A Path-breaking Microsimulation Health-Econometric Model of the Australian Pharmaceutical Benefits Scheme

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Paper presented at the 25th Australian Conference Of Health Economists, 2 October 2003, Canberra
About NATSEM

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Abstract

Finding ways of curbing government expenditure on the PBS while maintaining social equity and access to ‘essential’ medicines is at the centre of ongoing public debate. This paper describes a microsimulation econometric model of the PBS that simulates current and future use and costs of PBS medicines under existing and different PBS policy settings, and estimates the distributional effects of policy changes. The paper outlines future developments that will extend the current model to include health outcomes. Adding health outcomes represents a path-breaking advancement in modelling the PBS and will advance the debate on PBS sustainability beyond the prevailing cost containment mentality to consider not only the costs of pharmaceutical use but also the benefits that result from the use of these medicines.

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Acknowledgments

The construction of the current version of the model was funded by Medicines Australia. The preparation of this paper and developments to the model are supported by an Australian Research Council linkage grant (no. LP0219571). The authors wish to thank staff of Medicines Australia for their helpful advice and assistance with the project.

General caveat

NATSEM research findings are generally based on estimated characteristics of the population. Such estimates are usually derived from the application of microsimulation modelling techniques to microdata based on sample surveys.

These estimates may be different from the actual characteristics of the population because of sampling and nonsampling errors in the microdata and because of the assumptions underlying the modelling techniques.

The microdata do not contain any information that enables identification of the individuals or families to which they refer.
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1 Introduction

Australians have enjoyed access to ‘cheap’ medicines for over fifty years via Australia’s Pharmaceutical Benefits Scheme (PBS). However, the fiscal sustainability of the PBS, and in particular the continued funding of what appears to be ever-increasing government outlays on subsidised prescribed medicines, is now being fervently questioned within federal health and financial public policy circles. Finding ways of curbing government expenditure on the PBS while maintaining social equity and access to ‘essential’ medicines is at the centre of an ongoing and often emotionally charged public debate. This debate has been brought into sharp focus in the last couple of years with blow-outs in PBS expenditures combined with the entry, or imminent entry, into the pharmaceutical market of new high cost biotechnology drugs and other innovative targeted therapies. While these new drugs have the potential to deliver significant health benefits, often to those with previously unmanageable conditions, they present new challenges to the existing PBS. The PBS is under intense and unprecedented pressure, and these new ‘era’ drugs are likely to add considerably to the already high growth rates of PBS costs (Brown et al, 2002).

However, while current tensions, arising from the rapid increases in expenditures on pharmaceuticals and the demand for new high-tech high cost drugs, are expected to become even more prominent in the future, decision support tools to help policy makers respond to these issues in the most socially equitable and economically efficient ways are scarce. The lack of availability of sophisticated decision support tools in the health field, and more specifically in pharmaceuticals, stands in marked contrast to the high quality of information available to policymakers in the social security and income tax arenas.

Public ‘economic’ policy questions usually involve the analysis of the cost and (re-)distributional impacts of changes in policy – What are the costs (or savings) to government versus the community? Who are the winners and who are the losers? Microsimulation models
are being used to examine the nature of policy and the detailed effects of structural changes. These models typically have been applied to government policy in the taxation, social security and welfare fields, and have frequently played a decisive role in determining whether or not particular policies are implemented. Yet, despite having made a major contribution to the development of tax/cash transfer policies, there are some key areas of public policy to which microsimulation has not yet or only recently been applied – health for example (Brown and Harding, 2002).

This paper describes a microsimulation econometric model of the PBS. The model simulates current and future use and costs of PBS medicines under existing PBS and different policy settings, and estimates the distributional effects of policy changes. The conceptual and technical constructs of the model, data inputs and forecast outputs are outlined. However, to present a more comprehensive picture of the contribution of pharmaceuticals to the Australian economy, and to advance the debate on PBS sustainability (i.e. move the discussion beyond the prevailing cost containment mentality), not only do the costs of pharmaceutical use but also the benefits that result from the use of these medicines need to be modelled. The paper outlines future developments that will extend the current model to include health outcomes. Adding health outcomes represents a path-breaking advancement in modelling the PBS and in informing this public policy debate. Before the model is discussed, a brief overview of the PBS is given as well as an introduction to microsimulation modelling.

2 Background

2.1 Overview of the PBS

The Commonwealth Government’s Pharmaceutical Benefits Scheme (PBS) was designed originally in 1948 to provide access for all Australians to a 'free-list' of life-saving medicines. It now aims to provide Australians with timely, reliable and affordable access to necessary and cost-effective prescription medicines (DHA, 2001).
Today, a comprehensive range of medicines is included on the PBS, with the majority of prescribed drug sales being covered by the scheme. Medicines must be approved for use in Australia and then be assessed as being cost effective in order to be PBS listed. As at 1 May 2002, the PBS covered 593 drug substances (generic drugs), available in 1,461 forms and strengths (items) and marketed as 2,506 different drug products (brands). Many PBS items, however, are restricted in their subsidised use – some 785 items are restricted to specific indications, patient groups or clinical settings that achieve the optimal clinical benefit and cost effectiveness (restricted listing); with 286 of these restricted items further requiring the prescribing doctor to obtain prior approval from the Health Insurance Commission (HIC) to prescribe under subsidy to the individual patient (“Authority required” items). These two mechanisms function as cost containment arrangements by limiting usage to fewer patients.

Patient copayments are the consumer contribution to the cost of PBS listed medicines. Low income individuals and families eligible for certain Commonwealth Government pensions and allowances, however, are able to access PBS medicines at concessional rates. The PBS ‘Safety Net’ arrangements also operate to protect individuals and families from large overall expenses. The Government pays the additional cost of drugs exceeding patient copayments up to a benchmark price only. If a PBS item is priced above the benchmark price then the consumer is required to also pay this differential.

Levels of patient copayments and the PBS safety net arrangements are referred to as the ‘PBS policy settings’. Patient copayments and safety net thresholds are normally indexed to movements in the Consumer Price Index from 1 January each year. Once a family that does not have concessional status records spending beyond the general patient safety net limit in a calendar year, they are required to pay only the concessional copayment for each further PBS medicine within the same year. For concessional patients, there is no cost once their families have a record of spending beyond the concessional safety net limit in a calendar year. In this case, the government pays the full price of all further PBS medicines prescribed within the
Each year, on 1 January, the safety net for each family is effectively reset to zero for administrative purposes.

