



Australian
National
University

CENTRE FOR SOCIAL
RESEARCH & METHODS



PolicyMod: Microsimulation Model for the Australian Tax and Transfer System

December 2023

Ben Phillips, Cukkoo Joseph and Richard Webster

Contents

Section 1: Overview	4
Section 2: Overview of PolicyMod and types of analysis	5
Overview of PolicyMod	5
Types of Analysis	7
Distributional Analysis.....	7
Distributional EMTR Analysis	7
Cameo analysis.....	9
Regional analysis	10
Dynamic Income and Retirement Income analysis	14
Synthetic Survey Creation and Household Income and Housing Cost Projection	16
Section 3: Basefile creation	16
Steps involved in Basefile creation.....	17
Data	17
Household file	18
Income unit file	18
Person file.....	19
Upgrading	20
Read in parameters	22
Policy Modules	22
Benchmarking	25
Section 3: Definition of income variables	28
Section 4: Policy Modules in Detail.....	31
Pensions: DVA, AGE, DSP, PPS and CARER.....	31
Allowances: Youth Allowance, Newstart Allowance, Parenting Payment Partnered.....	33
Family Tax Benefits.....	35
Special Supplements and other payments:.....	37
Childcare	37
Tax and Medicare levy.....	38
Section 5: How to use PolicyMod	42
Section 6: Using PolicyMod.....	43
Making parameter changes	43
Making policy changes	45

Analysing Results of PolicyMod	46
Example of PolicyMod policy change – Change to Stage 3 Tax Cuts.....	47
Section 7: PolicyMod Summary and Potential Future Developments	52

Section 1: Overview

PolicyMod is a microsimulation model of the Australian Tax and Transfer system developed by the Centre for Social Research and Methods at the Australian National University. PolicyMod can model most components of the Australian personal income taxation and transfer system including existing and alternative policy settings. The model is primarily designed for analysing the distributional impacts of policy change in the previous years, current year and over the forward estimates (typically 3 or 4 years beyond the current financial year). However, the model can project the policy impacts out to 2059-60. PolicyMod is also capable of cameo analysis (policy analysis of hypothetical families). The model is a static (day-after) model and can be executed in SAS Enterprise Guide or Base SAS.

The distributional model considers the entire Australian population and can estimate the policy impacts for a vast array of variables such as family type, income deciles, housing tenure and social security payment type while the cameo model provides policy outcomes for selected families like single parents for a range of private incomes¹.

The major components of PolicyMod are the **PolicyMod basefile creation process** and **'alternative' basefile datasets** which are generated from the original basefiles after running the alternative policy code and parameters.

PolicyMod is based on the ABS Survey of Income and Housing (currently SIH 2019-20). The model allows users to expand the standard base to include some important additional parts of the Australian tax and transfer system such as indirect taxes and GST.

This documentation provides the details on how the model has been developed, the main steps involved in the basefile creation and policy modules, the process to run the model and a brief description of how to analyse the policy outcomes of PolicyMod.

Microsimulation models

Microsimulation models perform detailed analysis of specific policies based on micro-level data. Microsimulation modelling is often used to evaluate the effect of proposed interventions before they are implemented in the real world. Microsimulation models are mainly used to simulate government programs, demographic and economic changes for current or alternative policy or economic scenarios. It allows detailed assessment of the change in the financial situation for individuals or groups of individuals or households (same cohorts) or the whole population.

The main types of microsimulation modelling include:

- **Static models:** The model is purely 'static' in nature and results relate to day-after impacts. It does not incorporate any behavioural changes. **PolicyMod is a static microsimulation model.** Similar models include CAPITA (Commonwealth Treasury), and STINMOD (NATSEM)

¹ Technically the data underlying PolicyMod excludes remote communities and those living in non-private dwellings, however, the model has been benchmarked to the full Australian population.

- **Behavioural models:** Microsimulation models can add behavioural responses resulting from policy change. For instance, a change in Childcare policy can affect participation in the workforce. Similar models include MITTS (Melbourne Institute) and Treasury's CAPITA-B
- **Dynamic models:** The model dynamically predicts the demographics and other variables over time including age, labour force status, income and so forth. These models are useful in the areas of superannuation, pensions and HECS. PolicyMod has an ad-on capability to model dynamic changes in incomes and in particular superannuation into the future. This dynamic capability extends the initial basefiles in PolicyMod and the dynamics is based on observed income transition data in the ABS Census longitudinal data set which was obtained in the ABS Census TableBuilder product. Other examples include APPSIM, DYNAMOD (NATSEM), and MARIA (Treasury).
- **Spatial models:** Spatial microsimulation models can provide estimates of policy change at a regional level. These models often combine survey data with administration or census data to add to the regional content of the data. PolicyMod is available in a regional form where PolicyMod basefiles have been combined with ABS Census regional data along with a range of other regional data sources such as welfare, house prices and superannuation data. Other examples include SPTIALMSM (developed by NATSEM).
- **Micro-Macro models:** These models can link micro and macro models and can be used for considering the distributional impacts from macroeconomic changes such as terms of trade shocks or changes in indirect taxes such as a GST or carbon pricing that may have broad economic impacts across an economy. PolicyMod does not incorporate such a capability.

