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Abstract

This paper considers the recipient value and distributional impact of the Commonwealth Seniors Health Card (CSHC) by analysing a range of possible behavioural responses to economic incentives. First, I estimate the recipient value by considering the trade-off between moral hazard and risk pooling. The utility gain through risk-pooling is found to be negligible. The deadweight loss through moral hazard may be considerable. I also use illustrative models to demonstrate the possible effects of the CSHC on savings and labour supply. Whilst the CSHC may induce some people to save and work more, it may have the opposite effect on others.

Keywords: distributional impact, health insurance, recipient value, Australia, retirement

JEL classification numbers: H42; H31; H51; D91

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I Introduction

Retirement income policy is becoming increasingly important as structural ageing effects the population of almost all developed countries (OECD, 2007). At the same time, Australia's system of compulsory retirement saving is maturing. For the foreseeable future, most people will continue to receive at least some public pension income in retirement. Nevertheless, it is expected that older people will become increasingly affluent (Australian Government, 2007a: Chart C6). The Australian government has pursued a range of policies which aim to support and encourage 'self-funded retirees'. [2] Paradoxically, this increasing support implies that these people are not entirely self-funded. The effects of these policies warrant evaluation, as do their costs.

The Commonwealth Seniors Health Card (CSHC) is one of the main components of this policy suite. It provides noncash benefits, particularly a concession price for pharmaceuticals through the Pharmaceutical Benefits Scheme (PBS). It also provides eligibility for cash benefits, conditional on residency requirements. The aims of this paper are to estimate the value of the CSHC to recipients and to consider its possible distributional effects. In doing so, it considers a range of behavioural responses. It considers the trade-off between moral hazard and risk pooling associated with the PBS concession. It also presents illustrative models of the incentives it provides to savings decisions and labour supply both before and during the age of eligibility for the CSHC.

The remainder of the paper is organised as follows. Section II reviews previous Australian studies on the distributional impact of noncash government benefits. Section III gives a detailed description of the CSHC. It considers changes to its eligibility rules and the increasingly generous set of benefits to which holders are entitled. It also provides a profile of CSHC holders. The recipient value of the PBS component of the CSHC is estimated in Section IV using two complementary models which respectively address the trade-off between risk pooling and moral hazard. The issue of externalities is also discussed. The distributional impact of the CSHC is addressed in Section V. Consideration is given to behavioural responses in the realms of labour supply and saving. Taxation and general equilibrium issues are discussed. The main feature of this section is an illustrative inter-temporal model of the effect of the CSHC on people's saving behaviour as they approach retirement. Section VI concludes and provides a summary of the paper.

[2] The term 'self-funded retiree', now commonplace in Australian policy discourse, has no formal definition. However, in typical usage, it excludes anyone who receives any pension income. (see for example Commonwealth of Australia, 1999; Department of the Parliamentary Library, 2001). This population is the subject of the analysis in this paper.

II Previous Australian Studies

There have been no previous attempts to measure the distributional impact of the CSHC. However, the last 25 years have seen a stream of research on the impact of noncash government benefits (especially health care) on the distribution of economic well-being. In Australia, the role of noncash benefits (the 'social wage') is of particular interest in the historical context of the ACCORD agreement between the Labor government and the trade union movement in the 1980s. The ACCORD coincided with the re-introduction of universal public health insurance known as Medicare (Quiggin, 1998). The number of Australian studies is substantial and growing (Australian Bureau of Statistics, 1987, 1991, 1996, 2001, 2007; Economic Planning Advisory Council, 1987; Harding, 1984, 1995; Johnson et al., 1995; Johnson, 1998; Norris, 1985; Raskall and Urquhart, 1994). Many of these studies considered health benefits alongside other benefits such as education, housing and in some cases also public goods such as defence and roads. Australia was also included in a several comparative international studies (Garfinkel et al., 2006; Marical et al., 2006; Smeeding et al., 1993; Whiteford and Kennedy, 1995).

A second group of studies has focussed on specific health programs. These improve on those listed above primarily through their increasingly sophisticated statistical disaggregation of benefits amongst the population. These include analyses of the public hospital system (Schofield, 2000) and the PBS (Brown et al., 2005; Harding et al., 2004; Schofield, 1998).

In each of these twenty studies, public health insurance is valued at the cost of provision to government. In doing so, they implicitly or explicitly assume perfectly inelastic demand for health care and no utility gain from risk pooling.[3] They also assume no externalities. I discuss these issues further in Section IV.

In all but three of these studies, the distributional impact (sometimes referred to as the 'redistributive impact') is estimated by comparing the distribution of cash income to that of a broader measure of income which includes cash income plus the value of benefits (and in some cases also subtracting the value of taxes). In doing so, they assume perfectly inelastic labour supply and no inter-temporal substitution.[4] The three exceptions are Schofield (2000), Johnson (1998) and Johnson, Manning and Hellwig (1995), who do not attempt to measure the distributional impact.

[3] Alternatively, it could be argued that they implicitly assume that the utility gain from risk pooling is exactly offset by the utility loss from moral hazard. This trade-off is addressed further in Section IV.

[4] These issues are discussed at length in Section V.

As often mentioned by the authors, these studies may be useful starting points in assessing the distributional impact of government programs. However, if insufficient attention is given to their limitations, they also have the potential to be misleading.

Several U.S. studies (most by Timothy Smeeding) address some of the issues that the Australian studies have avoided. These include attempts to account for the distortionary effect of noncash benefits on consumption, attempts to value externalities and to account for differences in efficiencies between public and private sectors. These are discussed when relevant in the sections that follow.

III The Commonwealth Seniors Health Card

The Commonwealth Seniors Health Card (CSHC) was introduced in July 1994. Its original purpose was to provide pharmaceuticals at a concessional price to people of age pension age who met the pension income eligibility test, but who did not meet other eligibility conditions. The majority of such people did not meet the assets test or residency requirements. In April 1997 there were only 37,844 CSHC holders (Table 1) (Standing Committee on Family and Community Affairs, 1997). The concessional price for pharmaceuticals listed on the Pharmaceutical Benefits Scheme (PBS) was $2.60 per prescription at the time. Other people eligible for the concession include pensioners and low income earners. Consumers who were ineligible for the pension paid $16.00 per prescription. For both general and concessional consumers, the price is reduced after a consumer exceeds a given annual out-pocket expenditure in a calendar year, as shall be discussed subsequently.

In January 1999, there was a fundamental change in the role of the CSHC. The CSHC income eligibility threshold was no longer linked to that of the age pension eligibility threshold. It was almost doubled to $40,000 per annum for singles and $67,000 for couples. Officially, the 1999 CSHC policy change was designed to ‘encourage people to save for their own retirement’. (Costello, 1998: 5) The threshold was increased again nominally in July 2000 and more substantially in July 2001, to $50,000 for singles and $80,000 for couples (Australian Government, 2007b: Section 4.10.7.50). Immediately before the last of these threshold increases (June 2001), there were 226, 140 CSHC holders. (Department of Family and Community Services, 2003a). Two years after the last increase (June 2003) there were 282,691 CSHC holders (Table 1) (Department of Family and Community Services, 2003b). The exact number of people who took-up the card as a result of the income threshold reforms is unknown.[5] Recall that the 37,844 CSHC holders in 1997 were all below the age pension income eligibility threshold. If this number was to stay constant over time, then perhaps 87% of CSHC holders in 2003 had become eligible due to the increase in the threshold.[6] This is a very rough approximation, but it suggests that most CSHC holders may have become eligible due to the reforms.

Table 1 Number of CSHC Holders

April 1997	37,844
June 2001	226,140
June 2003	282,691
June 2004*	287,326
June 2005	300,165
June 2006	310,633
June 2007*	318,278

Notes: It is presumed that these are at June as for the other years, though this is not stated in the original source. Source: Standing Committee on Family and Community Affairs (1997) and FaCS/FaCSIA Annual Reports in various years.

Prior to September 2001, the PBS concession was the only benefit of the CSHC. Since then, there has been a number of additional cash benefits introduced which are linked to CSHC eligibility. From September 2001, CSHC holders who meet residency requirement are also eligible for the Telephone Allowance. This is a cash benefit initially worth $72 per year (paid quarterly) for people who have a telephone connected in their name or their partner's name. This has increased incrementally to $85.60 by December 2006. Age pensioners are also eligible for the Telephone Allowance.

[5] As will be shown below, the income distribution of CSHC holders is available at one point in time, using the Household Expenditure Survey (HES) of 2003-04. These data could be used to estimate the proportion of recipients whose income falls between the old and new thresholds. However, this may be misleading because of the application of CSHC income eligibility rules. Applicants meet the CSHC income eligibility test if their income in the previous financial year was below the threshold. However, applicants can also meet the income test on the basis of an estimate of income in the current financial year, if they can demonstrate a change in circumstances since the end of the previous financial year.

[6] This estimate becomes 86% if it is assumed that this number increased in proportion with the age pension age population (taking into account the increase in the age eligibility threshold for women from 60.5 to 62 years between 1997 and 2003).

From December 2004, CSHC holders who meet residency requirements are entitled to the Seniors Concession Allowance, a cash benefit initially worth $200 per year (paid in two instalments). This has increased incrementally to $214 by December 2006. Age pensioners are not eligible for this benefit. However, age pensioners are eligible for various concessions from State and Territory governments for services such as property and water rates, energy bills, public transport and motor vehicle registration, many of which are not available to CSHC holders. Indeed the Seniors Concession Allowance was introduced because of such concessions.

In turn, the Seniors Concession Allowance has provided eligibility for two 'one-off' payments. In June 2007, a payment of $500 was made to Seniors Concession Allowees as well as to age pensioners. In June 2006, a one-off payment of $102.80 was made to Seniors Concession Allowees. The same payment was made to age pensioners. Notably, however, age pensioners who were members of a couple (not separated due to illness) only received half of this amount each, whilst coupled Seniors Concession Allowees each received the full amount. Non-concession card holders were not eligible for these payments. It is also notable that a similar payment (worth $300) was made in 2001 to age pensioners, but not to CSHC holders.

CSHC holders might also be more likely to be bulk-billed[7] for GP services than non-concessional patients. In February 2004, the Commonwealth Government introduced financial incentives for GPs to bulk-bill concession card holders and children aged under 16. However, there does not seem to be any available data that quantifies the extent to which CSHC holders are actually bulk-billed.

From March 2004, CSHC holders are entitled to concessional coverage under the extended Medicare Safety Net. Under this scheme, 80% of non-hospital out-of-pocket medical expenses are reimbursed by the government after such expenditure exceeds a given threshold. In 2007, this threshold is $519.50 per year for concession card holders, and $1039 for non-concession card holders. Thus the additional concessional coverage is worth a maximum of 80% × ($1039-$519.50) = $415.60 per year per recipient. Data on the distribution of annual out-of-pocket medical expenses of CSHC holders are not available, and so the average value of this concession to CSHC holders is unknown. However, the average annual out-of-pocket expenditure by CSHC holders is estimated to be $257 in 2003-04, and the proportion exceeding $519.50 is no more than 11%.[8] Furthermore, both concession card holders

[7] Bulk-billing is a billing system which includes no charge for the patient.