Much of the current concern over the PBS stems from the affordability of the drugs and government and consumers’ willingness to pay. Federal government expenditure on the PBS has been one of the fastest growing areas of government outlays over the past decade, with significant budget blow-outs in recent years. Since the early 1990s, PBS expenditures have grown at over 10 percent a year (Figure 1) - well above growth in GDP (4 percent) or in the total health budget (6 percent). In 2001-02, government expenditure on the PBS increased by 20.0% (Figure 1). Meanwhile PBS settings, in general, have increased only in line with inflation. In recent budgets, the government has increased the level of contributions to be met by PBS patients and delisted certain medicines from the Pharmaceutical Benefits Schedule. Further, the May 2002 Federal budget aimed to introduce a near-28% increase in PBS copayments and safety net thresholds. Although these budget measures were blocked in Senate, in releasing the 2003 Budget, the Federal Treasurer re-iterated the need for such measures to be introduced. The PBS is an uncapped scheme. It has been estimated that if current trends and rules governing the PBS remain unchanged then the cost of the Scheme to government could increase four-five fold by 2020 (Walker et al, 2000; Commonwealth of Australia, 2002).

On average, the government subsidises patients to the extent of 84% of PBS drug costs. Nearly 80% of total government PBS subsidies accrue to concessional patients. There is, however, evidence that the strains upon consumers are increasing. Recent research suggests that the purchase of PBS subsidised prescription drugs amounts to a considerable proportion of the income of the working poor who are not eligible for concessional status under the PBS (Walker, 2000).
Although members of the pharmaceutical industry, in general, note that the PBS is seen internationally as one of the best in the world, they also are deeply concerned about some aspects of the PBS. Key issues identified in a recent report on the funding of high cost biotech drugs on the PBS (Brown et al, 2002) included: difficulties in the listing process, particularly the use of cost-effectiveness ratios as a pivotal decision-making tool and logistical problems and the lack of transparency in the approval process; the pricing of new drugs and misconceptions surrounding the likely costs to government of new drugs if listed; and delays in listing with the possibility that Australians may not have prompt access to the same new and more efficacious drugs as consumers in the rest of the developed world.

2.2 Microsimulation Models
An overview of what is microsimulation, the various types of models, some of the technical characteristics and considerations, and examples of model applications can be found in
NATSEM paper – Modelling the PBS

Harding (1996) and Gupta and Kapur (2000). Basically, microsimulation models are: by
definition quantitative; typically complex and large; and more commonly static, deterministic,
non-behavioural and non-spatial - although new microsimulation models are emerging that
are increasingly dynamic, encompass behavioural elements, or are designed as spatial
(regional) models (Brown and Harding, 2002). Microsimulation models are distinctive in that
they are based on microdata i.e. "low-level" population data, typically the unit records of
individuals from a national sample survey conducted by a national Bureau of Statistics, or
administrative records of individual clients or consumers.

One of the most important advantages of large scale microsimulation models is, that
being based on unit records, it is possible to examine the effects of policy changes for
narrowly defined ranges of individuals or demographic groups (Creedy, 2001). They can
mirror the heterogeneity in the population, replicate the complexity of the policy structures,
transfers and settings, and be used to forecast in detail the outcomes of policy changes and
'what if' scenarios i.e. the results can describe what may happen to particular individuals and
groups under specified conditions (Brown and Harding, 2002). Microsimulation models are
now used extensively throughout the industrialised world.

Although, the idea of analysing the impact of social and economic policies by
simulating the behaviour and characteristics of individual decision-making units was
pioneered in the US in the 1950s (Orcutt 1957; Orcutt et al 1961), microsimulation models
were only introduced into Australia in the mid-1980s. The National Centre for Social and
Economic Modelling (NATSEM) is Australia’s specialist microsimulation modelling centre,
established at the University of Canberra in 1993. NATSEM’s models and results are now
used by a wide range of government and non-government clients, the models playing an
important role in national public policy debate.
2.3 Modelling the PBS

Various modelling approaches can be used to project PBS script volumes and expenditures. The simplest is to use a ‘means’ group i.e. a cell-based model where the average per person script use and expenditure amounts, typically by age and gender, are derived for different demographic groups, and age and gender population projections then used to estimate future script volumes and total costs. Such an approach has the advantage of being simple and quick to develop and can readily estimate changes when the analysis is confined to aggregates. However, as Schofield (1999) shows it also has the disadvantage of greatly undervaluing the subsidies provided to low income families who are the main beneficiaries of the PBS. In contrast, microsimulation techniques bring a range of benefits including the ability to change a greater variety of parameters independently and the capacity to provide considerably more accurate and detailed estimates of PBS services and benefits and distributional effects of policy changes.

The model discussed in this paper (known as the MA Model) is a more comprehensive and sophisticated version of an original microsimulation model of the PBS developed in the late 1990s by NATSEM for the Pharmaceutical Benefits Branch of the then Department of Health and Family Services (Walker et al, 1998; Walker et al, 2000; and Walker 2000). In 2001, NATSEM was contracted by the Australian Pharmaceuticals Manufacturers’ Association (APMA), now Medicines Australia (MA), to develop a model of the distributional and economic impact of Australia’s pharmaceutical industry and the Pharmaceutical Benefits Scheme (PBS). The original model has been extensively revised and upgraded in successive stages over the past two years. The goal is to be able to simulate the widest possible variety of changes - in the drugs listed under the PBS, in their prices, in the rules (settings) of the PBS, in government versus consumer outlays, and in the distributional impacts.
3 Structure of the Model

The MA model is made up of two modules - an econometric Medicine Module and a forecasting microsimulation Patient Module. The ‘Base Case’ represents the situation where no policy changes occur (except CPI indexed increases in PBS settings).

3.1 Overview of the Medicine Module

The Medicine Module projects, using regression modelling, total scripts and average costs per script for 19 drug classes. Trends in these data then serve as inputs to the forecasting version of the Patient Module. The Medicine Module is based on data provided by HIC on monthly government expenditure and scripts between Jan 1992 - Jun 2002 for all items listed on the PBS. Since HIC collects data for each script on whether it was purchased by a concessional or a general patient, it is possible to estimate patient level expenditures. Drug groups are classified by therapeutic class for the Medicine Module, first by mapping the HIC PBS codes to the ATC codes, and second, the ATC codes to the 19 forecast groups used in the Medicine Module.