Section 2: Overview of PolicyMod and types of analysis

Overview of PolicyMod

This section explains the major features of the base version of PolicyMod. PolicyMod contains two major elements: 1) basefile creation code and 2) basefile parameters. PolicyMod also includes alternative basefile code and alternative parameters to model changes to policy or economic and demographic outcomes. The code models the eligibility and entitlement to a range of welfare payments and calculates personal income tax liability. The key concept within PolicyMod is the calculation of disposable income for each person and for their income unit and household. Underlying this calculation is a vast array of detailed calculations to simulate the tax and welfare system for Australia.

The starting point for each person, income unit and household is the ABS survey of income and housing. This survey has very detailed information on personal income, both private income and income that relates to welfare, such as age pension, Jobseeker, and childcare payments.

PolicyMod strips away the survey's welfare and taxation data and simulates that data. Why do we need to simulate that data when it's already there? Historically, the ABS based their welfare data on self-reporting. Increasingly this data is obtained by the ABS calculating their own simulated data for welfare eligibility and entitlement. In the future, it's quite possible the ABS will be able to link

respondents to their actual welfare payments based on government administration data. Regardless of the ABS collection method we still need to simulate our own estimate. We do this as our estimate is usually for years beyond the survey data which is usually 'old'. For example, we currently base our model on the 2019-20 ABS income survey, but our analysis is usually for the latest financial year or some year into the future. Policy may have changed since the survey and complicated indexation rules can make it more challenging to estimate future welfare payments. Additionally, we need our own estimate for the base world and we need to compare that estimate to a potentially different policy so it makes sense to simulate our own estimate within PolicyMod. If we were to estimate a new alternative policy we have no guarantee that the counterfactual policy (the base world) as developed by the ABS will have exactly the same set of rules and methods that we are applying in our alternative policy (outside the change we are simulating).

The policy modules of PolicyMod includes:

- **Pensions:** Age Pension, Disability Support Pension, Parenting Payment Single, DVA and Carer pension
- **Allowances:** Newstart Allowance, Youth Allowance, ABSTUDY/AUSTUDY and Parenting Payment Partnered
- **Family Tax Benefits:** Family Tax Benefits Part A and Family Tax Benefits Part B
- **Childcare:** Childcare Benefits and Childcare Rebate and for more recent years the childcare subsidy
- **Tax and Medicare Levy:** Personal Income Taxation, Medicare Levy, LITO, LMITO, SAPTO and BENTO,
- **Other payments and supplements:** Pharmaceutical Allowance, Telephone Allowance, Energy Supplements, Rent assistance, Income Support Bonus, Carer Allowance, Carer Supplements, School Kids Bonus and Pensioner Education Supplement.

Supporting these modules are the parameters spreadsheet which provides most of the necessary dollar values and other policy related parameters the modules require to estimate eligibility and entitlement.

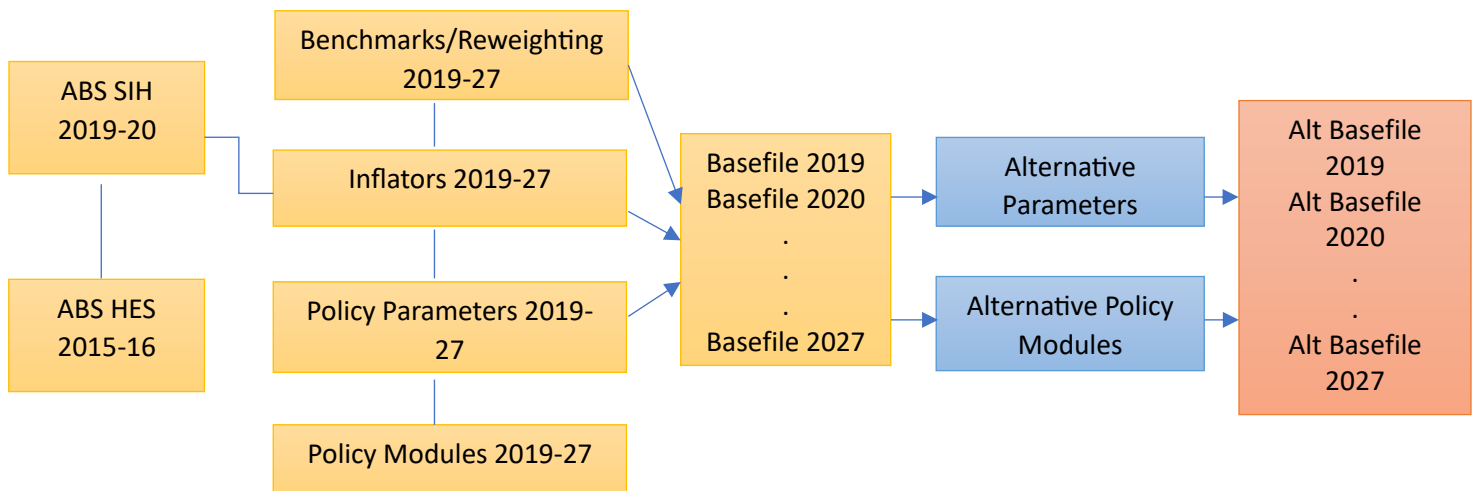


Figure 2: The structure of PolicyMod

Types of Analysis

Distributional Analysis

Running the basefile creation files or the alternative basefile creation code in PolicyMod produces a detailed range of standard output. Distributional modelling provides a detailed analysis of the impacts of policy changes on different groups within society, such as income levels, family type or person age. Typical analysis variables would be 'winners' and 'losers' in a financial sense. Other standard variables include dollar gains and losses, gains and losses compared to income as a ratio. All these analysis variables are available for a detailed range of household types.