[8] Authors calculations from the 2003-04 ABS Household Expenditure Survey Expanded Confidentialised Unit Record File. Expenditure in this data set is recorded on a household basis. Household expenditure is assumed to be equally distributed between household members. Respondents are asked to recall expenditure on

and general patients are also eligible for the (original) Medicare Safety Net. Under this scheme, 100% of the Medicare Schedule Fee is reimbursed for patients whose 'gap' fees exceed an annual threshold. The gap is the difference between the Medicare Schedule Fee and the amount reimbursed by Medicare. The gap is equal to 15% of the Schedule Fee, although practitioners are free to charge in excess of the Schedule Fee. In 2007, the threshold for this scheme is $358.90. Without access to relevant data, the interaction between the original and extended Medicare Safety Nets is difficult to gauge. Nevertheless, it is clear that the average value of this scheme to CSHC holders (in excess of its value to non concessional patients) is likely to be small. An upper bound is calculated as the maximum benefit multiplied by the maximum proportion of beneficiaries = $415.60 × 11% = $45.72. The actual value may be considerably smaller than this.

Table 2 summarises the non-PBS benefits received by each CSHC card holder in 2007. The total is $799.60 for 2007 plus the unmeasured values of additional bulk billing and the concessional threshold in the Medicare Safety Net. Older people without concession cards are not eligible for any of these benefits. Age pensioners are eligible for all of these benefits except for the Seniors Concession Allowance.

Table 2 Summary of non-PBS CSHC benefits per card holder in 2007

Telephone Allowance	$85.60
Seniors Concession Allowance	$214.00
One-off Payment	$500.00
Additional Bulk Billing	value unknown
Medicare Safety Net (concessional threshold)	value unknown*
Total	$799.60

* The value is estimated to be no greater than $45.72, but could be considerably less than this. Due to the lack of confidence in this estimate, it has been excluded from the calculations that follow.

medical services over the previous three months. The distribution of annual expenditure cannot be derived from these data. The variance of expenditure is likely to be greater for a short recall period than a long recall period. However, an upper bound of the proportion of people exceeding the threshold can be derived by assuming that the three-month recall period is representative of the full year for each household. Under this assumption, 11.0% of CSHC holders exceeded the $519.50 threshold. Thus a maximum of 11.0% of CSHC receive any benefit from the Medicare Safety Net. Similarly, no more than 8% exceed the $1039 threshold, hence benefitting from the maximum value of the concession.

The 2003-04 Household Expenditure Survey is perhaps the only nationally representative data set available which explicitly identifies CSHC holders. Table 3 shows summary statistics for CSHC holders, with comparisons to non-CSHC holders of age pension age and to younger people (including children). Approximately 10% of older people were CSHC holders. On average, CSHC holders were one year younger than non-CSHC holders of age pension age and a slightly larger percentage (2%) was male. Their average equivalised current disposable income was considerably higher ($102 per week) than that of non-CSHC holders of age pension age, but considerably lower ($78) than that of younger people.[9] A comparison of annual income reveals similar relativities. CSHC holders are located throughout the income distribution, although relatively few are in the top quintile. In comparison, non-CHSC holders of age pension age are concentrated in the bottom half of the distribution.

Whilst CSHC holders appear to fare poorly relative to younger people on these income measures, it is noted that cash income is not a good metric for comparisons of living standards between older people and younger people. This is due to the exclusion of imputed rental income from owner occupied housing, which greatly benefits older people relative to younger people (see Saunders and Siminski, 2005; Yates, 1991). This is reflected in the last row of Table 3, which shows that 88% of CSHC holders live in an owner-occupied dwelling without a mortgage, compared with 77% of non-CSHC holders of age pension age and just 23% of younger people.

[9] Specifically, the income measure is person-weighted equivalised income, using the 'modified-OECD' equivalence scale. The equivalence scale adjusts for differences in need due to household composition. Person-weighting ensures that all people (including children) are included in the summary statistics. The method assumes pooling of income within households.

Table 3 Descriptive Statistics from HES 2003-04

	CSHC holders	non-CSHC holders of age pension age	younger people*
number of people	264,438	2,312,571	17,011,496
sex (% female)	56.1%	57.8%	49.0%
mean age	71.7	72.9	34.9
mean equivalised disposable current income ($ / week)	493.07	390.75	570.81
mean equivalised disposable annual income $ / year	28,172	21,877	35,875
% in each decile of equivalised disposable current income			
1st decile (low)	17.5%	18.4%	8.8%
2nd decile	6.2%	27.3%	7.8%
3rd decile	8.4%	19.7%	8.9%
4th decile	12.3%	10.1%	9.9%
5th decile	12.8%	8.2%	10.2%
6th decile	10.5%	5.1%	10.6%
7th decile	8.2%	3.2%	11.0%
8th decile	11.3%	1.9%	11.0%
9th decile	5.7%	2.7%	11.0%
10th decile (high)	7.0%	3.4%	10.9%
Owner occupied dwelling (outright)	88.0%	77.1%	22.9%

Source: Author's calculations from from the 2003-04 ABS Household Expenditure Survey Expanded Confidentialised Unit Record File.

* All people (including children) who are below age pension age (males under 65 years and females under 63 years).

IV The Trade-Off Between Risk Pooling and Moral Hazard: Recipient Value

As discussed above, the CSHC provides a reduced price for PBS pharmaceuticals, which can be seen as a form of public health insurance. The aim of this section is to measure the average value of this benefit to recipients.

It is well understood that health insurance involves a trade-off between risk-pooling and moral hazard (Manning and Marquis, 1996; Pauly, 1968). Health insurance reduces the risk of high health expenditure. The avoidance of risk is valued by a risk averse actor. But health insurance also reduces the marginal price of health care, which may lead consumers to purchase a higher quantity of health care than they would otherwise. Manning & Marquis (1996) attempt to measure the optimal level of coinsurance (0% coinsurance = full insurance; 100% coinsurance = no insurance) to maximise utility given this trade-off using data from the RAND health insurance experiment. They demonstrate that there are three variables determining the optimal level of co-insurance:

- The price elasticity of demand for health care
- The level of risk aversion
- The degree of uncertainty over future health care consumption

The RAND experiment enabled them to estimate the price elasticity of demand for health care. This parameter facilitates the measurement of the dead weight loss attributable to moral hazard. The RAND experiment also enabled an estimate of risk aversion, using a stated preference approach. At the end of the experiment, respondents were asked to choose (hypothetically) between insurance plans at varying prices. The degree of uncertainty was also estimated: respondents were asked to estimate their expenditure for the following period, and this was compared to their actual expenditure.

In the Australian distributional literature, no attempts have been made to incorporate either moral hazard or the value of risk-pooling. In the early US distributional literature, some attempts were made to account for moral hazard, but not the value of risk pooling (Smeeding, 1977; Smeeding and Moon, 1980; Smeeding, 1982, 1984; Smolensky et al., 1977). However, none of these studies incorporated the insights of the economic literature on insurance. They treated $X of health insurance as $X of health care. Thus they did not consider the utility value of insurance given risk aversion, nor did they explicitly consider moral hazard.

There is a small and relatively new literature that considers the insurance value of Medicare in the USA (Finkelstein and McKnight, 2005; McClellan and Skinner, 1997). Both studies draw on the introduction of Medicare in 1965 as a natural experiment and find the insurance value to be substantial and larger than the welfare loss of moral hazard.

In this remainder of this section I estimate the utility gain from risk pooling and the dead weight loss associated with moral hazard for the CSHC. In doing so, I estimate the value of the PBS concession to CSHC holders. Following Manning and Marquis (1996), I measure these effects in two stages. Unlike Manning and Marquis, I do not compare the CSHC to a no-insurance counterfactual. I compare the benefits of the CSHC to the less generous 'general' level of pharmaceutical cover provided by the PBS. Under the 'general' scheme, consumers are already covered against high levels of pharmaceutical expenditure, so it is not surprising that the additional reduction in risk provided by the CSHC is negligible. On the other hand, the deadweight loss due to moral hazard is not negligible and is likely to vary considerably between individuals. The key parameters that drive this variation are the price elasticity of demand for pharmaceuticals and preferences for pharmaceutical versus non-pharmaceutical consumption (which will partially be driven by health status).

Risk Pooling

In this subsection I estimate the utility gain associated with risk pooling in the CSHC, based on the method of Finkelstein and McKnight (2005). Assume that the price of pharmaceuticals (p) is fixed. For a given individual, let demand for pharmaceuticals (x_i) be a function of health status (h_i over which there is uncertainty) and their preference for pharmaceutical consumption versus non-pharmaceutical consumption (which is fixed for each given consumer and is hence ignorable). Thus $x_i = f_i(h_i)$. In this model, the only source of variation in x_i for a given individual is health status. Poorer health leads to higher x_i. Thus it is assumed that utility is derived from non-pharmaceutical consumption only. Let income be denoted I. Let y denote the composite good of non-pharmaceutical consumption. The price of y is normalised to 1. Income is equal to total consumption, so that $I = px + y$. Assume that the utility function is the constant relative risk aversion (CRRA) function:

$$U_i = \frac{y_i^{1-\rho_i}}{1-\rho_i} = \frac{(I_i - px_i)^{1-\rho_i}}{1-\rho_i}$$

where ρ is the risk aversion parameter. The CRRA utility function provides analytical simplicity. It assumes that risk aversion is negatively proportional to wealth (or consumption) (Pratt, 1964).

Many available estimates of ρ are in respect to utility as a function of wealth and so are not relevant here (see Hartley et al., 2006 for a review of such estimates; and Meyer and Meyer, 2005 for a formal discussion of the relationship between CRRA utility functions of wealth and consumption). Estimates of ρ in respect to utility as a function of consumption include 4.1 in a study based on hypothetical gambles over permanent changes to income (Barsky et al., 1997). That study also found very little variation in this estimate by income quintile, supporting the assumption of CRRA for consumption. There have been several other studies which exploit savings responses to interest rates to measure the intertemporal elasticity of consumption, which in turn is the inverse of ρ. These estimates for ρ include 2.5 (Engen, 1993; cited by Engen and Gruber, 2001) and between 2 and 5 (Skinner, 1985). The consistency of these estimates justify the 'long line of simulation literature' described by Finkelstein and McKnight (2005) which takes ρ to be 3. In the present study, I follow Finkelstein and McKnight (2005) by assuming that ρ is equal to equal 3, and testing sensitivity to values of 1 and 5. It is acknowledged that all of the estimates reviewed above are with respect to the USA. To the author's knowledge, corresponding estimates do not exist for Australia.