Regression equations - based on trend, seasonality and time related dummy variables to improve the fit and predictive ability of the models - are constructed for both the average cost and script data for each of the 19 forecast groups. The Medicine Module provides five-year forecasts i.e. July 2002 to June 2007 for each forecast group, using a monthly forecast interval. The aim was to keep the Medicine Module simple in terms of the predictive variables used in the forecast regression equations and, where possible, the functional form of the regression models specified as logarithmic, linear or exponential depending on the best statistical fit.
3.2 Overview of the Patient Module

The Patient Module is composed of two parts – an input dataset and a forecasting component. The main input dataset is at the person-level (i.e. each record pertains to an individual with a family identifier to link family members) with individual characteristics and data on drug usage across the 19 drug classes by sex, age and card status. The unit of analysis can be the individual, the family, or aggregate levels (e.g. by groupings of income ranges and/or drug classes). In forecasting mode, the scripts data in the person-level dataset are revised each year to be consistent with the aggregate level of scripts estimated in the Medicine Module.

Individual-level data on demographic, socio-economic and drug usage patterns are obtained to construct the model’s base using several sources. These data are then consolidated and aged or uprated to the base year (2001-02). A second dataset on the costs of the pharmaceuticals is then prepared, using a distribution of average per script costs at the ATC level for each of the drug classes in that year. These cost data are then merged onto the patient-based dataset, allowing estimation of the costs of the drugs used by each individual in the Patient Module. By aggregating individual-level costs, the model is able to estimate total patient and government expenditures on PBS prescribed drugs over the base year. These aggregates are ‘aligned’ such that they match actual administrative data on PBS scripts for 2001-02. In forecasting mode, the module can then project PBS scripts and expenditures for the next five years (i.e. from 2002-03 to 2006-07).

Stage 1 - Creating the main input dataset: Four data sources are combined at the unit-record level to create the patient module's basefile (i.e. the combined dataset is comprised of individuals, each described by a set of pooled relevant characteristics): individual records derived from the 2001A version of STINMOD\(^1\) based on the ABS 1998-99 Household Expenditure Survey (HES) form the base population dataset; the ABS 1995 National Health Survey (NHS) is used to derive information on the usage of prescribed pharmaceuticals across the 19 drug classes, by age, gender and concessional (i.e. ‘card’) status; weekly
household expenditures on prescribed pharmaceuticals are obtained from the ABS 1998-99 HES; and administrative data on PBS scripts and costs across the 19 drug classes from HIC’s time series collection. The process of combining the datasets is outlined in Figure 2.

The model's population database is the non-institutionalised population that spends on prescribed drugs i.e. the dataset contains only spenders on prescribed medicines. A proportion of households with concessional safety net status i.e. a proportion of families with concessional card status that did not spend on prescribed drugs are included in the dataset to represent concessional cardholders that had reached the safety net. For the most part, however, the model’s population database excludes persons (and their families) that have no expenditure on prescribed drugs. It also excludes persons living in institutionalised care, for example, hospitals or nursing homes. Prescribed drug usage figures at ages above 70 years, therefore, are likely to be under-estimates. The input dataset contains a separate record for each adult and child. Links between family members are maintained since the PBS rules regarding safety net thresholds concern total expenditures by families on prescribed drugs.

Adding indicators on script usage from the NHS is difficult - the number (from one drug to a maximum of 7 drugs) and type of drugs (from among the 19 drug groups) consumed by each of 64 age-sex-concession cardholder status groups is imputed from the NHS to the Patient Module’s main dataset. As a result, each person in the Patient Module had one or more of the 19 drug types allocated to them, so that within each card, age and gender cell, the drug usage pattern in the model matches the usage pattern in the NHS.

The dataset is further modified such that the imputed total number of scripts by the 19-drug classification is consistent with HIC data on actual scripts for the base year 2001-02. In aligning the model to administrative data in this way, the pool of prescribed medicine scripts is separated into three groups: Group 1 scripts comprise drugs with a cost to government under the PBS; Group 2 scripts comprise PBS listed prescribed medicines not attracting a
Figure 2 Combining the NHS, STINMOD, HES and HIC datasets

Group number and type of drugs consumed by sex, five-year age group and card status

GROUP DATA

2001 STINMOD (output)

Add HES data on weekly spending on prescribed drugs, and select only those with positive spending

Create data records for children

1998-99 HES

Extract weekly spending on prescribed drugs

MAIN INPUT DATASET

Impute number and type of drugs used by sex, age and card status from NHS onto STINMOD dataset, allocating more scripts to persons with higher drug spending

Align model with 2001-02 HIC scripts (revise scripts per person so aggregates match HIC numbers).

2001-02 HIC (scripts)

government subsidy i.e. scripts with a total cost (or price) below the PBS copayment level; and Group 3 scripts comprise prescribed drugs not listed under the PBS.

Because the alignment process needs to be carried out against observed administrative data, it is only done once for the base year (2001-02). Then throughout the forecasting period, the group assignment of each observation remains unchanged. The focus of the model is the segment of the population that uses Group 1 scripts i.e. scripts listed on the PBS that incur a government subsidy. By definition, this excludes drugs whose price is lower than current copayment rates.

Stage 2 – Simulating the PBS and forecasting scripts and expenditures: Once the main person-based dataset of the Patient Module has been prepared, the PBS is modelled by applying the rules of the scheme to each individual and family in the dataset over an 18-
month period on a two-weekly basis starting on 1 January (that is, when each family’s safety net threshold is reset to zero). The safety net operates on a calendar year basis and therefore needs to be modelled over this period. To reconcile this with the need to generate statistics on a financial year basis, statistics are produced on scripts and costs for both the first and last 12 months of the 18 month simulation period. Results are aggregated for four groups of patients – concessional patients above the safety net (C0), concessional below the safety net (C1), general above the safety net (G1) and general below the safety net (G2).

Briefly, the steps carried out within the second stage of the Patient Module for the base year involve: 1) allowing users of the model to specify the policy settings of the scheme (copayment levels and safety net thresholds over the simulation period for concessional and general patients); 2) simulating the scheme by computing the costs associated with the scripts imputed to individuals and identifying below and above safety net patient expenditures for concessional and general patients; 3) computing government contributions as: total costs less patient contributions; and 4) creating detailed output datasets for concessional and general patients.

The same process is carried out to generate scripts and expenditures for the forecast years (2001-02 to 2006-07), except that instead of using actual data on scripts and costs, the model reads in data on scripts and costs estimated based on trends of aggregate scripts and costs (the sum for concessional and general patients) as generated by the Medicine Module for each of the 19 drug groups.