PolicyMod provides both results for standard estimates of income levels, program total costs and income distribution information for both the base policy run and any alternative run of the model.

Additional coding within SAS can enable more detailed analysis where required. For example, the standard code provides analysis for family type. Minor code changes could provide more detail such as family type by income level or wealth level.

Detailed distributional analysis of different household and individual characteristics is largely only limited to the survey variables available on the ABS survey data. The underlying survey data is very detailed and therefore PolicyMod can provide very detailed distributional analysis. However, the level of detail available is limited by the sample size of the underlying ABS Survey.

Distributional EMTR Analysis

PolicyMod can be run in such a way that effective marginal tax rates (EMTRs) are calculated for each person in the basefile. EMTR calculation is a complicated process whereby the model is run for both reference and the spouse. Each of these is run as an 'alternative' policy run of the basefile where the reference is run with an incremented private income. The model is run for each adult and so alternative runs are also applied where the spouse income is incremented, and both the spouse and the reference are run. For these runs only one of the spouse or reference person has an income incremented. Due to the nature of the welfare system in Australia both the reference and spouse are run separately. Many payments that are paid to individuals also depend on a partner's income so a higher income for a spouse or reference person may also affect any welfare payments that apply to the other partner.

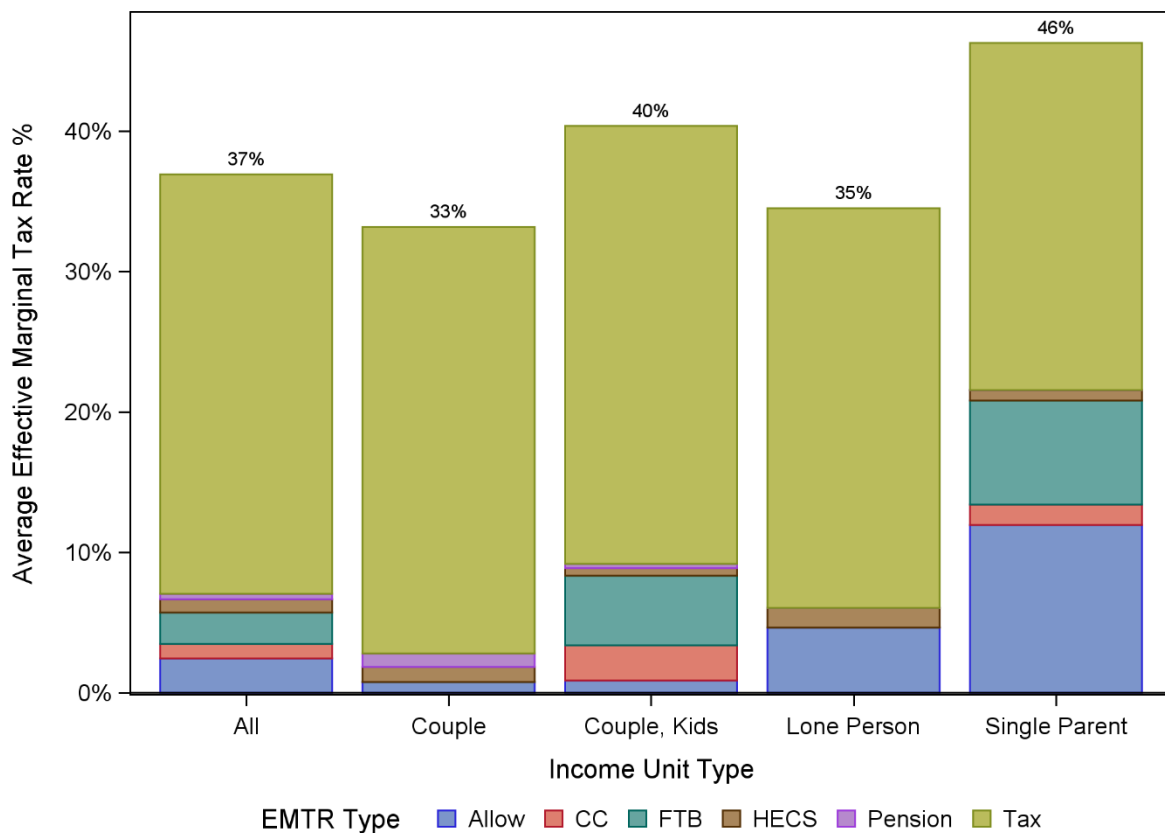
The distributional EMTR analysis calculates (in standard form) an EMTR for each working age person with some exceptions such as whether the person is on a welfare payment that has no work requirements, or if they study full time. These EMTR calculations for individuals can then be aggregated to understand the distribution of EMTRs for groups of interest such as low, middle, and high income or family type, gender, or whether the family has a child in childcare.

EMTR distributional analysis is of interest to policy makers and analysts interested in workforce incentives. High EMTRs are generally suggestive of lower incentives to work. There is often strong

interest in workforce incentives, for groups with lower participation rates such as single parents, older persons, and females.

The EMTR distributional model includes most components of the tax and transfer system including childcare and HECS. The model does not currently include public housing (which can add substantially to EMTRs for affected families) but this could be added with additional code.

The chart below shows a typical table produced by PolicyMod for distributional EMTRs. In this example average EMTRs are calculated by family type but decomposed between different elements of the tax and welfare system. Clearly, personal income tax dominates followed by family payments (FTB) and allowances.