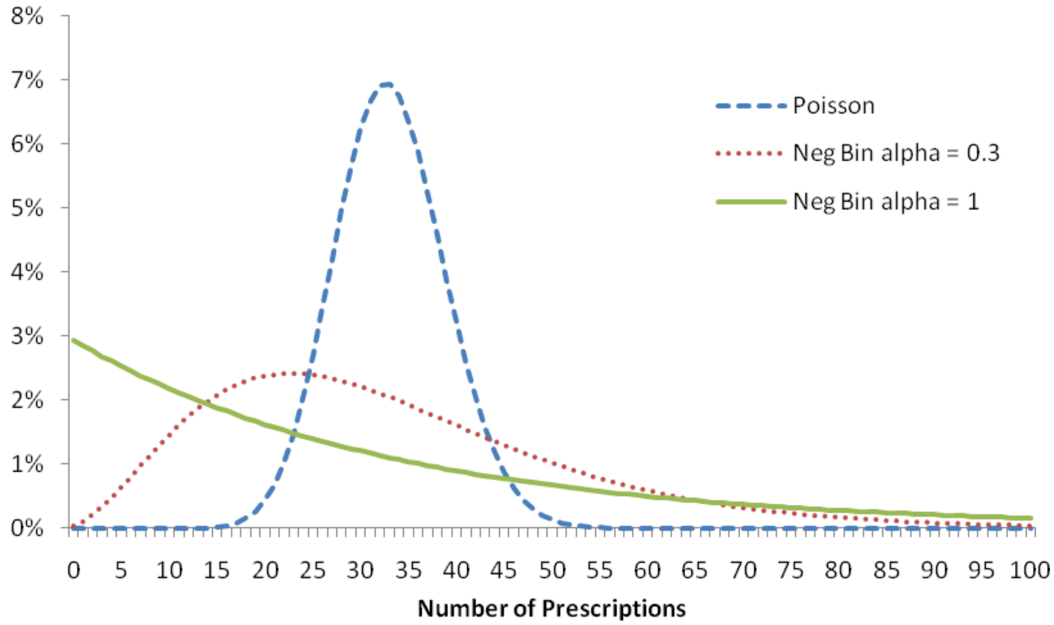
To implement this approach, it is necessary to estimate the extent of uncertainty over future health status and/or health consumption. Whilst x is a random variable, it may not be completely random. In particular, health status is likely to be serially correlated. Several approaches have been used in the literature to address this issue. In the RAND Health Insurance Experiment, participants were asked to predict future health care consumption. Manning and Marquis (1996) compared these responses to actual consumption, thus measuring the extent to which it was predicted. Finkelstein and McKnight (2005) modelled the distribution of health care consumption before and after the introduction of the Medicare scheme in the United States.

The data to implement such approaches for the CSHC are not available. In fact, the annual distribution of pharmaceutical expenditure is not readily available for even one point in time for the population of interest.[10] However, this is not a major limitation. The approach taken here is to make conservative assumptions over the distribution of out of pocket health care expenditure and the extent of uncertainty over future consumption. Despite these assumptions, the utility value of the CSHC due to risk-pooling is found to be small or even negligible.

Health care consumption is assumed to be completely random, regardless of prior health status or other observable characteristics. This approach will overestimate the uncertainty over future health care consumption (and hence the utility value of risk pooling). Following Siminski (2008), the annual number of PBS pharmaceutical prescriptions consumed is assumed to follow an overdispersed count data process, with a mean of 33.1. The extent of overdispersion is unknown, but is parameterised through a Negative Binomial process (see Cameron and Trivedi, 1998: equation (3.26) for the density function). Figure 1 shows three such distributions. The first is the Poisson distribution, which is a special case of the Negative Binomial with the overdispersion parameter (α) equal to zero. This is also almost identical to a Normal distribution. The other distributions are Negative Binomial with α set to 0.3, and 1 respectively. When $\alpha = 1$, the variance of the Negative Binomial is 34 times larger than that of the Poisson.

[10] HES 2003-04 includes self-reported household expenditure on prescription medication in a two-week period. The distribution of this amount is unlikely to be a useful proxy for the shape of the annual distribution for at least two reasons. The variance of expenditure in two-week recall period is likely to be much greater than that of annual expenditure. Secondly, not all prescription medications are listed on the PBS. Patients would pay the full cost of any such medications, thereby increasing the variance further.

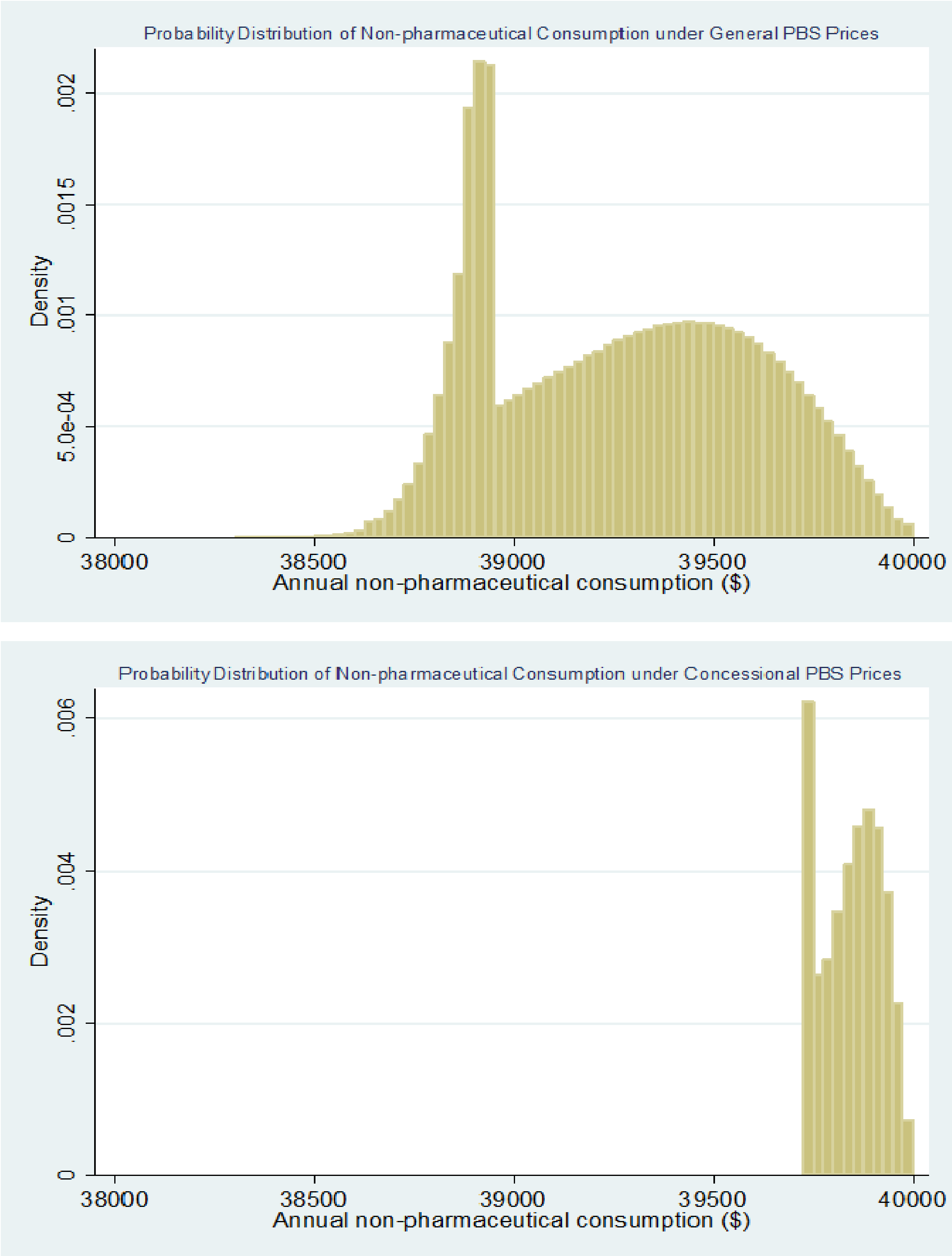
Figure 1 Possible distributions for annual number of PBS drug purchases



Note: these are hypothetical distributions of the number of PBS drug purchases, assuming it follows a count data process with a mean of 33.1 (see text).

Each of these distributions of prescription counts implies a distribution of pharmaceutical expenditure under general and concessional price schedules. Recall that pharmaceutical consumption is assumed to be completely random, and utility is derived only from non-pharmaceutical consumption. For a given person, the probability distribution of non-pharmaceutical consumption is a function only of PBS concession eligibility. An illustration of these distributions under both sets of prices is shown in Figure 2. In this example, the negative binomial distribution is assumed to have α equal to 0.3. The discontinuity in the distribution under 'general prices' occurs at the point where the safety net is invoked. In the distribution under 'concession prices', expenditure is capped at a maximum of $274.40 per year. In the model being developed here, the effect of the CSHC is to replace the 'general price' probability distribution of non-pharmaceutical consumption with the corresponding 'concession price' distribution.

Figure 2 Probability distributions for annual non-pharmaceutical consumption by PBS concession status ($) (Annual Income = $40,000; α = 0.3)



Notes: This figure shows the hypothetical probability densities of annual non-pharmaceutical consumption, assuming general PBS prices (top panel) and concession prices (bottom panel) for a person with an annual income of $40,000, assuming that the number of pharmaceuticals purchased is completely random and follows a negative binomial distribution with a mean of 33.1 and overdispersion (α) equal to 0.3.

The expected utility (with a CSHC card) for person *i* is:

$$E(U_i^C) = \int U(y_i)\, f(y_i) dy_i$$

where *y* is non-pharmaceutical consumption and *f* is the probability density function depicted in the first panel of Figure 2 (or the corresponding distribution with different assumptions about dispersion). The expected utility without a concession card is given by:

$$E(U_i^g) = \int U(y_i) g(y_i) dy_i$$

where *g* is the probability density function depicted in the second panel of Figure 2 (or the corresponding distribution with different assumptions about dispersion).

A rational consumer is indifferent between possessing a CSHC or receiving a cash payment *M* when the utility of each situation is equal:

$$\int U(y_i + M) g(y_i) dy_i = \int U(y_i)\, f(y_i) dy_i$$

With $\rho =$ 3, this becomes:

$$\int -\frac{(y_i + M)^{-2}}{2} g(y_i) dy_i = \int -\frac{y_i^{-2} f(y_i)}{2} dy_i$$

With $\rho =$ 3 and α = 0.3, M is evaluated to be \$582.85. The actuarially fair insurance premium is the difference in expected pharmaceutical expenditure (under concessional and general prices) = $E(x^C) - E(x^G)$ = \$579.19. Thus the contribution to utility associated with risk reduction is a \$3.66 per year, or 0.6% of the actuarially fair premium. Table 4 shows the results under various assumed values for α and ρ. Even under assumptions of high dispersion of the PBS consumption distribution (α = 1), high risk aversion (ρ=5) and completely random future health status, the value of the CHSC to risk reduction is equal to only 2.4% of the actuarially fair premium value of the card. The actual value is likely to be less than 1% and is hence negligible.

Table 4 Utility value of CSHC to risk reduction (% of actuarially fair premium)

	α		
ρ	0 (Poisson)	0.3	1
1	0.0%	0.2%	0.5%
3	0.1%	0.6%	1.4%
5	0.2%	1.1%	2.4%

Source: author's estimates (see text).

Moral Hazard and Dead Weight Loss

In this subsection, I consider the deadweight loss (DWL) associated with the PBS component of the CSHC. DWL is the difference between the social cost of the CSHC and the minimum cash amount that rational recipients would be willing to receive instead of the CSHC (assuming no utility gain from risk avoidance). The key parameter which influences the results is the price elasticity of demand for pharmaceuticals. Exploiting the CSHC policy change as a natural experiment, Siminski (2008) estimated the price elasticity to be -0.1 for this population. This value is adopted here, with sensitivity tested to other values.

For this exercise, it is assumed that there is no uncertainty, since uncertainty was addressed in the previous section. In this model, consumers know their own health status with certainty for the immediate accounting period (a calendar year). For this health status and a given price, there is a unique quantity of pharmaceuticals consumed, which maximises the utility of a given consumer. This consumer's utility function depends on pharmaceutical consumption and non-pharmaceutical consumption. In summary, the approach taken is to derive the Hicksian compensating variation (HCV) for such a consumer under a number of different scenarios (Hausman, 1981; Hicks, 1943). The difference between the cost to government and the HCV is the DWL component of government expenditure.

An important qualification to this treatment of dead weight loss is that it does not account for the effect of price on health care expenditure in future periods or in different settings. If a higher copayment leads to lower pharmaceutical consumption, this may have health consequences. This may translate to more expensive treatment (for example emergency hospital treatment). Newhouse (2006) reviews some recent evidence of this effect.