A schedule of the SAS programs developed to create the database and run the model for the base year and forecast years, is shown in Figures 3 to 5.
Figure 3  MA model main dataset construction programs

**PROG 1.SAS**
Run STINMOD01a, generate datafile on families = family dataset

**PROG 2.SAS**
Create individual records for children using the datafile on families = child dataset

**PROG 3.SAS**
In the datafile on families:
(i) Create individual records for adults in the model (persons aged 15 and over) = adult dataset
(ii) Identify families with concession cards, identify potential self-funded retirees

**PROG 4.SAS**
(i) Extract household expenditure on prescribed drugs from HES dataset, add this variable to model dataset on adults;
(ii) Add 0-14 year olds to adult dataset = model dataset, including children and adults
(iii) Limit the number of adults with senior's cards, to be consistent with Centrelink numbers.

**PROG 5.SAS**
Create data extract from NHS 1995 on drug usage based on revised drug classification (19 drug groups)

**PROG 6.SAS**
Read in NHS 1995 data extract

**PROG 7.SAS**
Impute number and type of drugs from NHS 1995 to model dataset by card status, age group and sex. Do this for all persons with positive expenditure on prescribed drugs and a certain % of cardholders with zero expenditure on drugs.

**PROG 8.SAS**
Generate revised person weights for base year to be consistent with revised ABS population projections for the household population that spends on prescribed drugs; uprate income variable

**PROG 9.SAS**
Select self-funded retirees from the pool of potential self funded retirees

**PROG 10.SAS**
Align model scripts for the 19 drug groups to HIC data, for card and general patients = main model input dataset
Figure 4  MA model control programs (base year)

PROG 11.SAS
Read in detailed HIC data on scripts and costs by PBS item; generate HIC summary data by ATC code and ATC subgroup

PROG 13.SAS
Read in PBS settings on copayments and SNT thresholds

PROG 12.SAS
Read HIC summary data and generate dataset on base year price distribution; each of the 19 drug groups can have from 1-10 drug subgroups

PROG 14-1.SAS
Run model and generate PBS costs for cardholders

PROG 14-2.SAS
Run model and generate PBS costs for non-cardholders

PROG 15.SAS
Generate standard output tables on scripts, costs and family drug spending as a proportion of income
Figure 5 MA model control program (forecasts)

PROG 8 forecast.SAS
Generate revised person weights for every forecast year to be consistent with revised ABS population projections for the household population that spends on prescribed drugs; uprate income variable

PROG 16 forecast.SAS
For every forecast year, scale up number of imputed prescribed drugs [DTYPE1- DTYPE19] based on growth in scripts between base and forecast year

PROG 13 forecast.SAS
Read in PBS settings on copayments and SNT thresholds

PROG 11 forecast.SAS
Read in detailed HIC data on scripts and costs by PBS item; generate HIC summary data by ATC code and ATC subgroup

PROG 12 forecast.SAS
Read HIC summary data and generate dataset on forecast year price distribution; each of the 19 drug groups can have from 1-10 drug subgroups

PROG 14-1 forecast.SAS
Run model and generate PBS costs for cardholders

PROG 14-2 forecast.SAS
Run model and generate PBS costs for non-cardholders

PROG 15.SAS
Generate standard output tables on scripts, costs and family drug spending as a proportion of income
4 Selected Details of the Modelling Process

4.1 Up-rating the Population Base

The model’s base population is up-rated to reflect changes in concession cardholder eligibility, population projections and changes in family incomes. Any changes to Commonwealth Government eligibility criteria for concessional cardholder status need to be incorporated into the model. For example, from 1 January 1999, the income thresholds for self-funded retirees’ eligibility to the Commonwealth Seniors Health Card (CSHC) were raised. The Commonwealth Seniors Health Card reduces the cost of prescription medicines for Australians of ‘Age Pension’ age, but who do not qualify for the Age Pension. Centrelink indicated that they expected about 220,000 additional self-funded retirees to qualify for the Seniors’ card with a take-up rate of about 50%. From 1 July 2001, the Commonwealth Government again raised the income thresholds for self-funded retirees’ eligibility to the CSHC - Centrelink identified that these changes increased the number of CSHC cardholders by approximately 31,760 individuals. These policy changes were incorporated into the model taking into consideration the fact that the input datasets on which the model was based were all pre-1999, at which time these policies had not yet taken place.

The Patient Module’s population is up-rated year by year, over the forecast period, in line with the ABS five year age-sex group projections. The ABS population projections are scaled down so that the population represents only individuals who live in households and who spend on prescribed drugs i.e. the non-institutionalised prescribed drug user population. The ‘target’ five year age-sex groups for each of the forecast year populations are entered into the software package ‘CALMAR” to derive new person-weights. A weight represents the likelihood of finding persons with a similar set of characteristics in the Australian population. Weights are provided in the ABS surveys but these apply to the time of the surveys and therefore need to be adjusted to better match updated numbers and compositional changes in
the population. The module’s population is up-rated by changing the person-weights (originating from the 1998-99 STINMOD) to those generated by CALMAR.

The Patient Module’s database is also up-rated to reflect likely increases in family disposable incomes. A uniform rate of change in income, regardless of income class, is assumed. Family disposable incomes are up-rated by the trend growth of male average weekly earnings of 3.356% pa over the last ten years (1992-2002).

4.2 Updating PBS Settings

In addition the PBS policy settings – copayments and safety net thresholds (SNT) – are updated to the settings operational from the base year. Projections of PBS settings for the forecast period are made by up-rating the current PBS settings in line with expected changes in the CPI. Given that there seem to be no reasons why CPI changes over the next few years should diverge markedly from longer term trends, it is assumed for the base case forecasts that copayments and SNTs will increase by 2.5% per annum.

The levels of copayments and safety net thresholds for the base year (2001-02) are given in Table 1. Assuming a 2.5% per annum growth rate from 1 Jan 2001, the levels reached by 1 Jan 2006 are $3.96 for concessional patients below safety net and $24.77 for general patients below safety, with safety net threshold for concessional patients of $205.91 and $757.70 for general patients. It is assumed that the proportion of scripts of families allowed to reach the safety net threshold will remain at the 2001-02 levels throughout the forecasting period i.e. at 21.8% for concessional patients and 20.0% for general patients on a calendar year basis. These proportions are based on PBS data provided by HIC on the actual number of scripts per patient category.
Table 1  Policy settings of the Pharmaceutical Benefits Scheme for 2001-2002

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<thead>
<tr>
<th></th>
<th>1/1/2001</th>
<th>1/1/2002</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
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<tr>
<td>Copayment - Concessional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below safety net</td>
<td>3.50</td>
<td>3.60</td>
</tr>
<tr>
<td>Above safety net</td>
<td>0</td>
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<tr>
<td>Copayment - General</td>
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<td>Below safety net</td>
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<tr>
<td>Safety net - Concessional</td>
<td>182.00</td>
<td>187.20</td>
</tr>
<tr>
<td>Safety net - General</td>
<td>669.70</td>
<td>686.40</td>
</tr>
</tbody>
</table>

Source: Department of Health and Ageing website.