The macro set up in SAS enables the user to define the increment of income. For example, the increment could be \$1 or \$10 or \$100 per year. A small increment may sometimes tend to amplify EMTRs where there are 'sudden death' losses of payments. Small increments are sometimes considered not to be as representative of realistic labour supply choices so either larger increments are preferred or the increment can be based on hours worked or even days worked. PolicyMod has the option to allow increments to be based on hours or days worked. This option can be a little trickier for those people not already working, we need to apply an estimate to their hourly wage rate. This is estimated using a simple wage equation based on education level, gender and age.

Incorporating childcare is simpler for the option of hours or days worked as childcare use flows directly from hours worked. We only apply childcare to families already with children in care. The option to increment by a dollar amount complicates additional childcare use as a dollar of extra income implies different childcare use for different parents. In this case extra childcare is based on the per cent increase in wage income for each person. Our general preference for EMTR calculations involving childcare is that realistic labour force decisions such as an extra hour or an extra day of work are used. Regardless of the method chosen PolicyMod offers considerable flexibility for distributional EMTR calculations.

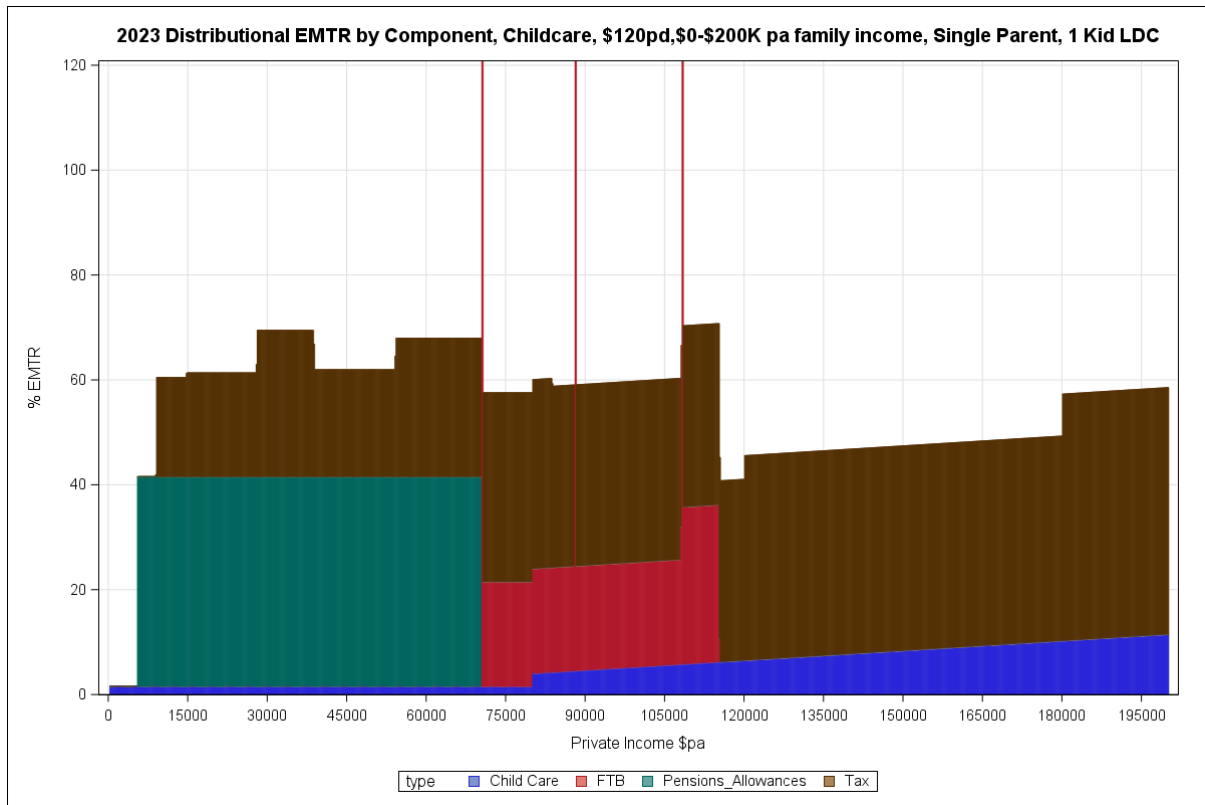
Small increments in income may sometimes lead to very large EMTRs and since for sometimes relatively small samples this may result in average EMTRs that are not representative of the full population we do limit the maximum EMTR to any one person to 200 per cent. This constraint can be changed if so desired.

Cameo analysis

The purpose of cameo modelling in microsimulation modelling is typically to understand the financial implications of working additional hours on disposable income for certain persons across a range of hypothetical situations. That analysis could be for current policy settings, alternative settings or for comparing different policies.

Cameo models can produce a range of family or individual types with different income levels to help analyse different policies in the tax and transfer system. An example could be considering the disposable income of a couple family with two children aged 2 and 6 years of age and how their disposable income (after tax and benefits) changes as their private income changes. A natural application from such cameos is the calculation of effective marginal tax rate (EMTR) schedules that are useful for identifying workforce incentives at different points in the income distribution for each hypothetical family type.