Consider a demand function for pharmaceuticals for person *i*. Let the quantity demanded and price of pharmaceuticals be denoted x_i and p, respectively. Let y_i be the quantity demanded of the composite of all other goods. The price of y_i is normalised to 1 and is fixed. Income is denoted I_i.

Assume that the demand function exhibits constant price and income elasticities. Under these assumptions, The Marshallian demand function for pharmaceuticals can be written as:

$$x_i = c_i p^{\alpha_i} I_i^{\delta_i} \tag{1}$$

where α_i and δ_i are the own-price and income elasticities of demand for pharmaceuticals. c_i is individual specific and varies with health status and preferences for pharmaceutical versus non pharmaceutical consumption, but these are assumed fixed for the accounting period and are known with certainty.

Consider the following indirect utility function:

$$V_i(p, I_i) = \frac{-c_i p^{\alpha_i+1}}{\alpha_i+1} + \frac{I_i^{1-\delta_i}}{1-\delta_i} \tag{2}$$

This utility function corresponds to the demand function given in (1).

For a given utility u_i, the corresponding expenditure function is derived by solving (2) for I, which is now denoted $e_i(p,u_i)$:

$$e_i(p, u_i) = \left[(1-\delta_i)\left(u_i + \frac{c_i p^{\alpha_i+1}}{\alpha_i+1}\right)\right]^{\left(\frac{1}{1-\delta_i}\right)} \tag{3}$$

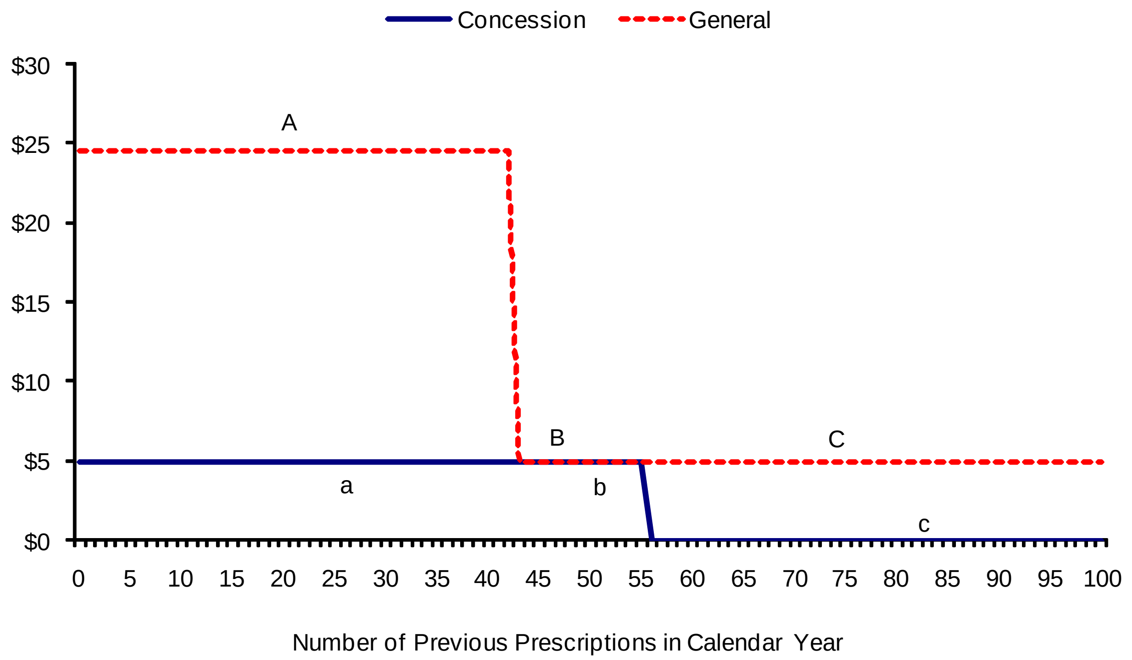
This is the minimum expenditure required to achieve utility u_i, given the price p.

Consider the consequences of the abolition of the CSHC, which would change p from p_0 to p_1. The compensation in income which would result in no change in utility given the price change is the Hicksian Compensating Variation:

$$\text{HCV} = e_i(p_1, u_i) - e(p_0, u_i) = \left[(1-\delta_i)\left(u_i + \frac{c_i p_1^{\alpha_i+1}}{\alpha_i+1}\right)\right]^{\left(\frac{1}{1-\delta_i}\right)} - \left[(1-\delta_i)\left(u_i + \frac{c_i p_0^{\alpha_i+1}}{\alpha_i+1}\right)\right]^{\left(\frac{1}{1-\delta_i}\right)} \tag{4}$$

Figure 3 shows the nominal price schedules for general and concessional consumers. For CHSC holders in 2007, the first 56 PBS medications cost $4.90 each. Additional prescriptions are free. For non-concession card holders, the first 43 prescriptions cost an estimated average of $24.56 each.[11] Additional prescriptions cost $4.90 each.

Figure 3 Nonlinear concessional and general price schedules, 2007



Source: author's estimates (see text and footnote 11).

The zero price after 56 prescriptions for concession card holders is a complication for the analysis. Demand is undefined for a zero price in the constant elasticity demand function. However, it is noted that the full cost of obtaining a prescription is not truly zero. There are non-monetary (time) costs associated with obtaining the medications, as well as (time and possible monetary) costs associated with seeing a GP to obtain a prescription. This unmeasured cost might be small for several reasons. GP care is free for most Australians, especially older people (for around 85% of people aged 65 and over) (Abbott, 2005). For most medications, GPs can prescribe several courses (up to six) at one time. They can also prescribe as many different types of medication at one time as deemed appropriate. Furthermore, many people will have needed to see their GP in any case, for reasons other than to obtain the prescription. Nevertheless, it is difficult to estimate the net value of

[11] The co-payment is capped at $30.70, but many medications are cheaper than this. The approach here assumes that the ratio of the average payment to the maximum co-payment is the same here as found for earlier years by Siminski (2008).

these costs. For the purpose of the illustration, this unmeasured cost is assumed to be $1 per prescription. This is applied throughout the analysis, regardless of the cash price. Sensitivity of the results is shown for alternative assumptions of $0.50 and $5.

Consider a consumer with α = -0.1 and δ =2. At t = 0, I = $40,000 and consumption of 30 units of pharmaceuticals (x_0=30). Substituting these values into (1), c is equal to 2.2 * 10^{-8}. Evaluating (2) at these values results in a utility value of –2.5 * 10^{-5}. If the concession was removed (if p is increased to p_1), what would be the compensation required to maintain utility at the same level? Substituting into (4), the compensating variation is evaluated to be $547. This consumer would be indifferent between a health concession card and a cash benefit of $547.

Now consider the cost to government of the CSHC subsidy. At p=$25.56, x = 25.91 (from (1)), which is the component of consumption *not* induced by the CSHC. For each of these 25.91 prescriptions, the cost to government is equal to the difference between the concessional and general PBS prices, which is $24.56 - $4.90 = $19.66. An additional 30 – 25.91 = 4.09 prescriptions were induced by the price change (moral hazard). In the absence of the CSHC, these would not have been consumed at all. For these 4.09 prescriptions, the unit cost to government is greater than for each of the original 25.91. It is equal to the full government contribution of these drugs. For concession card holders this is estimated to be $32.[12] In total, the cost to government of the CSHC for this consumer is equal to 25.91 * ($24.56-$4.90) + 4.09 * 32 = $640. The DWL is the difference between HCV and government cost = $94, or 15% of its cost.

The above example is a special case in a more general situation, characterised by a nonlinear price schedule (Figure 3). The quantity demanded in the example above is to the left of the discontinuities in both price schedules (x_0<43). This quantity and the associated marginal price is labelled 'a' in Figure 3. Quantity demanded and the marginal price in the counterfactual (concessional PBS prices) is labelled 'A'. 'A' will also always be to the left of the discontinuities, since the marginal price in the general schedule is less than or equal to the concession price at all points in the price schedule. Let 'Scenario 1' refer to the situation where x_0<43.

In Scenario 2 x_0 is between the price discontinuities in the two price schedules (43 < x_0 < 56 prescriptions in the year, labelled 'b'). To calculate the corresponding HCV, it is necessary to calculate utility under the counterfactual, which is the general price schedule. To do so, one must confront the issues posed by the nonlinear price schedule. The optimal consumption level in the

[12] This is equal to the total government contribution to PBS expenditure for concession card holders divided by the number of prescriptions. Corresponding data are not available for the subset of CSHC cardholders.

counterfactual (x_1) might also lie between the discontinuities (denoted 'B'). However, the consumer may derive higher utility from a lower level of pharmaceutical consumption, $x < 43$, given the higher price of each of the first 43 prescriptions.

Nonlinear price schedules pose considerable difficulties for the analysis of health care demand (Keeler et al., 1977). However, under the assumptions outlined above, the consumer knows their health status for the accounting period with certainty. This consumer can thus choose an optimal level of consumption for the entire year at the beginning of the period. If they choose a point to the left of the discontinuity ($x_1<43$), the associated utility and HCV can be calculated using the same techniques as Scenario 1, with price equal to \$25.46.

If the optimum consumption level is to the right of the discontinuity ($x_1>43$) they will face an 'effective price' of \$5.90 per prescription. This 'effective price' is relevant to every prescription considered for purchase during the year, since the consumer knows with certainty that an additional prescription purchase will result in an additional expenditure of only \$5.90 for the year. The actual expenditure on pharmaceuticals, however, is greater than this, since the cost of pharmaceuticals is \$25.46 - \$5.90 higher for the first 43 prescriptions. The effect of this on consumption and utility is a pure income effect, equal to a reduction in income equal to (\$25.46 - \$5.90) * 43 prescriptions = \$845. Therefore, if the consumer chooses a consumption level greater than 43 prescriptions in the counterfactual, the HCV is exactly equal to \$845. To summarise, pharmaceutical consumption in the counterfactual will be to the left of the price discontinuity ($x_1<43$ prescriptions) if the associated utility is greater than consumption above the discontinuity. In other words, if $V(25.46, 40000) > V(5.9, 40000-845)$. The cost to government and DWL are calculated using the same methods as Scenario 1.

To illustrate, take a consumer with the same parameters as in the first example, with the exception that he consumes 50 units of pharmaceuticals ($x_0=50$). From (1), *c* is equal to $3.7 * 10^{-8}$. In the counterfactual, utility is higher if the consumer purchases more than 43 prescriptions, as $V(5.9, 40000-845) = -2.57 * 10^{-5} > V(25.46, 40000) = -2.58 * 10^{-5}$. The optimal $x_1 = 47.9$. HCV is evaluated to be \$845. The cost to government of the CSHC for this consumer is equal to 47.9 * (\$25.65-\$5.90) + 2.1 * 32 = \$912. The DWL is \$67, or just 7% of its cost to government.

This is a much smaller DWL than in Scenario 1. This is because the 'effective price' for concession cardholders is the same as that of non-card holders. The DWL is driven solely through an income effect. However, if x_0 is slightly lower (48 units), a much larger DWL is calculated. In this case, the optimum consumption in the counterfactual is to the left of the price discontinuity ($x<43$). It is in fact

41.5 prescriptions. The associated DWL is \$143, or 14% of the cost to government. It is driven by both income and price effects.

