which of course is a function of the physician's fee $c(p)$;

(iii) Then the premium gross of subsidy is set to cover expected claims costs plus a loading $k > 0$ for costs and profit, so that we have the premium net of subsidy

$$r = (1-s)(1+k)\bar{\pi}c \qquad (26)$$

with $s = 0.3$ the government subsidy to private insurance.

We see then that an increase in the physician's fee has two possible effects on the insurance premium. First, it has a direct effect in raising c. However, this increase in premium will, if it changes the demands for insurance by the different risk groups differentially, change the value of μ and therefore $\bar{\pi}$. For example, an *adverse selection effect* would arise when the initial increase in c causes a fall in μ, an increase in $\bar{\pi}$, a further increase in r, a further fall in μ, and so on, until only high risk buyers are left in the market.[15]

[14] $F(y')$ gives the proportion of households with income $y \leq y'$.

[15] Butler (2003) argues convincingly that this kind of process has characterised the market for insurance to cover costs of hospital treatment in Australia. The source of the problem of course is the absence of premium differentiation between risk classes in a private insurance market, where participation is voluntary and cross-subsidisation of high by low risks cannot be enforced.

Thus the higher are GPs fees, the higher will be the insurance premium and the smaller will be the subsets of households insured, and the higher their average income level. The larger the uninsured subsets, the larger the demands for outpatient treatment on the public hospital system. The model clarifies the parameters that would need to be estimated empirically to be able to predict quantitatively the effects of the proposed policy. Presumably the government has already made these estimates.

4 Equilibrium

An equilibrium of the health services and insurance markets is represented by a fee level for physicians, a corresponding insurance premium, and a fee level for concession card holders (paid by the government), such that:

- no physician wishes to change her fee given the flow of patients forthcoming;
- no individual wishes to change her insurance purchase decision given the level of physicians' fees and the insurance premium;
- all concession card holders receive treatment if required.

We have seen in the previous section that, given the distribution of incomes, utilities and risk types in the population, we can partition households into four subsets:

- the lowest income group, concession card holders;
- the next lowest income group, containing also a higher proportion of low risk types than the population as a whole. These do not buy insurance and use public hospital outpatients departments if they need health care;
- the second highest income group, who buy private insurance, but use a public hospital if their treatment cost is less than the deductible;
- the highest income group, who buy private insurance and always use private treatment, paying out of pocket when necessary.

An important point is that, at the margin, the number of households in each of these groups will be sensitive to the insurance premium as well as to the cost of treatment below the deductible.

After the introduction of the policy, and assuming that a significant proportion of households buy insurance, any individual GP will see herself as faced by a very inelastic demand, for the reasons set out at the end of section 2, and as a result we would expect significant fee increases. This is unlikely to represent an equilibrium, however, because, as we saw in the previous section, demand for insurance and hence for GPs services is elastic to the insurance premium. Sooner or later therefore, probably, given political sensitivities, sooner, there will have to be a fee negotiated between insurers and physicians. Call this p^I. Then any one physician will see herself as faced with two possible sources of demand, each with a fixed price. In order of decreasing prices, these are:

- insured patients, with price p^I;
- concession cardholders, with price p^C;

Given the fixity of prices, a GP competes for private patients by choosing quality of service, denoted q in the model of section 2, and cost reducing effort e, while choosing the number of concession card holders she wants to treat. However, she perceives upper limits to the number of insured patients she could receive, denoted x_0^I. We then model her choice problem as that of maximising

$$\begin{aligned} u &= p^I x^I(p^I, q) + p^C x^C(p^C, q) - c(q, e)X + g(X, q) - \gamma(e) && (27) \\ s.t. \quad x_0^I &\geq x^I(p^I, q) \qquad x^C \geq 0 && (28) \end{aligned}$$

where $X = x^I + x^C$ is total demand. First order (Kuhn-Tucker) conditions are

$$\begin{aligned} \frac{\partial u}{\partial q} &= (p^I - c + g_X - \lambda)x_q^I - c_q X = 0 && (29) \\ \frac{\partial u}{\partial x^C} &= p^C - c + g_X \leq 0 \quad x^C \geq 0 \quad x^C \frac{\partial u}{\partial x^C} = 0 && (30) \\ \frac{\partial u}{\partial e} &= -c_e X - \gamma^{'}(e) = 0 && (31) \\ x_0^I &\geq x^I(p^I, q) \quad \lambda \geq 0 \quad \lambda[x_0^I - x^I(p^I, q)] = 0 && (32) \end{aligned}$$