4.3  Handling drugs ‘falling out’ of the PBS

As the model only covers PBS subsidised drugs, in the original PBS model when the average price of a drug falls below the copayment, then the drug “drops out” of the model and the associated scripts and costs are no longer counted. This feature of the model posed problems when formulating alternative scenarios wherein the price of some drugs fell below copayment. In such cases, the model would stop counting the associated scripts and costs and results were not comparable with the base case. For example, if a particular scenario raised the copayment, one would expect patient costs to increase but in some cases, there was in fact a decline in patient costs as a result of drugs falling out of the PBS.

To address this problem, the model code was revised such that all scripts and costs were counted even when the settings in a particular scenario would have caused some fall-out from the PBS. Additional tables were generated on the proportion of drugs ‘falling out’ of the PBS that had been originally counted in the base case.
4.4 Distributional approach to drug pricing

A distributional approach to pricing with a function representing the variations that exist across prices within each drug class now has replaced the use of average prices per drug class. Total expenditures were initially estimated using the average price of each drug class as generated by the medicine module. For each of the 19 drug groupings, the average price was computed as total expenditure on PBS prescribed drugs in that drug group divided by total number of corresponding scripts:

\[ \text{Average price} = \frac{\text{total expenditure}}{\text{no. of scripts}} = \frac{\sum w^i p^i}{\sum w^i} \]

where \( w^i = \) no. of scripts for drug subgroup \( i \); \( i = 1 \) to \( n \); \( n = \) no. of subgroups

\( p^i = \) average price of drug subgroup \( i \); and

\( \sum w^i = \) total no. of scripts for all drug subgroups

Average prices for specific drugs would be the same for all patient types. However, average prices for drug groups, an aggregation of various specific drugs categorised into one group, may vary across different patient types depending on the composition and cost of specific drugs within each drug group. For most drug groups, there is a significant difference between the average price for concessional and general patients, with the average price for general patients being significantly higher for most drug groups. The major reason for this is not differences in consumption (or that general patients consume the more expensive drugs), but rather, difference in scope or definition. Recall that the PBS data only covers PBS prescribed drugs. Since general patients have a much higher copayment rate, lower cost drugs whose average price fall below the copayment rate for general patients are not included in the PBS data, whereas these are included for concessional patients whose copayment rate is much lower.
Two different sets of average prices were read in by the Patient Module - one set of average prices for C0, C1 and G1 patients and another set of average prices for G2 patients. C0 patients pay nothing for drugs they consume. C1 and G1 patients pay the lower copayment rate for concessional patients, while G2 patients pay the copayment rate for general patients. C0, C1 and G1 patients were aggregated since the average price they pay per drug group are not too dissimilar. G2 patients are classified into another group since the average prices they pay per drug group are much higher.

The use of average prices in the MA model was justified on the basis of simplicity. However, as the model moves to a more complex one, one option to better approximate reality is to input a distribution of prices for each of the 19 drug groups (at a greater level of disaggregation, at the ATC level) rather than simply using the average price per drug group. For example, stomach medications (drug group 13) for concessional patients and general patients that reached the safety net (CG1) had an average price of $38.50 in 2001-02. This price composed three subgroups: drugs to treat peptic ulcer (A02B) with an average price ($P_i$) of $40.40 and accounting for 98.2% of scripts ($w_i$); antacids (A02A), $12.40 and 1.1%; and stomatological preparations, $8.70 and 0.7% respectively.

While the model based on average prices produced accurate results at the aggregate level, as discussed above, some drug groups did ‘drop-out’ of the model in scenarios where the average price falls below simulated copayment levels for general patients. The incorporation of a set of prices rather than one average price to some extent overcomes this ‘drop-out’ problem.

5 Model Validation

An important element of model building is validation with the credibility of any model being dependent on the reliability of the input data and the construction of the model. The MA model was validated by: comparing the distribution of the imputed number of drugs per
individual in the model with the original script distribution from the NHS, for both general
and concessional patient groups with a close match being found; and comparing the Patient
Module’s output on aggregate scripts and costs with actual figures for 2001-02. The model
closely replicates actual numbers and is able to closely approximate scripts for each of the 19
drug classes.

As the key function of the model is to be able to examine the implications of policy
changes, it is crucial that the model produces reliable and accurate results when running
scenarios. The model was therefore further tested and validated by simulating the projected
outcomes from changes in the PBS settings as announced in the 2002 federal budget and
checked against the estimates produced by the Commonwealth Government (Commonwealth
of Australia, 2002a). When announcing the new policy settings, the related changes were
estimated to result in about $1,056m in net savings to government\textsuperscript{ii} over the following four
years. The MA model estimates of total PBS government expenditures for the period 2001-02
were virtually identical to the Budget estimate and for the period 2002-06 closely
approximated government estimates (within 5.5%). Differences in assumptions are likely to
explain the gap between the Budget estimates and those generated by the MA model.

6 Standard Model Output
Because of the differences in the rules affecting concessional and general patients, the model
generates two output datasets - one for concessional patients and the other for general
patients. These are then combined for purposes of preparing ‘easy to read’ tables. Standard
tabulations, distinguishing between concessional and general patients, are generated for the
base year, for each of the forecast years of the base case, and where appropriate for alternative
scenarios, on the following: scripts and costs (patient, government, total) for 19 drug classes
for concessional, general and all patients; scripts, patient costs and government costs by 5-
year age groups, concessional and general patients; scripts by gender, 19 drug types,
concessional and general patients; family spending on subsidised PBS drugs as a share of family disposable income, by income quintile, concessional and general patients; and patient distribution by age of family head, family type, by income quintile, concessional and general patients.

Three examples of the types of results that can be produced by the model are given in Tables 2 and 3, and Figure 6. As seen from Table 2, while the total volume of PBS scripts is expected to increase by 14% over the five year forecast period, the total cost of the PBS increases by some 33%. Cholesterol and triglyceride lowering drugs, stomach medications and cancer therapies are shown to contribute significantly to this growth in expenditure (Table 3).