In Scenario 3, x_0>56 (denoted 'c' in Figure 3). Consider a consumer with the same parameters as in the first two scenarios, with the exception that he consumes 80 units of pharmaceuticals (x_0=80). Since x_0>56, the nominal marginal price is assumed to be \$1 per prescription as discussed above. To account for the income effect associated with paying \$5.90 for each of the first 56 prescriptions, income is effectively reduced by (\$5.90-\$1)*56 = \$274.40. From (1), *c* is equal to 5.1 * 10^{-8}. In the counterfactual, utility is maximised with x_1= 65.1 prescriptions. HCV is evaluated to be \$908. The cost to government of the CSHC for this consumer is equal to \$1367. The DWL is \$459, or 34% of its cost to government. If the assumed additional price of pharmaceuticals is increased to \$5, the DWL falls to 20% of the government cost. If it is assumed to be 50c, DWL falls increases to 39%. Regardless of the choice of this parameter, the DWL is highest in Scenario 3.

The left panel of Table 5 summarises the results for the three illustrative consumption levels and the assumed price loading per prescription (α and δ are fixed at –0.1 and 2, respectively). The value of the card to the recipient clearly depends on the consumption level, with high consumers benefiting more than low consumers. DWL also varies considerably at the different levels of consumption, being highest for high consumers and lowest for those who consume 50 prescriptions. The estimated HCV is not particularly sensitive to the assumed price loading due to unobserved costs. However, the estimated DWL is sensitive to the price loading, particularly at the top of the distribution (where pharmaceuticals are nominally free).

The right panel of Table 5 shows the average HCV and DWL across the entire distribution of consumption. As before, the assumed value of the overdispersion parameter is 0.3. The preferred estimate for the average HCV of the PBS component of the CSHC is \$547. This estimate is not particularly sensitive to the assumed overdispersion, nor to the assumed price loading. The DWL in the right panel is the percentage of total government expenditure that is DWL (rather than the average of DWL percentages across the distribution). In the preferred estimate, the DWL is equal 17.7% of government expenditure, but this is sensitive to the assumed overdispersion and price loading.

Table 5 HCV ($ per person per year) and DWL (% of government cost) by consumption level and assumed price loading

	x0			Average across PBS consumption distribution, overdispersion =		
HCV	30	50	80	0 (Poisson)	0.3	1
Price loading						
$0.50	544	845	893	601	537	458
$1	547	845	908	604	547	467
$5	561	845	934	619	559	479
DWL						
price loading						
$0.50	15.4%	7.3%	39.3%	15.2%	21.1%	27.4%
$1	14.6%	7.3%	33.6%	14.4%	17.7%	22.9%
$5	10.7%	7.3%	19.7%	10.5%	11.8%	14.4%

Source: author's estimates. See text.

Table 6 shows the sensitivity of results to the price elasticity of demand for pharmaceuticals (δ is fixed at 2 and the price loading is $1). The value of the card to the recipient does not vary greatly with price elasticity. The cost to government of the card varies far more with this parameter. Thus the share of government expenditure that is DWL also varies considerably.

Table 6 HCV ($ per person per year) and DWL (% of government cost) by price elasticity of demand for pharmaceuticals

	x_0			Average across PBS consumption distribution, overdispersion =		
HCV	30	50	80	0 (Poisson)	0.3	1
α						
0	599	845	948	659	583	497
-0.1	547	845	908	604	547	467
-0.3	458	769	481	506	424	356
DWL						
α						
0	-1.5%	7.3%	7.5%	-1.2%	1.9%	3.5%
-0.1	14.6%	7.3%	33.6%	14.4%	17.7%	22.9%
-0.3	36.5%	36.0%	78.2%	36.4%	48.3%	55.3%

Source: author's estimates. See text.

Table 7 shows the sensitivity of results to the income elasticity of demand for pharmaceuticals (α is fixed at –0.1 and the price loading is $1). Neither the HCV nor the DWL is sensitive to income elasticity.

Table 7 HCV ($ per person per year) and DWL (% of government cost) by income elasticity of demand for pharmaceuticals

	x0			Average across PBS consumption distribution, overdispersion=		
HCV	30	50	80	0 (Poisson)	0.3	1
δ						
0.5	541	845	918	597	543	467
2	547	845	908	604	547	467
5	558	845	890	618	554	469
DWL						
δ						
0.5	15.5%	2.0%	30.9%	15.3%	17.0%	21.5%
2	14.6%	7.3%	33.6%	14.4%	17.7%	22.9%
5	12.8%	16.1%	38.3%	12.4%	18.7%	25.2%

Source: author's estimates. See text.

The results are also insensitive to the assumed income of the consumer. For example, the HCV varies by just $2 between I = $30,000 and I = $50,000. The corresponding variation in DWL is 0.4%.

To summarise, the average HCV of the PBS concession for CSHC holders is estimated to be $547. This estimate is not greatly sensitive to variations in any of the assumed parameters. The deadweight loss of the concession is estimated to equal 17.7% of the cost to government, but this is sensitive to the assumed price elasticity of demand, the assumed price loading and the assumed overdispersion in the distribution of consumption. The concession provides no insurance value over the HCV. However, there is likely to be considerable variation between individuals around the average value of the concession. This variation is primarily due to differences in PBS consumption levels, which reflect preferences over pharmaceutical versus non-pharmaceutical consumption. These, in turn, will be partially a function of health status.

Externalities: Non-Recipient Value

The discussion so far has focussed on the value of the benefit to the recipient. It is commonly argued that health care markets are characterised by material externalities (such as the communal benefits of immunisation and through the health of the labour force) and altruistic externalies (Hall, 2001; Thurow, 1974). Altruistic externalities are associated with what Tobin (1970) refers to as 'specific egalitarianism', people are generally less willing to tolerate inequality of access to health care than to other commodities. Such externalities seem relevant to the market for pharmaceuticals.

Both Smolensky et al. (1977) and Smeeding (1984) treat externalities from health care as pure public goods. Whilst using different methods, both assume a constant utility value to donors (taxpayers) associated with contributing taxes for re-distribution through noncash health benefits. They do not allow for the possibility of heterogenous levels of altruism. Nor do they account for externalities that are not public goods. For example, formal health care may substitute for informal care being provided by family members, who may thus be the ultimate beneficiaries of some health care benefits. People who are employed in the health care industry or otherwise have a financial interest in the industry are also obvious beneficiaries of non-recipient benefits (Peskin, 1984). It is clear that the methods proposed in distributional analyses to account for externalities are rather limited. But this appears to be fundamental to understanding the public health care system.

However, this seems to be a minor issue in the case of the CSHC. CHSC holders have been found to be quite unresponsive to price changes to pharmaceuticals. The policy change would have little if any effect on their health. Thus externalities associated with their health status are likely to be small. Similarly, tax-payers perhaps gain less utility from the altruism of subsidising the consumption of this population than that of poorer groups. In this paper, I do not account for any externalities from the PBS concession for CSHC holders.

V The Distributional Impact

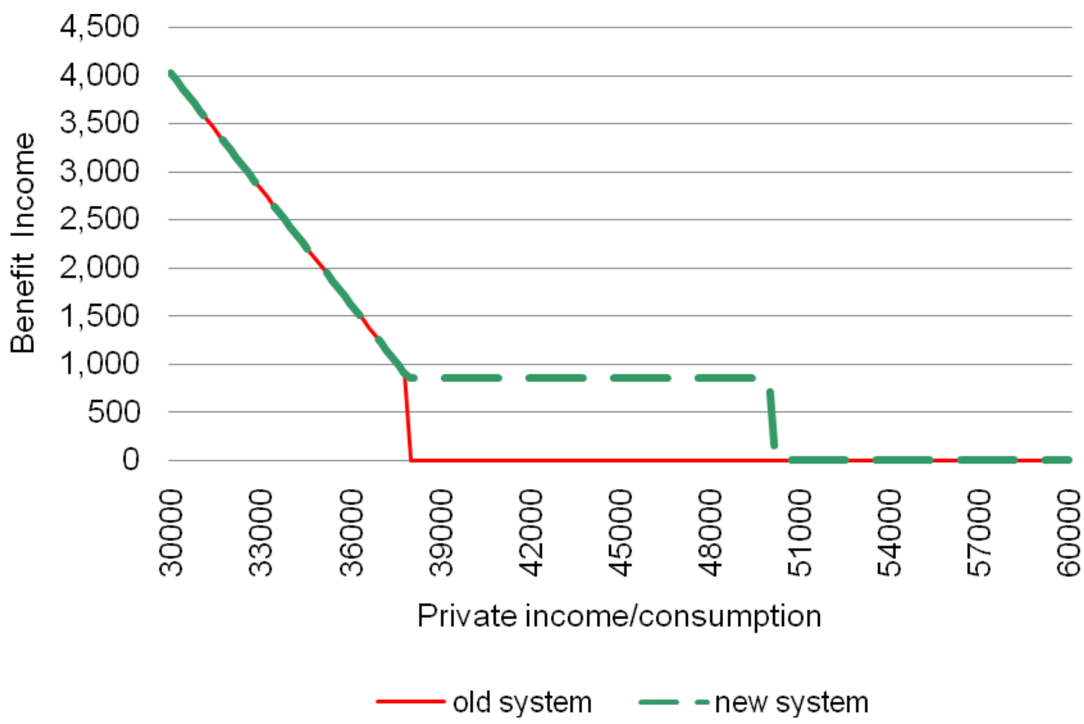
The distributional impact of the CSHC depends not only on its value to recipients, but also on several other behavioural responses which it elicits. In particular, these include decisions over saving and labour supply. The majority of this section is devoted to illustrative inter-temporal models of the possible effects of the CSHC on saving and labour supply. The source of finance for the CSHC and general equilibrium issues are also briefly discussed.

Inter-temporal Substitution

Officially, the 1999 increase in the income eligibility threshold for the CSHC was designed to 'encourage people to save for their own retirement' (Costello, 1998: 5). If CSHC eligibility does influence saving decisions, this has implications for the distributional impact of the benefit. Assume that utility is a function of consumption. If people are influenced by the CSHC to defer consumption until retirement, their pre-retirement utility would be reduced. I show that the policy change may indeed induce some rational agents to save more for retirement. For others, however, the policy change may have the opposite effect.

Saving for retirement may be affected by one or more of three behavioural responses. People may be influenced to change the balance between consumption and savings in the pre-retirement period. They may be influenced to change the timing of retirement. They may also be influenced to change the quantity of labour supplied in the pre-retirement period. To the extent that these responses are induced by the income threshold for the CSHC, they are a consequence of the interaction between private income and government benefits. The dotted line (labelled new system) in Figure 4 shows this interaction for single people in 2007 (males aged 65 and over; females aged 63 and over) who meet the age pension assets and residency tests. The benefit structure includes the average recipient value of the PBS concession as estimated in the previous section and the values in Table 2, with the following qualifications. The Seniors Concession Allowance offsets a range of concessions which age pensioners are entitled to (but CSHC holders are not). The value of these concessions for age pensioners is assumed to equal the value of the Seniors Concession Allowance. The One-off Payment is excluded from the value of the CSHC. The value of additional bulk-billing and the Medicare Safety Net are not included. The solid red line (denoted 'old system') represents a hypothetical 2007 benefit structure (for those who meet the age pension assets and residency tests) if the CSHC was abolished. This is also the benefit structure that these same people would be subject to if the 1999 reform had not occurred.

Figure 4 Annual Private Income and Benefit Income in Retirement, singles 2007*



Source: Table 2 and author's estimate of the average recipient value of CSHC ($846.60). The schedule is relevant for a person who meets Age Pension assets test and residency requirements.