These results imply three possible types of equilibria:

(i) $x_0^I > x^I(p^I, q)$. In this case, insured patients are sufficiently plentiful that only these are treated;

(ii) $x_0^I = x^I(p^I, q)$ but $x^C = 0$. Essentially the same as (i);

(iii) $x_0^I = x^I(p^I, q)$ and $x^C > 0$. Both types of patient are treated. However there is nothing to guarantee that all concession card holders in the aggregate are treated. For this, p^C would have to be set sufficiently high, and/or p^I sufficiently low.

To summarise: what drives the equilibrium is the physician's objective of maximising utility (which contains a non-monetary factor reflecting desire to treat patients in general and preference for high-quality treatment), given the way in which patient demand for her services responds to her quality. Setting quality is the way in which physicians compete, since fee levels, for insured patients as well as for cardholders, are set by central negotiation rather than by the individual physician. It is quite possible that at the given set of fee levels, for insured patients as well as for cardholders, the number of the latter that GPs would want to treat in the aggregate is less than the total number of cardholders, in which case, if quota restrictions are not to be introduced[16], either the cardholder fee would have to be raised, the fee for insured patients lowered, or both, to achieve an overall equilibrium.

5 Income and Insurance Demand: Evidence

The models presented in the previous sections suggest the kind of market segmentation likely to result from the proposed policy, given that households vary by income and risk type. Empirically, households also differ along other dimensions relevant for the analysis, most notably by demographic characteristics reflecting their phase in the life cycle. To add empirical flesh to the bare bones of the analysis, we present some data on the current situation, in which private insurance for hospital care, but not for GP treatment, is available. We consider how insurance and health care costs are distributed along three main dimensions: stage in the life cycle, income, and female employment status.

[16]Every GP must take a certain minimum number of cardholder patients. Note that under the GPAS a GP must be prepared to take cardholder patients, but no minimum number above zero is specified, so 1 would suffice. This could easily be incorporated into the above problem with no significant change in results.

We see it as most useful to organise life cycle data not on the usual basis of calendar age of the household head, but rather according to the presence and ages of children. This is because the absence of perfect capital markets, in which children, or parents on their behalf, could borrow against future income, implies that children are costly to parents. Our approach reflects the view that two families, one with a head of household aged say 25, the other with head aged say 35, and with two children under school age, have far more in common with each other than with a childless household with a head of the same age.

We therefore define six life cycle phases of couples as follows:

Phase 1: the couple has as yet no children and the wife is aged thirty-five or less;

Phase 2: at least one pre-school child is present in the household;

Phase 3: the children are of lower school age;

Phase 4: the children are of high school age;

Phase 5: at least one spouse is in full time work, the children have left home; and

Phase 6: both spouses are retired.

Data for a sample of 3994 couples are taken from the ABS 1998 Household Expenditure Survey. The sample is split into the six phases according to the ages of the children (if present), the age of the female partner and the employment status of both adults. Phases 1 to 6 contain 385, 708, 609, 737, 757 and 798 records, respectively.[17]

Table 1 shows the general life cycle relationship between annual income and health expenditures, in \$1998. Column 1 lists weighted data means for annual net household income[18] and column 2, for private health expenditure. The percentage of households purchasing private health insurance in each phase is shown in column 3 and the average insurance premium they pay is reported in column 4. Column 5 lists data means for government indirect health benefits (hospital and non-hospital treatment) and column 6 shows separately government spending on medical benefits (non-hospital treatment).