The chart below shows an example of PolicyMod cameo analysis, in this case for a single parent with one child in long day care with a private income ranging between \$0 and \$200,000 per year. Hypothetical families (or cameos) are typically focused on family types or individuals for whom there is policy interest on increasing their workforce participation. Single parents and secondary earners in couple families with young children are often a family type that policy makers have considerable interest in understanding their workforce incentives and cameo style analysis is useful here. The chart shows that when you combine the impacts of the loss of family payments, childcare costs, other welfare payments and increased personal income tax liability the gains from work often significantly diminished with EMTRs typically being around 60 per cent for private income below about \$120,000 per year.



Regional analysis

PolicyMod output is usually based on the records of the ABS Survey of Income and Housing (SIH). The SIH typically has around 15,000 households spread roughly evenly throughout the population of 26 million Australians. Such a sample is very good for analysis at the national level or for broad household types. The sample is also substantial enough to estimate the impact at a capital city or broad region level. The sample is not sufficient to provide estimates at a detailed regional level such as the SA2, SA3 or SA4 level. An SA2 for example is typically around the size of a large suburb. While the ABS survey is quite substantial it is quite likely that many SA2s will not actually be included in the ABS survey. Even when an SA2 is included in the survey the sample size may not be sufficient to warrant statistical analysis. Even at the SA4 level (for example, Sydney – Inner West) the sample size may be only a couple of hundred dwellings. The ABS SIH has not been designed for small regional areas as any analysis based on such small areas would have limited confidence attached to them.

While analysis at a regional level is problematic when solely relying upon the base survey data there are solutions that for some analyses provide useful insights at a more detailed regional level. Regional microsimulation combines regional benchmark data with the survey microdata. By reweighting the survey microdata to regional (or small area) benchmarks it's possible to derive estimates for any survey variable at a detailed regional level, such as SA2 or SA3 level geographic data. The approach taken to reweighting at a regional level is outlined in Tanton (2011) and we

follow this general approach in calculating regional weights that are representative of the economic and demographic make up of each small area².

The estimates will vary in quality depending upon how well the benchmark variables predict the variable of interest. For example, poverty estimates generally involve the use of income data only, or income and housing cost data. Since the target data is based on the Census and the Census data provides very detailed income and housing cost data the poverty estimates should be very close to reality and should be of a high quality. It's almost trivially the case that benchmarking in this case will provide very good estimates. One could almost just use the benchmarks, however the benchmarks typically will only provide income and housing cost ranges (eg \$0-\$100 pw income) rather than actual figures and the benchmark may not provide estimates on the joint distribution of income and housing costs. A further drawback of just using the benchmarks is that they may only relate to a time period in the past and the interest may be for a more recent time period for which the microsimulation model will have, at least partly, accounted for change.

An example where the estimates are likely to be of lower quality would be a variable such as the average expenditure on council rates. While there is likely to be some reasonable correlation between council rates and some of the benchmark variables (such as income) different councils in different regions will have different rules for their rates schedules that benchmarking to standard economic, social and demographic targets are unlikely to provide much basis for prediction.

A variable such as financial stress could be expected to offer reasonable quality that is neither near trivial, such as poverty, or poor quality. The quality depends upon the correlation between the variable of interest (financial stress) and the benchmark variables. The table below shows the range of regional benchmark variables. With detailed information on income, wealth, employment, education, occupation and housing costs and welfare recipient status we have a range of variables that are known to relate closely to financial stress ([Phillips 2022](#)). Given the strong association it should be expected that the regional estimates for financial stress should be of a reasonable quality.

Benchmarks used for GREGWT

Benchmark Categories
1 Age by Sex by Labour Force (12 BMs)
2 Education Status (3 BMs)

² Tanton, R. Vidyattama, Y, Nepal, B, McNamara, J. *Small Area Estimation using a Reweighting Algorithm*, Journal of the Royal Statistical Society, Vol 174, Issue 4 2011.

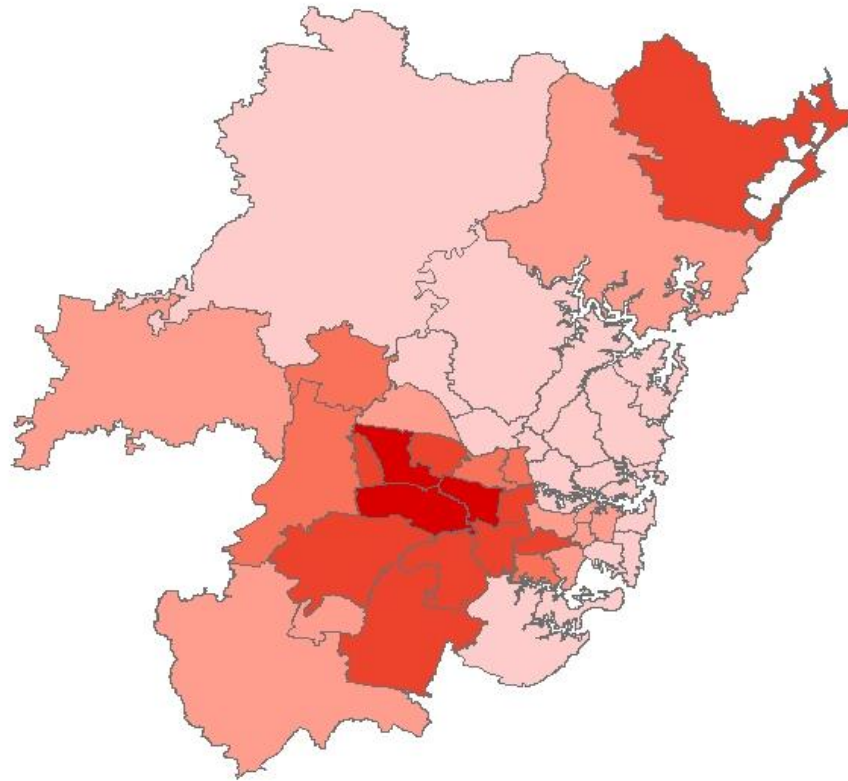
3	Occupation (3 BMs)
4	Household Income (4 BMs)
5	Mortgage (4 BMs)
6	Rent (4 BMs)
7	Family Type (4 BMs)
8	Count of Persons (5 BMs)
9	Dwelling type (1 BM)
10	Social Security Payments (5 BMs)
11	Family Tax Benefits Part A (1 BM)
12	Family Tax Benefits Part B (1 BM)
13	House price (1 BM)
14	Superannuation (1 BM)