Consider a simple two-period model (pre-retirement: t=0 and retirement: t=1), where a consumer maximises utility by choosing consumption in the two periods. The consumer's private income in period 0 is assumed exogenous, as is the structure of the benefit system, which depends on private consumption in period 1.[13] Assume that the consumer's utility function is additively separable over the periods. Assume also that the real interest rate is equal to the discount rate, so that the consumer's problem is to maximise total utility:

$$\max_{C_0} U = U(C_0) + U(C_1) = U(C_0) + U(I_0 - C_0 + B_1) \tag{5}$$

Where I_0 represents private income in period 0, C represents consumption and B represents benefit income. As in the previous section, assume that the utility function exhibits constant relative risk aversion with ρ equal to 3, so that:

$$U = \frac{C_0^{-2}}{-2} + \frac{(I_0 - C_0 + B_1)^{-2}}{-2} \tag{5a}$$

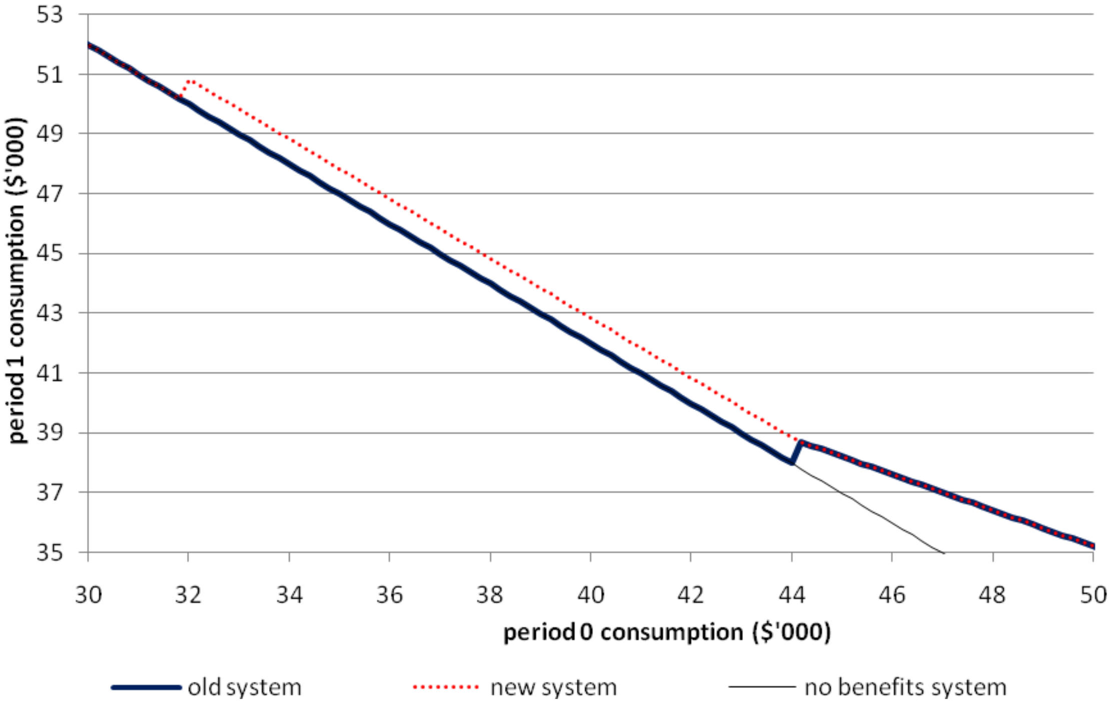
First consider a hypothetical scenario, in which no benefit income is provided in retirement (B_1=0). Taking the partial derivative of U with respect to C and solving leads to an optimum consumption of $C_0 = C_1 = I_0/2$.

The situation is more complex if one considers the role of the benefit system. The effect of the CSHC on saving differs considerably depending on I_0. To illustrate this, I consider different levels of I_0, each chosen to illustrate a different type of effect. Consider the 'old-system' benefit structure, described above. The inter-temporal budget constraint facing a consumer with I_0=\$82,000 is shown for this scenario as a thick continuous line in Figure 5, and is denoted 'old system'. Two other budget constraints are also shown. A thin continuous line depicts the budget constraint in the hypothetical case of no government benefit income. This constraint is identical to the first constraint at the points where C_1 is greater than or equal to \$37,940.50. Below this, the no-benefits line continues with the same slope. The 'old system' line has a discontinuity at this point, which reflects the effect of CSHC eligibility. It also has a more shallow gradient, which reflects the impact of the pension taper-off region, where the pension rate is contingent on private income. The third line (a red dotted line) represents the actual 2007 benefit system, which incorporates the higher income eligibility

[13] The benefit system actually depends on private income in period 1, rather than consumption. In this two-period model, all period 0 savings are converted into an annuity, which is received in full as income in period 1. In a multi-period model, this conversion of savings into income would depend on the expected number of years of survival and the number of years prior to retirement.

thresholds for the CSHC. It is labelled ‘new system’. This line has the same slope as ‘old system’ at all points. The difference is that the discontinuity is lower in the period 0 consumption schedule, at C_1= $50,000.

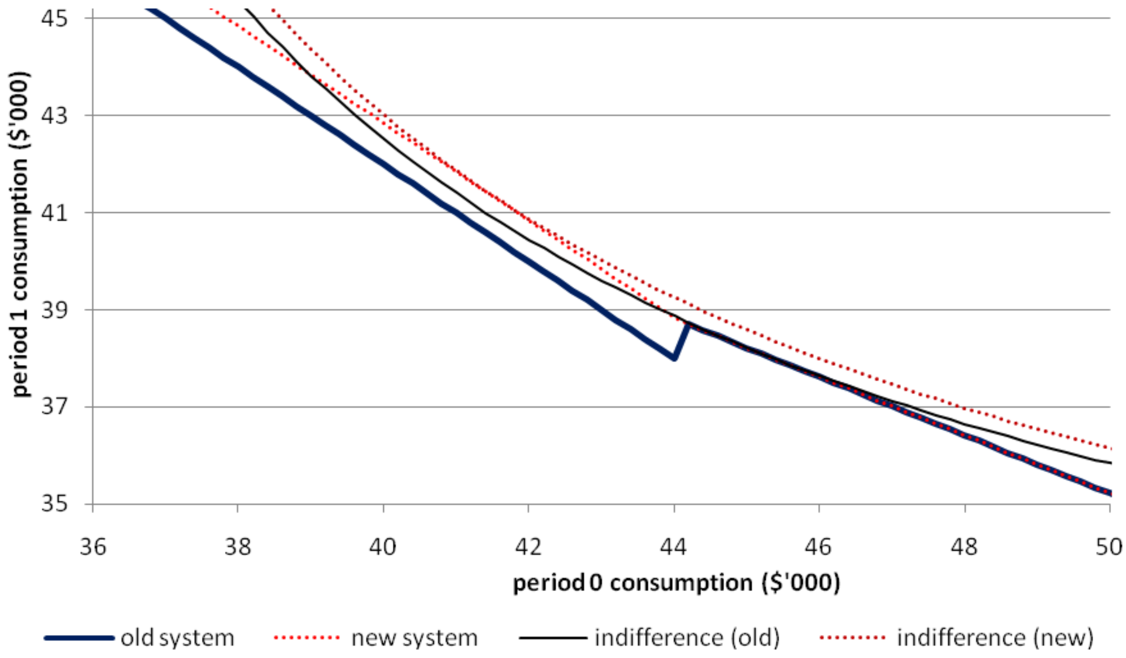
Figure 5 Inter-temporal Budget Constraints for Single Person with I_0 = $82,000



Source: see text.

The effects of the CSHC on saving can now be examined within this framework. Consider the optimal C_0 which maximizes utility. The indifference curves with the optimal level of utility under the ‘old system’ and the ‘new system’ are also shown in Figure 6, which is otherwise based on Figure 5. Under the ‘old system’, utility is highest when C_0 is equal to approximately $45,186. In the no benefits system, we know from above that utility is maximized when C_0 = $82,000/2 = $41,000. Therefore, in this stylized example, the ‘old system’ reduced saving by $4,186 over the no benefit scenario. Under the ‘new system’, utility is maximized with C_0 approximately equal to $41,423, which shows that the disincentive to saving is much smaller under the new system for I_0 = $82,000. More generally, similar results are found when $80,154 < I_0 < $83,651.

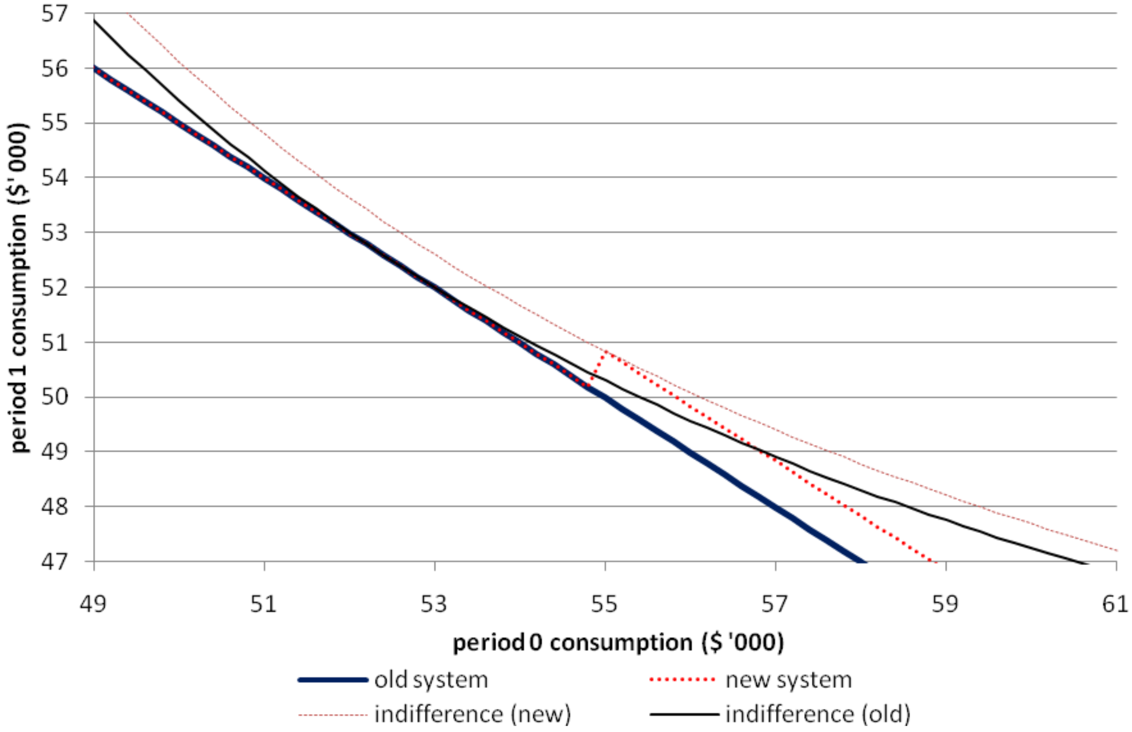
Figure 6 Inter-Temporal Budget Constraints and Indifference Curves For Single Person with I_0 = $82,000



Source: see text.

However, the new system can have the opposite effect at higher levels of I_0 due to the budget constraint discontinuity caused by CSHC eligibility. The discontinuity leads some rational decision makers to corner-solutions in the utility maximisation problem. This is shown in Figure 7 for I_0 = $105,000. Under the new system, utility is maximised at C_0 = $55,000. In the old system, the optimal C_0 is $52,500. Thus the new system discourages saving at this level of private income. More generally, corner solutions (which all correspond to decreased savings as a result of the new system) are found for $100,700 < I_0 < $108,722. The effect on saving is greatest at I_0 = $108,722, with the new system reducing optimal saving by around $4,400 as compared to the old system.