[17] For further detail on the criteria used to split the sample into the six phases, see Apps and Rees (2003).

[18] Net income is calculated as private household income net of income taxes, the Medicare Levy, family tax benefits and direct (cash) benefits.

Table 1: Income, health expenditures and government benefits*

Phase	Net Inc	Priv H-Exp	% Insd	Prem	Gov Ben	Med Ben
1	49833	1483	37.4	1303	2731	1086
2	40693	1757	37.2	1640	6475	2350
3	46268	1866	39.2	1578	4533	1968
4	53837	2456	50.8	1844	4748	1854
5	50242	2651	53.3	1964	4082	1478
6	22209	1985	46.7	1682	7665	1769
All	42763	2079	43.8	1730	5114	1737

*Weighted data means.

This table certainly does not contradict the model of section 3. At each income level, not all households insure (the model says that those that do (not) are the relatively high (low) risk groups), though of course within each phase there is a range of incomes, so some of the non-insured would also be lower income households in all risk groups. Also notable is the fact that the major beneficiaries of government non-hospital benefits, after retirees (who would typically be concession cardholders), are families with young children.

The data means for each life cycle phase in Table 1 conceal a very high degree of heterogeneity in female labour supply behaviour and its association with health expenditure and insurance, after the arrival of children.[19] Table 2 tries to bring this out by presenting life cycle profiles for a sample of 2827 "in-work" households in phases 1 to 5, with phase 2 to 5 split into two groups of eqaul size according to the market hours of the female partner.[20] We label the two groups *type 1* and *type 2*. Thus, type 1 households are those in which the female partner works mostly within the home, while in type 2 households she has a much more significant market labour supply. We also split the sample into two groups of eqaul size within each phase according to the income of the male partner as primary earner. The table reports separate results for households with primary incomes in the lower and upper 50% of the distribution of primary income in each phase.

[19] We attribute this heterogeneity to differences in domestic productivities across otherwise identical households, together with the fact that household production (particularly of child care) is a close substitute for market production after the arrival of children. For further discussion, see Apps and Rees (2003).

[20] Phases 1 to 5 contain 405, 615, 609, 537, and 617 records, respectively.

Table 2: Distribution of health cover by primary income and household type

Hhld Type	Phase	Lower M Inc	50% F Inc	% Insd	Upper M Inc	50% F Inc	% Insd
1&2	1	26854	22337	27.8	51912	34921	48.3
	2	26889	1144	22.1	61781	1333	44.8
1	3	25070	5771	28.7	70023	6730	49.4
	4	24752	8995	36.5	66581	12168	62.2
	5	21121	7910	48.1	61806	7466	57.5
	2	27352	17554	37.9	55554	29557	60.9
2	3	23575	21668	35.5	60034	32716	58.8
	4	27762	23912	49.7	65648	37941	71.6
	5	23733	22220	53.3	51039	35910	65.7
1&2	6	226	422	30.6	13646	7267	63.3

The association of female labour force participation with health insurance demand are striking. In phases 2 to 4 of the life cycle, insurance demand increases by around 50% at the lower income levels, and 25% at the higher income levels, when the wife goes out to work. Also striking is the effect of income on insurance demand at all stages of the life cycle. Noteworthy however is that even among households with the highest insurance demand, two-earner high-income households with older children, or whose children have left home, around 30% of households do not buy health insurance. The group with lowest levels of insurance purchase are the single-earner, low income households with young children. It should be emphasised of course that the pattern of female labour force participation, and therefore the tax base, are themselves influenced by the structure of effective tax rates resulting from the tax-benefit system. Moreover, a move to a system in which health benefits are means-tested on the basis of household income from market labour supply effectively increases the marginal tax rate on the secondary earner, and this will have further effects on female labour supply and insurance purchase. This implies that evaluation of alternative health funding policies can only be reliably conducted in a broader public finance context, taking into account their overall effects on labour supply and the tax base.[21]

[21] For further and more detailed discussion of this point, see Apps and Rees (2003).