The chart below shows an example of the sort of analysis possible with regional microsimulation of PolicyMod. In the chart below the variable being mapped is the change in the after-housing poverty rate from a change in welfare policy – including the recommendations of the Economic Advisory Committee including:

- 1) Increasing JobSeeker to 90 per cent of the age pension (a \$265 pf increase)
- 2) Increasing rent assistance to 40 per cent above rate that existed prior to the 2023 Commonwealth Budget

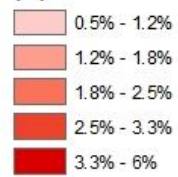
The chart shows that areas in the south-west of Sydney are estimated to have the largest decrease in poverty in Sydney while areas in the city centre and the inner north the smallest change in poverty.

Greater Sydney



Poverty rate difference

(%)



Greater detail on regional microsimulation and PolicyMod can be found in Joseph, Phillips (2023)³.

Dynamic Income and Retirement Income analysis

PolicyMod is a static microsimulation model, which given the dynamic and maturing nature of superannuation in Australia is not ideal for long-term modelling of superannuation balances.

To introduce dynamics into the model, we take income transition probabilities from the ABS Census 2016 longitudinal file to model the likely trajectory of income, labour force status, marital status and home ownership status for all adults in the 2022 basefile of PolicyMod (around 27,000 adults). Two sets of transition probabilities are created for the model.

The first set are transition probabilities based on income and labour force transitions between 2011 and 2016 by age, sex, income, and labour force status for all persons in the 5 per cent sample contained in the 2016 longitudinal census file. A second set of transition probabilities is created to model dynamic changes in marital status and home ownership status based on age, sex, marital status and home ownership status and income.

The benefit of using real life transitions for income and labour force is that through the life course it's unlikely that people will take the average trajectory. A more realistic life course is that people will potentially take time out of the labour force for events such as childbirth, transition to unemployment or shift from full- to part-time work or become either permanently or temporarily disabled. The ABS Census transitions offer a realistic trajectory that accounts for the ups and downs of one's employment and earnings history.

Like all models it is not possible to simulate all possible life events; nor do we attempt to simulate behavioural change. However, modelling realistic income and labour force transitions through the life course offers a more realistic perspective on potential earnings and superannuation balances at retirement and the distribution of expected superannuation balances at retirement. Given the substantial spread of superannuation balances it is important to understand how policy change impacts not just the average balance but also those towards the top and bottom of the distribution.

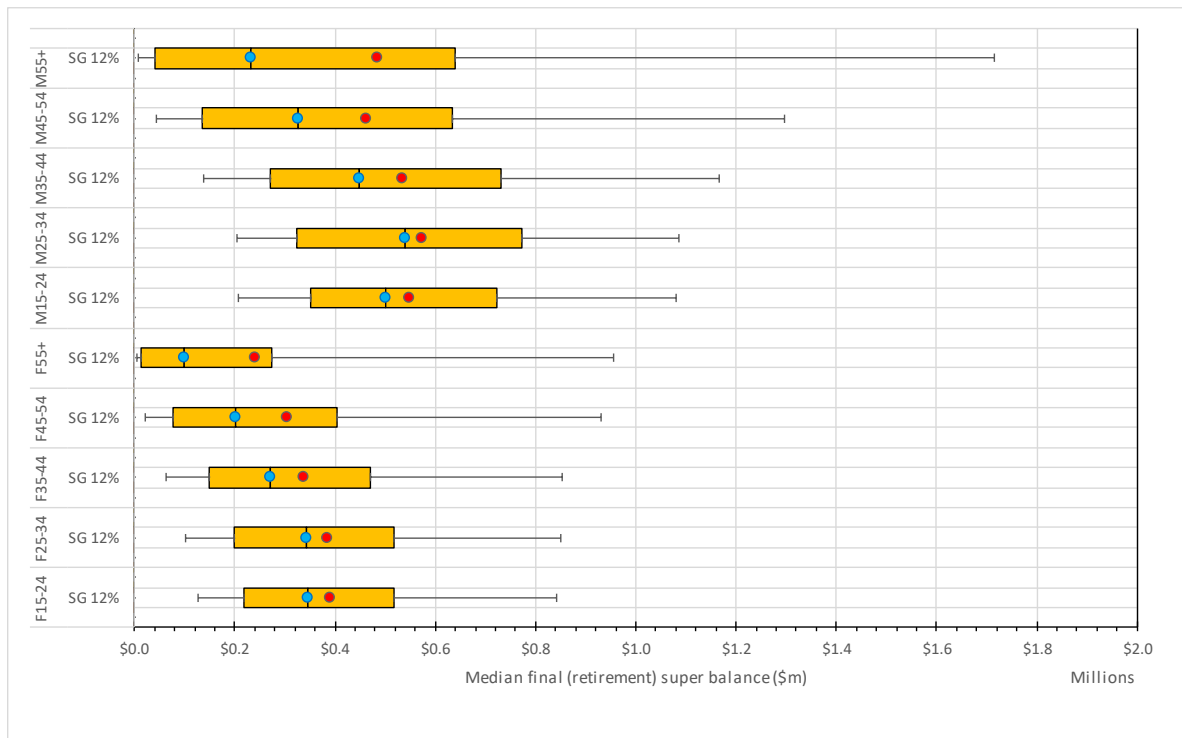
Using the income and labour force transition modelling we can model the incomes and labour force status of individuals in five-year intervals (which we interpolate to single years) between 2022 and 2072 using the implied income growth rate from the Census income transitions matrix. By calculating concessional contributions, earnings and tax paid annually we can model superannuation balance to retirement age. The model only considers mandatory (concessional) contributions made under the Superannuation Guarantee. Voluntary (non-concessional) contributions are considered behavioural and not included in the scope of the model.