Figure 7 Inter-temporal budget constraint for single person with I_0 = $105,000

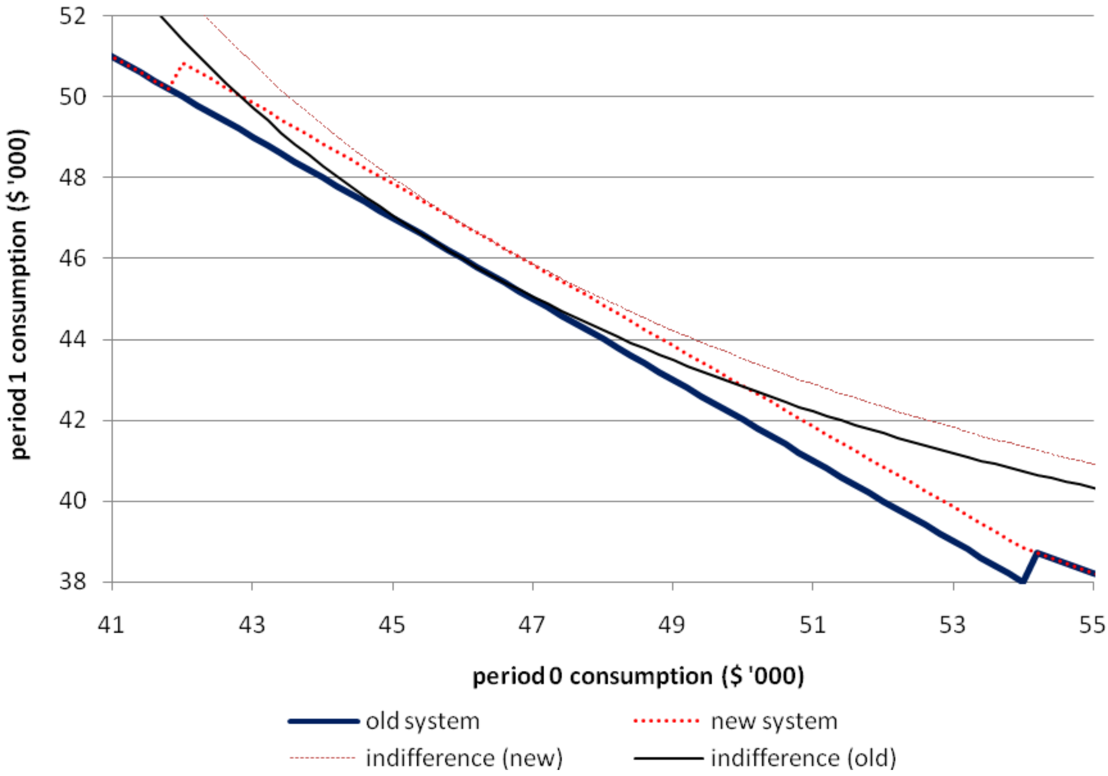


Source: see text.

For people with $83,651 < I_0 < $100,700, the policy change represents a pure wealth transfer in Period 1. The rational course of behaviour in these circumstances is a small reduction in saving, which allows the consumer to derive utility from the benefit in both periods. The indifference curves corresponding to the old and new systems are shown in Figure 8. Under the assumptions that have been adopted, the policy change would induce people in this income range to reduce savings by half the value of the CSHC.

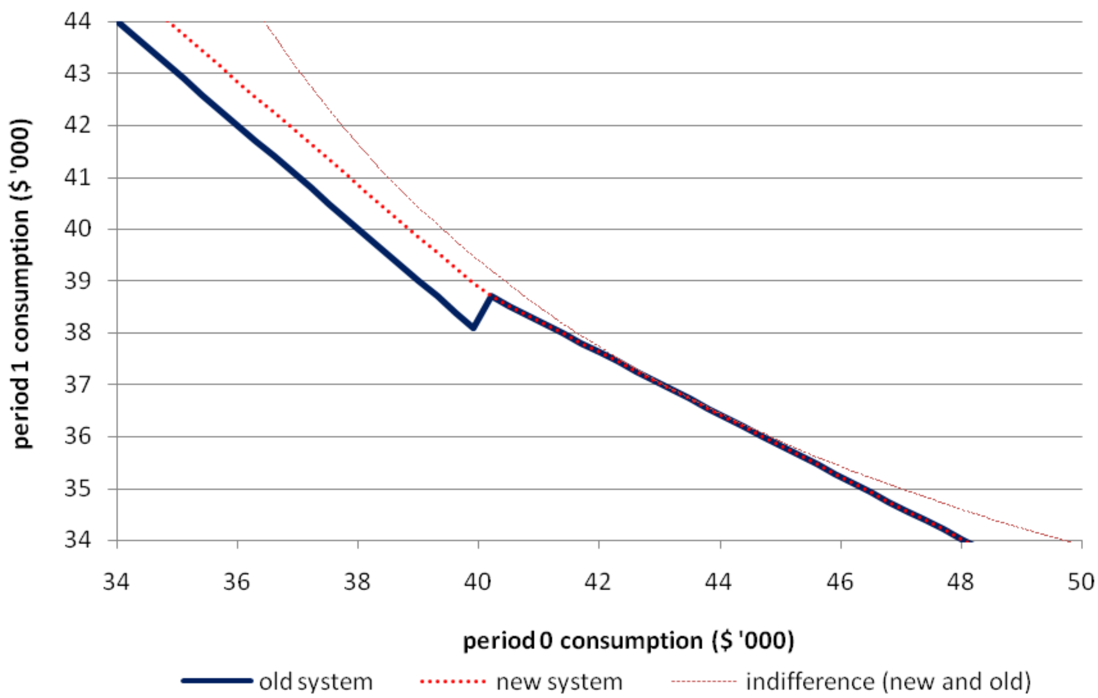
For I_0 < $80,014 the optimal consumption levels are the same for the old and new systems. This is illustrated in Figure 9 for I_0 = $78,000. The optimal C_0 = $43,500 under both the new and the old system. Similarly, the savings of rational decision makers with I_0 > $108,722 would not be altered by the policy change.

Figure 8 Inter-temporal budget constraint for single person with I_0 = $92,000



Source: see text.

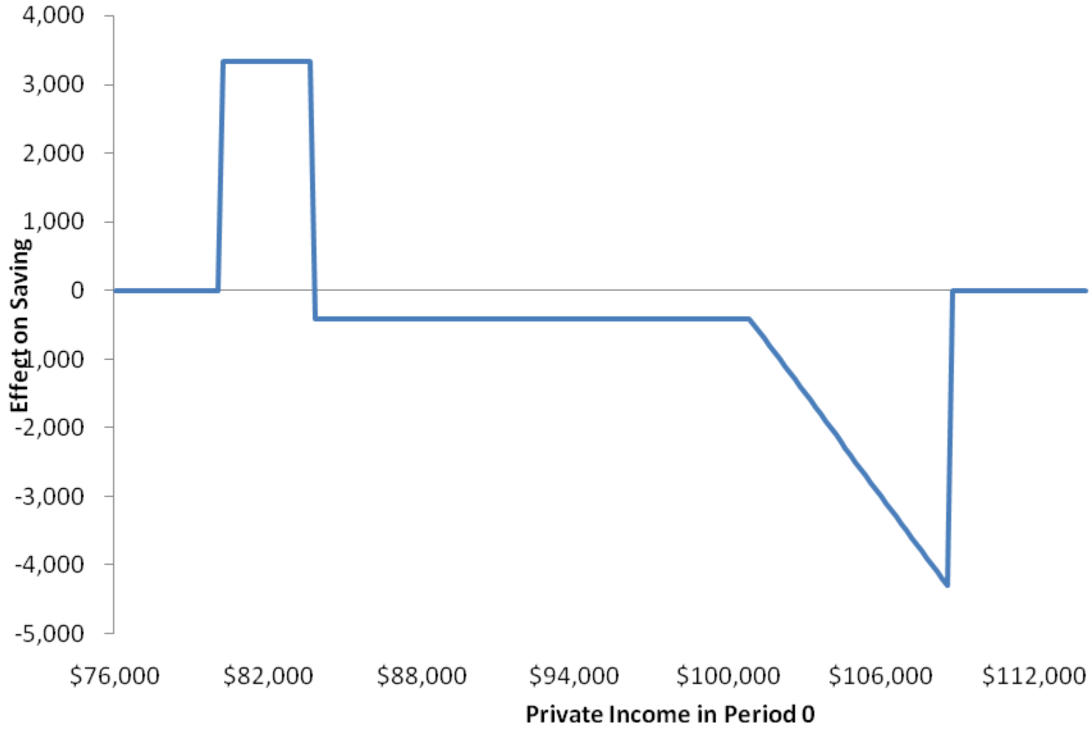
Figure 9 Inter-temporal budget constraint for single person with I_0 = $78,000



Source: see text.

The effect of the CSHC on saving is summarised in Figure 10 for Period 0 income between $76,000 and $114,000. The CSHC has no impact on saving outside of this income range. A positive value on the vertical axis denotes an increase in saving associated with the CSHC, while a negative value denotes a decrease in saving. It is clear from this graph that whilst the policy change does have a substantial positive effect on saving within a given income range, this range is quite small. The policy change has a negative effect on saving across a much large range of incomes. In this illustrative model, it is not possible to estimate the net effect on saving. If, however, Period 0 income was uniformly distributed, the net effect of the CSHC on saving would be negative. The average effect on saving would be a decrease of $489 within the income range where saving is effected by the policy change ($80,154 < I_0 < $108,722) and as mentioned above, the effect is zero outside this range.

Figure 10 Effect of Policy Change on Saving by Period 0 Income



Source: Author’s estimates. See text.

It is emphasised that the above two-period model is illustrative. The estimated savings effects at various incomes may not correspond to optimal behaviour in continuous time. In principle, this model could be extended to a multi-period model. Such a model would consider the effect of the CSHC on saving throughout the life course. This has not been pursued. The reason for this is the level of uncertainty around the effect of the policy change on the actual retirement benefits of people in the future. The income eligibility threshold is not indexed to inflation and so its real value changes every year. It is also subject to ad hoc change. For example, it was increased considerably in 2001. Age pension policy also affects the income range of people who would benefit from the CSHC. For example, the age pension taper rate was decreased from 50% to 40% in July 2000, substantially increasing the income eligibility threshold for a part pension. As a result, the income range relevant to the CSHC was reduced. To demonstrate the volatility of the relevance of the CSHC, consider its income eligibility threshold for singles. In 1999, this threshold was 93% higher than the part-rate age pension eligibility threshold. In 2007, it was just 32% higher. Furthermore, PBS copayments for both general and concessional patients are subject to change in every year and superannuation policies are regularly adjusted, adding to uncertainty over the future value of the CSHC.

Models which incorporate uncertainty can of course be developed. However, such a model would require assumptions on the probability distribution over future scenarios. Such an exercise would not seem to be useful. For the same reasons regarding uncertainty, the material change brought about by the CSHC policy change is unlikely to have influenced the savings decisions of people whose retirement is distant. On the other hand, the policy change may have been more effective as a symbol of the likely direction of future policy changes. The government has made it clear that it intends to increase support for self-funded retirees. Indeed, as discussed earlier, there have been a number of separate reforms which all add to the generosity of benefits for self-funded retirees. As a result, the CSHC reforms may indeed have increased saving for retirement.