6 Conclusions

We can summarise the main results of this paper as follows.

First, on introduction of the policy changes, GPs are likely to see the demand facing them as highly inelastic, while the cost advantage of bulk billing has been reduced, and so we would expect relatively large excesses of fee over bulk billing rates to emerge. These will grow over time if the MBS rates are not adjusted for inflation.

A coordination problem will then emerge, because insurance premiums will reflect fee levels, and the demand for private insurance will be sensitive to these premium levels. At the aggregate level, demand responses will be higher than those perceived by individual GPs. It is likely therefore that fees will come to be centrally set by negotiations among insurers, government and GPs representatives.

We see the "market for non-hospital health services" as being divided into four segments, determined by phase in the life cycle, female employment status, income and health status. In order of increasing income they are:

- concession card holders;
- non-buyers of private insurance who use public hospitals' outpatients departments in the event of sickness. These are likely to be lower income households with young children, with a higher proportion of low risks and single-earner households than in the population as a whole;
- buyers of private insurance, who use public hospitals in case of costs lower than the deductible;
- buyers of private insurance, who use GPs exclusively and pay out of pocket expenses where necessary.

This raises the issue of the ability of the public hospital system to deal with the increased demand, and the implications of that for waiting lists and total expenditure.

To investigate the question of who gains and who loses under the policy proposal,[22] it is necessary to put it in a broader public finance context. To maintain the existing system, an increase in the MBS fee levels would be

[22] It seems to us immediately obvious that this cannot represent a Pareto improvement, even of the potential variety.

necessary, requiring therefore an increase in tax revenue. The policy proposal we are discussing is setting up an alternative financing mechanism to this. Therefore it is necessary to identify and quantify the real incidence and incentive effects of each kind of system. We hope in this paper to have made a first step in that direction.

References

[1] PF Apps and R Rees, (2003), Life Cycle Health Costs and Living Standards, paper presented at the Australian Economics Society Conference, ANU, Canberra, 2003.

[2] J Butler, ((2003), Adverse Selection, Genetic Testing and Life Insurance - Lessons from Health Insurance in Australia, *Agenda,* 10, 1, 73-89.

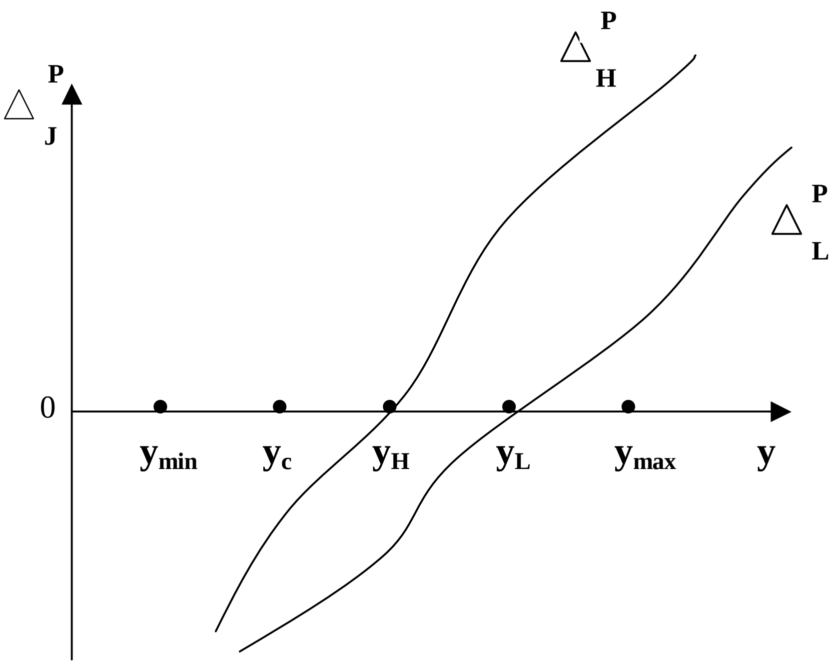

Figure 1: **Segmentation by income level and risk type**