³ Joseph and Phillips (2024) Spatial Analysis of Poverty, International Journal of Microsimulation Modelling.

From the matched Census sample, we generate probabilistic 5-yearly transitions from an initial state (defined by age, sex, labour force status and income range) to the full combination of future states of labour force status and income range.

Once the transitions have been applied for every individual record in the sample, from initial age to 65 years, income, and labour force status for the intermediate years between each 'step' are interpolated using a range of simple rules and assumptions. The most important value to be determined in this process is intermediate annual income, as this used to calculate concessional superannuation contributions.

The model is capable of changing superannuation policy and estimating total impacts on budget and household income and superannuation. The chart below shows the projected superannuation balances for each age cohort as of 2022. Males tend to have significantly larger balances at retirement and younger age groups, through a maturing superannuation system, have much larger balances at retirement.

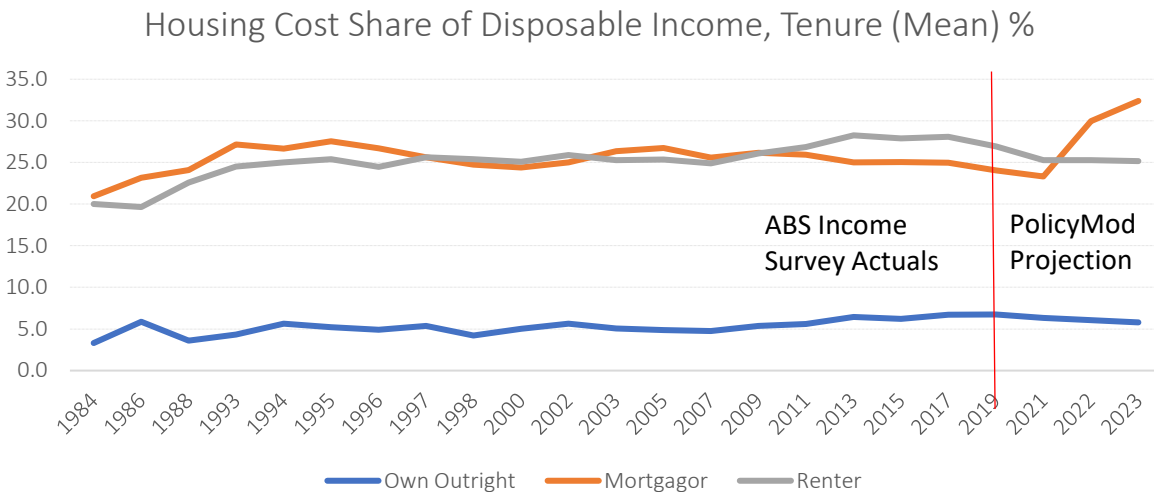


Greater detail on the modelling of retirement income in PolicyMod can be found in Webster, Phillips (2023)⁴.

⁴ Modelling Australian Superannuation with SuperMod: A Dynamic Distributional Model of Retirement Incomes in Australia, ANU Working Paper.

Synthetic Survey Creation and Household Income and Housing Cost Projection

The best source of data on income inequality, income and housing cost data in Australia is the ABS' Survey of Income and Housing. The survey was most recently produced for 2019-20 and while the 2023-24 survey is currently 'in the field' the confidentialised data available to researchers is unlikely to be available until sometime late in 2025. With such lags in access to good quality income and housing data microsimulation can help fill the void with the ability to 'nowcast' or project estimates for the years after the latest survey in 2019-20. With considerable benchmarking and uprating undertaken the PolicyMod basefile provides a projection for incomes and housing costs. Some of these estimates benefit from distributional data such as the use of 2023 data on changes in wage data for each 10th percentile of the income distribution using the ABS *Characteristics of Employment* publication. PolicyMod also includes detailed state-based information that updates housing rents, house prices, mortgage interest and mortgage principal, labour force estimates and demographic change.



Section 3: Basefile creation

The basefile of PolicyMod is designed for the static modelling of major components of the Australian personal income tax and transfer system. The basefile of PolicyMod is based on the ABS survey data (SIH 2019-20). The model is flexible enough to expand the base to include some important additional parts of the tax system such as indirect taxes, superannuation, HECS and GST.