A particular strength of the microsimulation approach is its capability to generate an indicator of the affordability of PBS patient expenditures to poor and rich Australian families. This is a major advantage of the microsimulation approach since distributional issues are much harder to handle with other types of models. Figure 6 illustrates the type of distributional information that the model is able to provide. The general and concessional patient population have each been divided into five equal groups ranked by equivalent disposable (after tax) family income i.e. into income quintiles, and the average family spending per week on PBS drugs as a proportion of average weekly disposable weekly income per family is then calculated for each group. The figure shows at the family level that the poorest families devote a higher proportion of their after tax income to PBS subsidised drugs. In January 2002, families with concessional patients were estimated to have spent between 0.6% and 1.0% of their family weekly disposable income on PBS-subsidised drugs, while the poorest general patient families spent 0.5% compared with 0.1-0.2% for the higher general patient income quintiles.
Table 2 Model forecast of aggregate scripts and costs

<table>
<thead>
<tr>
<th></th>
<th>Model projection ('000s)</th>
<th>Percent increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001-2</td>
<td>2006-7</td>
</tr>
<tr>
<td><strong>SCRIPTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concessional</td>
<td>129,842</td>
<td>145,563</td>
</tr>
<tr>
<td>General</td>
<td>23,930</td>
<td>29,362</td>
</tr>
<tr>
<td>Concessional + General</td>
<td>153,771</td>
<td>174,925</td>
</tr>
<tr>
<td><strong>COSTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concessional</td>
<td>3,741,199</td>
<td>4,903,085</td>
</tr>
<tr>
<td>Patient</td>
<td>361,330</td>
<td>461,501</td>
</tr>
<tr>
<td>Government</td>
<td>3,379,869</td>
<td>4,441,584</td>
</tr>
<tr>
<td>General</td>
<td>1,307,372</td>
<td>1,805,310</td>
</tr>
<tr>
<td>Patient</td>
<td>441,230</td>
<td>615,935</td>
</tr>
<tr>
<td>Government</td>
<td>866,142</td>
<td>1,189,375</td>
</tr>
<tr>
<td>Concessional + General</td>
<td>5,048,571</td>
<td>6,708,394</td>
</tr>
<tr>
<td>Patient</td>
<td>802,559</td>
<td>1,077,435</td>
</tr>
<tr>
<td>Government</td>
<td>4,246,011</td>
<td>5,630,959</td>
</tr>
</tbody>
</table>

Note at this stage of the model’s development, it is only possible to estimate PBS patient expenditures as a proportion of disposable income (at the level of the family) in a notional 1–14 January ‘window’ - a time when safety net thresholds had just been reset to zero. What cannot be obtained at this stage is a yearly estimate of a particular family’s (or an income-based group of families) expenditure as a share of their after tax income.

It also should be noted that the above results are for the entire population, not just for those who actually purchased PBS pharmaceuticals during our fortnightly window. Thus, in essence, the above results average out the effects for those who are and are not sick during this period. In earlier work, NATSEM has published estimates of the proportion of disposable income devoted by families to the purchase of PBS drugs (Walker, 1999; NATSEM news issue 18, February 2002). These proportions are much higher than those shown here because the earlier work referred only to those families who used PBS subsidised drugs during the fortnightly window. In contrast, the averages presented in Figure 6 include the entire population, whether they did or did not use PBS subsidised drugs.
Table 3 Model forecast of scripts and costs by drug group: 2001-02 and 2006-07

<table>
<thead>
<tr>
<th>Description</th>
<th>Scripts</th>
<th>Total Costs ($'000s)</th>
<th>% Change</th>
<th>2001-02 %</th>
<th>2006-07 %</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Anti-inflammatories</td>
<td>8,507,293</td>
<td>8,924,277</td>
<td>5</td>
<td>249,867</td>
<td>260,636</td>
<td>4</td>
</tr>
<tr>
<td>2 Anti-asthmatics</td>
<td>9,780,309</td>
<td>9,922,932</td>
<td>1</td>
<td>368,781</td>
<td>416,856</td>
<td>13</td>
</tr>
<tr>
<td>3 Diabetes medications</td>
<td>4,234,469</td>
<td>5,328,602</td>
<td>26</td>
<td>167,049</td>
<td>219,628</td>
<td>31</td>
</tr>
<tr>
<td>4 Vasodilators and beta blockers</td>
<td>6,575,862</td>
<td>6,649,379</td>
<td>1</td>
<td>124,255</td>
<td>130,951</td>
<td>5</td>
</tr>
<tr>
<td>5 ACE inhibitors</td>
<td>10,151,785</td>
<td>10,835,743</td>
<td>7</td>
<td>277,792</td>
<td>280,978</td>
<td>1</td>
</tr>
<tr>
<td>6 Angiotensin IIs</td>
<td>5,844,772</td>
<td>9,269,699</td>
<td>59</td>
<td>171,416</td>
<td>239,244</td>
<td>40</td>
</tr>
<tr>
<td>7 Calcium channel blockers</td>
<td>7,157,541</td>
<td>7,899,729</td>
<td>10</td>
<td>183,406</td>
<td>217,076</td>
<td>18</td>
</tr>
<tr>
<td>8 Cholesterol and triglyceride reducers</td>
<td>12,181,051</td>
<td>19,259,922</td>
<td>58</td>
<td>740,413</td>
<td>1,094,956</td>
<td>48</td>
</tr>
<tr>
<td>9 Analgesic medications</td>
<td>9,756,252</td>
<td>11,411,279</td>
<td>17</td>
<td>135,684</td>
<td>188,302</td>
<td>39</td>
</tr>
<tr>
<td>10 Anti-psychotics</td>
<td>1,439,180</td>
<td>1,724,054</td>
<td>20</td>
<td>184,314</td>
<td>255,272</td>
<td>38</td>
</tr>
<tr>
<td>11 Anxiolytics and hypnotics</td>
<td>6,111,236</td>
<td>6,264,319</td>
<td>3</td>
<td>44,587</td>
<td>46,037</td>
<td>3</td>
</tr>
<tr>
<td>12 Anti-depressants</td>
<td>9,853,512</td>
<td>12,616,815</td>
<td>28</td>
<td>341,042</td>
<td>471,921</td>
<td>38</td>
</tr>
<tr>
<td>13 Stomach medications</td>
<td>10,345,165</td>
<td>13,051,263</td>
<td>26</td>
<td>422,361</td>
<td>597,731</td>
<td>42</td>
</tr>
<tr>
<td>14 Anti-biotics</td>
<td>11,254,266</td>
<td>9,916,106</td>
<td>-12</td>
<td>185,313</td>
<td>184,070</td>
<td>-1</td>
</tr>
<tr>
<td>15 Anti-neoplastics</td>
<td>968,944</td>
<td>1,175,214</td>
<td>21</td>
<td>318,403</td>
<td>644,468</td>
<td>102</td>
</tr>
<tr>
<td>16 Genitourinary</td>
<td>6,288,959</td>
<td>6,478,922</td>
<td>3</td>
<td>161,080</td>
<td>197,802</td>
<td>23</td>
</tr>
<tr>
<td>17 Anti-epileptics</td>
<td>1,474,269</td>
<td>1,722,015</td>
<td>17</td>
<td>89,362</td>
<td>127,278</td>
<td>42</td>
</tr>
<tr>
<td>18 Direct acting antivirals</td>
<td>302,772</td>
<td>423,622</td>
<td>40</td>
<td>70,427</td>
<td>108,494</td>
<td>54</td>
</tr>
<tr>
<td>19 All other medications</td>
<td>31,543,756</td>
<td>32,051,491</td>
<td>2</td>
<td>813,017</td>
<td>1,026,694</td>
<td>26</td>
</tr>
<tr>
<td>All</td>
<td>153,771,392</td>
<td>174,925,384</td>
<td>14</td>
<td>5,048,571</td>
<td>6,708,394</td>
<td>33</td>
</tr>
</tbody>
</table>
Figure 6  Proportion of fortnightly family income spent on PBS subsidised drugs by concessional and general patient families, Jan 1-14 2002