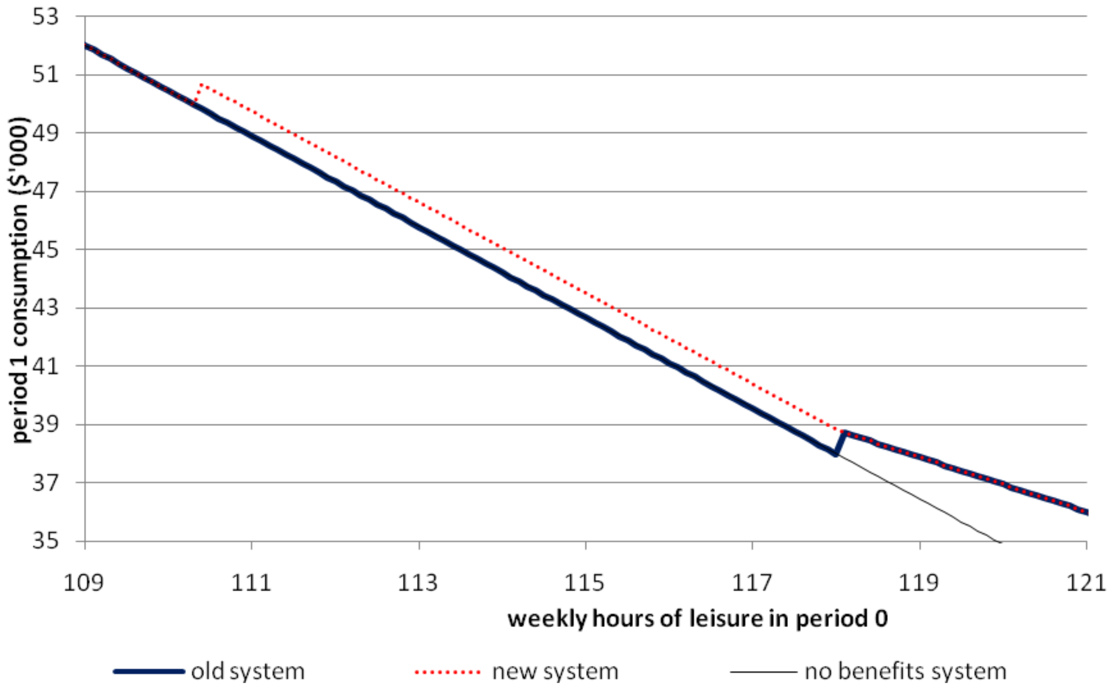
This discussion demonstrates the complexity of identifying the effect of the policy change on saving decisions. It is even more difficult to incorporate this information in a cross-sectional description of the value of the CSHC for people of different ages and incomes, and this has not been attempted. It is clear, however, that the CHSC may affect the consumption (and hence utility) of people approaching retirement. The analysis suggests that it is possible for the policy change to have affected saving in either direction. Thus it may have increased the utility of some people prior to retirement, and decreased it for others.

Labour Supply

In this section, I briefly consider possible labour supply responses by people of pre-retirement age and people of retirement age (i.e. meeting age eligibility rules for the age pension and the CSHC), respectively.

In the inter-temporal model presented above, the consumer maximises utility by choosing consumption in period 0. It treats income in period 0 (and hence labour supply) as exogenous. A complementary model might make the opposite assumptions. In this model, a consumer maximises utility by choosing the quantity of hours supplied to the labour market in period 0. Consumption in period 0 is treated as exogenous. Labour supply in period 1 is assumed to be zero, as in the previous model. The budget constraint in such a model can be expressed in terms of leisure in period 0 and consumption in period 1. Figure 11 shows two such budget constraints for C_0 = $40,000 and a wage of $30 per hour. The model abstracts from the taxation system for the purpose of the illustration. It is clear that the shape of these constraints are the same as those in the original inter-temporal model above. Assuming that utility is diminishing in leisure ($U_L > 0$, $U_{LL} < 0$) this model has similar implications for saving as the original model. To summarise, the effect of the policy change on saving is ambiguous, regardless if the effect is through a shift in the timing of consumption, or through a change in labour supply prior to retirement age.

Figure 11 Inter-temporal Budget Constraints for Single Person with C_0 = $40,000 and wage = $30 per hour

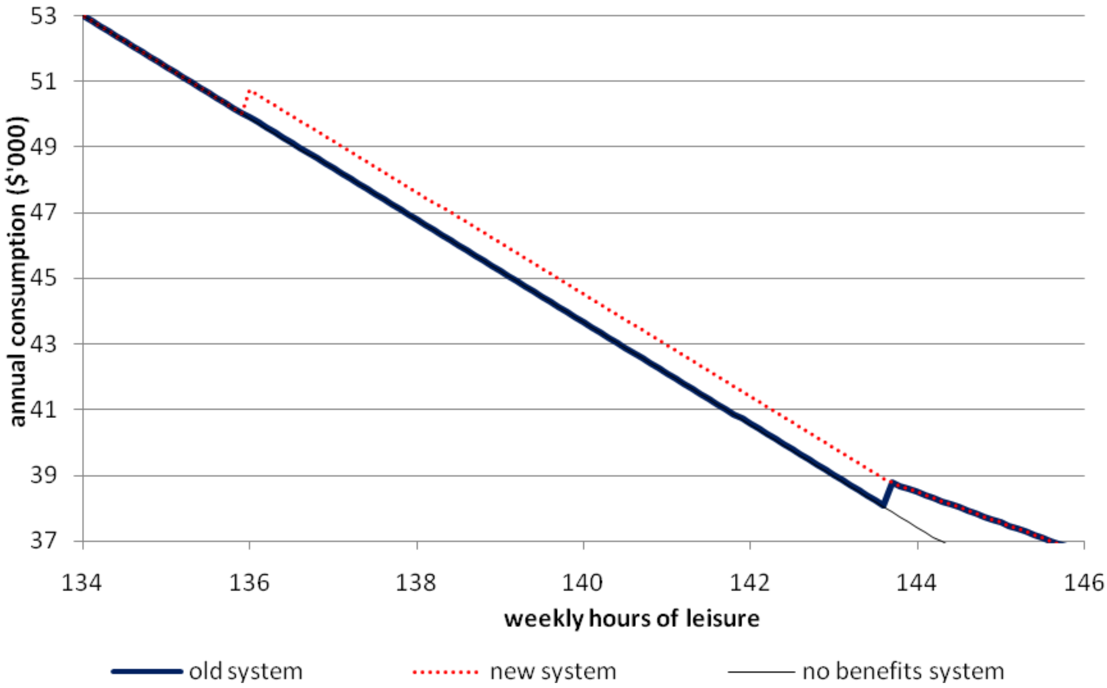


Source: see text.

Finally, the policy change may affect labour supplied by people of retirement age. Consider a single period model where utility is derived from consumption and leisure by people of retirement age.

Assume that saving in previous periods is exogenous. Figure 12 shows two such budget constraints for a single person with no savings and a wage of $30 per hour. Once again, the budget constraint has the same shape as in previous models, implying that the effect on the labour supply of older people may be positive for some and negative for others.

Figure 12 Budget Constraints for Single Person of Retirement Age with wage = $30 per hour and no savings



Source: see text.

Taxation

A complete treatment of the distributional impact of the CSHC reform must also consider the source of finance. It is necessary to construct a counterfactual which speculates on an alternative use of funds. Whilst alternate forms of spending are possible, it is convenient to assume that the freed-up resources result in a tax-cut. The incidence of a tax-cut may fall partly with the consumer and partly on producers, depending on the demand and supply elasticities of goods markets. There may also be a labour supply response to the tax-cut.

In practice, however, the financial implications of the CSHC reform are small. The total number of CSHC holders in June 2006 was 310,663 (Department of Family and Community Services, 2006). It was estimated in the previous sections that the annual cost to government per CSHC holder is $846.60 (excluding the one off payments, the value of the concessional Medicare Safety Net threshold and any additional bulk-billing). Thus the total annual cost of the CSHC is around $263m. In comparison, Australian government income taxation revenue was $176bn in 2005-06, of which $6.5bn was generated from the Medicare Levy[14]. If the CSHC was abolished and the Medicare Levy was adjusted accordingly, it would be reduced by 0.06 percentage points (to 1.44%). For a person with average earnings ($43,100 p.a. at May 2006), such a tax cut would be worth $26 per year.

General equilibrium

To consider the full implications of withdrawing benefits and providing a tax cut, consideration must be given to general equilibrium issues (see Piggott, 1987). To some degree, the prices of all goods and services in the economy may change in response to a tax-cut, and industrial restructuring may be induced as a consequence. Similarly, on the expenditure side, government spending on health care also has general equilibrium implications. A removal of government health insurance may have effects on demand in the private health care industry, as well as the possibility of changes in demand for other goods and services with, again, the possibility of industrial restructuring.

Of course these issues are much smaller for studies of small programs such as the CSHC than for studies with broader scope. For this reason, some argue that studies of the 'global' distributional impact of government are neither meaningful nor useful (Bird, 1980). In the case of the CSHC, the behavioural responses with possible general equilibrium implications are the additional income and pharmaceutical consumption of CSHC holders, changes to saving and/or labour supplied by people prior to retirement, and the loss of disposable income to tax payers to finance the benefit. No attempt has been made to model these general equilibrium effects.

VI Summary and Conclusion

This paper has estimated the value of the CSHC to recipients and considered its distributional impact. Its main feature is a series of models which demonstrate the effects of moral hazard, risk pooling and incentives to saving and labour supply. The treatment of the PBS concession is the first to explicitly model the trade-off between moral hazard and risk pooling for the utility value of an Australian public health insurance scheme.

[14] The Medicare Levy is a 1.5% levy on private taxable income. It was introduced to help fund the Medicare system when it was introduced in 1984. However, it only finances 11% of total government health expenditure (Australian Institute for Health and Welfare, 2007; Australian Government, 2007c).

In 2007, the average value of the CSHC was estimated to be $847 per card holder plus a 'one-off' cash payment of $500 and the unmeasured values of the Medicare Safety Net concessional threshold and additional bulk-billing. The largest and most difficult component to value is the PBS concession. The PBS concession may induce additional consumption which leads to a dead weight loss. It was shown that the additional utility value of the concession through eliminating risk is negligible. The preferred estimate of the average value of the PBS concession to CSHC holders is $547. This estimate is not particularly sensitive to the assumed parameters. Its average cost to government was estimated to be $665 and so the dead weight loss is equal to 18% of the cost to government. This is despite a relatively small price elasticity of demand for pharmaceuticals for this population (-0.1). Whilst the estimated dead weight loss is sensitive to the assumed parameters, it was rarely less than 10%. Given that the dead weight loss may be substantial, a cash transfer may be a more efficient use of resources. On the other hand, the concession has greater value for people with higher PBS consumption. To the extent that higher PBS consumption reflects poorer health, the concession is perhaps more equitable that the equivalent cash transfer.[15]

An illustrative model was developed to demonstrate the effects of the CSHC on incentives to save for retirement. The model demonstrates that whilst it may induce some people to save for retirement, it may have the opposite effect on others. This issue is complicated, however, by rapidly changing retirement income policies, including an increasingly generous provision of benefits to 'self-funded' retirees. Similarly, it may have a positive effect on the labour supply of some people both before and during the age of CSHC eligibility, but a negative effect on others.

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[15] The two policy options hence represent a trade-off between equity and efficiency. I do not attempt to rank the two states, since this cannot be done through objective means.

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