7  Future Enhancements

While the model has been significantly upgraded over the past year, there are three major areas on which the model can be further developed and enhanced, with respect to both technical aspects of the modelling and its application to policy and research on pharmaceuticals in general and the PBS in particular. The fundamental task of incorporating health outcomes into the existing expenditure and distributional microsimulation model of the PBS is an entirely new area of work. It is at the cutting edge internationally in terms of both modelling and health outcomes research.

7.1  Modelling the safety net

Currently, the share of over safety net scripts to total scripts is a user-specified variable in the model, with the default (defined separately for general and concessional patients) being the actual share reached in the base year 2001-02. The safety net is modelled at the family level.
Two conditions specified in the model for a family to reach the safety net are that (a) the family's drug expenditure reaches the SNT threshold, and that (b) the share of total scripts of families that have already reached the SNT does not yet exceed the default value specified. Given that the above conditions relate to both costs and scripts, there needs to be some consistency between model inputs relating to these.

As stated earlier, difficulties are encountered in fully modelling the effects of the safety net due to reliance on survey data and because the safety net rule applies to the total spending on PBS medicines by a family in a calendar year. Data on the drugs used during the course of a year by a particular family are not available. Instead, all that is available is the two-week sample of drug use provided by the national health survey. To derive annual estimates, the standard practice is to multiply the two-week figures by 26. For most purposes this provides fairly reliable estimates, but it is not adequate for modelling the PBS safety net. For chronic conditions (when drugs are used regularly throughout the year), multiplying the NHS two-weekly figures by 26 should give a fair estimate of annual drug consumption. For non-chronic conditions, multiplying by 26 would give correct aggregate estimates within the age-sex-card cells but over-specify drug consumption for individuals and families. Thus, families consuming drugs for non-chronic conditions may incorrectly be shown to reach the safety net when in actuality, the consumption of such drugs should have been spread out over several families, none of whom may have reached the safety net.

As a result, the current version of the model constrains the proportion of scripts beyond the safety net limits to that available from administrative data. This results in correct cost estimates by drug type. Most of the scenarios specify either a proposed change in copayment levels or drug prices. Such changes would likely involve changing the number of families reaching the safety net. While for the base case, the model can be run without changing the safety net-related information, this is not necessarily so when running the scenarios. There would be a need for the user to specify the likely change in the proportion of
scripts reaching the safety net following the changes in copayments, etc. that are being simulated (Walker, Percival and Fischer 1998, pp. 27-31).

The model is being modified so that it is able to simulate changes to the safety net features of the PBS. To do this, its population base first needs to be extended - from the prescribed drug users identified in the two-week window covered by the NHS, to all prescribed drug users in the population over a full year. Also, there is a need to distinguish between drugs for chronic conditions and non-chronic conditions. Finally, data on annual rather than fortnightly drug usage is required. With these modifications, there would be no need to constrain the proportion of scripts beyond the safety net limits, or the likely change in the proportion of scripts reaching the SNT following changes in copayments that are being simulated. Further, the analysis of patient PBS medicine costs as a proportion of disposable income, by income quintile, need not be restricted to the 1–14 January ‘window’.

A review of actual data on the proportion of families reaching the SNT shows that this varies across the different drug classes. This factor should be considered in modelling the SNT in order to more closely approximate actual costs incurred. (The current model is able to align scripts in the base year model to exactly match actual HIC statistics by each of the 19 drug classes, but patient and government expenditures are not as closely matched).

7.2 Incorporating Elasticities of Demand

Each scenario is based on ‘static’ i.e. non-behavioural modelling, in that it is assumed there is no patient response (behavioural change) to any changes proposed in copayment rates or prices. Other than being a standard practice in microsimulation modelling, it is reasonable to make this assumption as real world data as to how patients would react are not currently available. Therefore, to date it has not been possible to build reliable parameters into the model, and automate such responses.
However, NATSEM has run some scenarios incorporating price elasticities in a simple way by modifying script inputs read in by the Patient Module, using estimates on price elasticity provided by Medicines Australia. Such demand responses can be built into the model if appropriate data are available. The demand response to changing prices can be estimated differentiating between drug groups, concessional and general patients, or one year after the change in price or copayment or for longer periods thereafter. If price elasticities are built into the model, then care needs to be taken that the demand response is not overstated or double counted in cases of drugs dropping-out when the average drug price falls below copayment levels.

7.3 Adding a Health Outcomes Module

To date, the primary utility of the model has been based on its capability to generate PBS expenditures based on various price and copayment assumptions, as well as to estimate the corresponding effects on families belonging to various income groups. While the model has provided valuable insights into the effects of various policies on government expenditure on PBS medicines and equity, it does not have the capability to quantify the value that pharmaceutical spending delivers. To present a more comprehensive picture of the contribution of pharmaceuticals to the economy, not only do the costs but also the benefits that it delivers particularly in the form of improved health outcomes need to be presented. This is the focus of a 3-year ARC linkage grant recently obtained by NATSEM and Medicines Australia as the industry partner.

This extension will be more complex and resource intensive than the modelling attempted to date. Modelling health outcomes presents a range of theoretical and practical challenges, particularly at the high level of aggregation at which the MA model currently operates. There are limitations in the methodology and data available for health outcomes modelling which will need to be explored and overcome in extending the model.
The introduction of diseases into the model’s dataset is the necessary first step to developing a facility in the model to measure health outcomes. Adding variables on disease patterns will complement the variables already available on drug usage and cost patterns. This will enable the model to be used, for example, to examine options that raise copayment thresholds for general patients but simultaneously protect the chronically ill through safety net provisions.

For various reasons, the existing Patient Module produces adequate aggregate estimates, but the usage of pharmaceuticals as imputed onto the person-level dataset is not based on actual disease patterns, and the patterns of drug usage for individuals are not in accordance with disease profiles and clinical practice. The current clinical inconsistency in the allocation of multiple drugs to individual users needs to be overcome, and drug usage at the level of the individual needs to match disease patterns in the model.

It appears at this stage that the best way to add these enhancements to the Patient Module is to replace the existing Patient Module database with the 2001 ABS National Health Survey confidentialised unit record files (CURF). The unit record files of the NHS have been chosen because they are the best source of coherent information across not only illnesses and drugs, but also health risk factors. As the 2001 NHS contains less detail on prescribed drugs than the 1995 NHS, it not intended that the 2001 NHS is used as the sole basis of the enhanced Patient Module. Instead, the 2001 NHS will be used to benchmark certain key changes in prescribed drug behaviour (i.e. one goal will be to update the 1995 NHS to match key changes shown in the 2001 NHS).

The next step is to quantify health outcomes. A scoping study has been undertaken to identify a recommended approach for the development of the ‘health outcomes module’. The scoping study addressed three key methodological tasks: the selection of health indicators as possible measures of health outcomes; identification of methodological approaches for relating pharmaceutical use and expenditure to health outcomes; and data requirements and
data sources. The perspective adopted in the scoping study reflects the key underlying policy issue – namely what health benefits are derived from newer drugs compared to older drugs. This focus was chosen as it is the new molecules that are in part driving the costs of the PBS.

The development of the methodology will involve two key tasks: 1) to specify and add measures of health outcomes into the model’s basefile - these may be clinical endpoints specific to disease categories (e.g. heart attacks, strokes); deaths; rates of hospitalisation; or summary measures such as years of life lost, years lived with a disability, disability adjusted life years etc.; and 2) to develop a method for evaluating the relationship between health outcomes and the use of and expenditure on PBS medicines. A key outcome of the scoping study is that it gave rise to two complementary methodological approaches that could be pursued in tandem: a cost-effectiveness analysis type method incorporating intervention analysis to compare outcomes by drug vintage; and a regression modelling approach as demonstrated by American researchers Frank Lichtenberg and Susan Horn to determine causality between drug age and health outcomes.

The cost effectiveness approach would follow, in general, the principles of a cost effectiveness or cost utility analysis. The regression modelling method follows standard multiple linear regression modelling in which health outcomes are modelled as a function of pharmaceutical use and other co-variates. The main problem is whether or not Lichtenberg and Horn’s work, or variants thereof, can be replicated given the available datasets. An argument underpinning the use of regression modelling is that the resultant equations can be used to identify the incremental effects of changing the drug-parameters on health outcomes.

Once the modelling approach has been decided upon, the health outcomes module will be piloted in one of the model's therapeutic areas, and then rolled out to other selected therapeutic areas. Candidate areas for the pilot will be chosen on the basis of the ease of modelling outcomes and the availability of data. Given the current emphases within health policy and national health information systems, it may be prudent to build the test module
using one of the national health priority areas (NHPAs) as the case study. Also updated data are available for the NHPAs from the 2001 NHS. Further, it would seem sensible to focus on a high cost disease area, drug classes with new molecules, and an emotive i.e. topical area. It would also be sensible to choose a case study where the benefits of drug intervention are well known and documented. As there is likely to be a problem with confounding variables then the case study also should be selected to minimise this impact if possible.

On completion, the health outcomes extension will ideally be able to quantify the benefits that additional spending in different therapeutic areas is likely to deliver in terms of: reduced morbidity and mortality; savings to the health and welfare systems; and other social and economic benefits e.g. increased work force participation.

8 Conclusions

This paper describes a microsimulation model that NATSEM developed for Medicines Australia to model the distributional and other impacts of the PBS. The model has provided valuable insights into the effects of various policies on government expenditure on PBS medicines and on patient equity. By focusing the analysis on PBS costs, however, one risks further entrenching the cost containment mentality that currently dominates the debate on PBS sustainability. The authors recognise the need to consider not only the costs associated with pharmaceuticals, but also the associated benefits including continued access to new medicines in Australia.

The opportunity to further improve the model was realised when NATSEM was awarded an ARC Linkage grant. The most important features of the model that could stand improvement are in the areas of modelling the safety net and quantifying the health benefits of future pharmaceutical innovations. These future enhancements will result in an immensely powerful model that can be used to help influence policy and public debate about pharmaceuticals and the PBS. The types of policy questions that could be analysed will
extend from relatively simple issues e.g. the impact of expected changes in PBS subsidised drug prices and scripts over the next 5 to 10 years on government PBS outlays, patient out-of-pocket expenditures and related revenues to industry; to measuring the likely impact of, for example, the introduction of new PBS listed drugs, the effects of demographic and socio-economic changes upon outlays, or the distributional and revenue impact of certain changes in the rules of the PBS (eg. introduction of differential copayment levels); and to far more advanced questions such as: what would be the cost and distributional impacts of changing the Safety Net provisions of the current PBS scheme? How would pharmaceutical usage and costs change in response to the earlier onset of diseases expected from the significant increases in obesity over the past five years amongst Australia's children and young adults? How would the introduction of a new drug able to control obesity alter the above results; or what would the ranking of various future pharmaceutical policy options be in terms of their health benefits relative to their costs?

Unless GDP growth accelerates significantly, or PBS expenditures grow well below historic rates in the future, difficult decisions will have to be made about priorities in health funding. Likely future growth in government outlays on the PBS is a cause for government concern. Future increases in expenditure will be partly driven by population ageing but also by the introduction of new high cost biotechnology and other targeted drugs and (forecast) increases in drug prices. If Australia is to enjoy ongoing access to new medicines then the debate on funding pharmaceuticals must be broadened to consider the benefits that these medicines will bring. The significance of the type of modelling outlined in this paper is that this new path-breaking PBS model will increase Australia's capacity for making informed decisions about the rules of this scheme and, ultimately, about the overall social and economic value of the PBS to Australian society and to specific members of the community.
References


Schofield, D. 1999, Modelling health care expenditure: a new microsimulation approach to simulating the distributional impact of the Pharmaceutical Benefits Scheme, PhD in Information Sciences and Engineering, University of Canberra.


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i STINMOD is NATSEM’s static microsimulation model that models the impact of the personal income tax and social security systems on Australian families.

ii This is the savings to the Department of Health and Ageing portfolio from changes in the PBS settings – a further savings of $59.7m accrue to the Department of Veteran’s Affairs through savings from the RPBS.