The *basefile creation* process of PolicyMod develops basefiles for 2019-20 financial year and projects these out to 2059-60 providing a 40-year projection horizon. Such analysis is clearly

subject to considerable margin of error but is useful for considering future fiscal outcomes from the perspective of demographic change. The standard projection horizon for static models is over the *forward estimates* which are typically 4 years beyond the financial year of the latest Federal Budget.

Increasingly, there is interest in a longer time horizon such as 10 years beyond the budget and PolicyMod can accommodate such a horizon. While 10-year projections or longer are possible within static PolicyMod the user should be aware there is considerable scope for error with such long-term projections. Projections of any length are subject to complex behavioural responses, dynamical systems and broader economic changes that are difficult or impossible to incorporate within a static modelling framework. The longer the projection timeframe the greater the scope for these complications or other unrelated and unanticipated economic and social changes to occur.

The *basefile creation* process involves the following steps:

- uprating (all dollar values);
- reweighting to administration and ABS benchmarks;
- imputation of some required elements such as deductions for calculating taxable income;
- running code to determine welfare and taxation eligibility and entitlement.

Undertaking these steps require some attention to data issues and the use of a range of official statistics from the ABS and a range of administration data sources from government departments such as the Department of Social Services.

The parameters required to run the basefile include payment rates of major components of the Australian Tax and Transfer system from 2019-20 financial year to over the forward estimates and further projection up to 2059-60. The 'alternative' parameters are the same as those of the base world run of PolicyMod but can be changed to match a new policy proposal. Section 5 and 6 explains how to change the parameters in PolicyMod and generate distributional policy outcomes. Where no policy change is developed running the alternative base creation code leads to a 'null run' and the user should ensure that the resulting output reflects no change to the alternative base file when compared to the base world base file.

PolicyMod Control Program Base and Alternative Comparison.sas is SAS code that develops basefiles for the current policy settings and compares it to alternative policies (simulation world, *Basefile_alternative.sas*) and then produce alternative basefiles for each year up to the forward estimates and then projects it out to 2059-60. This enables users to compare the distributional impact of a new or proposed policy to the existing policy with the help of charts and tables in PolicyMod.

Steps involved in Basefile creation

Data

The basefile of PolicyMod heavily depends on the ABS Survey of Income and Housing (the 2019-20 Survey) data. The survey of Income and Housing (SIH) contains data at the income unit, household, and person level. It contains the demographic and income information of each member

of the family including age/sex/employment status, marital status, family type and number of children and income from both private and government sectors.

For the basefile creation, PolicyMod uses the same variable name as the ABS Survey of Income and Housing. This reduces the complexity and helps the user to be consistent with survey variables. The remaining variables in PolicyMod (mainly constructed during the basefile creation and the simulation of policy modules). Some variables from the survey data are not included in the model to reduce the size and complexity but can be included if deemed important for analysis.

PolicyMod does not rely on the information provided in the survey data about the eligibility, the entitlement of each payment and taxation of each individual. We strip out the information on tax paid and allowances or pensions and simulate them later by extracting information in the survey data. Some imputations are required to make the survey data available for the simulation of some policy modules like Childcare and Family Payments. PolicyMod does income uprating and reweighting of the samples in the survey data. This ensures the basefile represents the current population distribution in Australia.

This section explains how the ABS survey data is incorporated into PolicyMod. The underlying survey data comprises the ABS survey data the following levels:

- 1) Household;
- 2) Income Unit;
- 3) Persons unit.

Household file

'%INCLUDE HHLDKEEP' includes the required variables from the household level in the survey data. The household level information is not a key part of the tax or transfer system. The tax system is mostly based on individual level data and the welfare system a combination of personal and income unit level data. However, the household level data set includes a lot of information that is of interest to analysts such as region, household type such as couple family with children or single parent. The household file also includes useful data for analysis such as housing costs (at the household level), dwelling type (such as unit or detached house), main source of income for the household and age and sex of the head of the household.

Income unit file

'%INCLUDE IUKEEP' includes the main income unit variables from the ABS survey required for the basefile creation. The income unit is the closest unit to the family for the purposes of some elements of the welfare system such as family tax benefit and childcare.

More recent versions of the ABS survey include more detailed data on the age of children which means that PolicyMod does not need to impute certain ages of children.

The **Childcare** module in PolicyMod requires a separate basefile created using the ABS survey data. To calculate the entitlement for Childcare Benefits (now childcare subsidy), there needs to be an estimate of number of hours of each child in care and the hourly rate charged. But the survey data only provides the total hours and cost (formal and informal) of childcare used for the income unit.

So, child-based estimates of the number of hours and hourly cost for each child in formal care for the income unit are imputed.

'%include ccare' creates a basefile for the childcare calculation in PolicyMod. The survey data provides actual childcare benefits and rebate information at income unit level. However, for the purpose of policy comparisons, we simulate this information based on the detailed family and child information provided in the survey in the policy code.

The ABS survey data provides the number of children in formal and informal care, the types of care used, ages of the children and cost of the care at family level. But we require data on type, cost, and hours of childcare for each child. Majority of the families have one child in the care, but for families with multiple children in the care, some imputations were required. Ccare takes a 'logical approach' to developing the care type, hours used and gross costs per hour. For most cases where there is only one child the imputation is largely the same as the actual survey data for the income unit. Where there are multiple children in formal care, or for single children multiple types of care, we have made some simplifying assumptions to create a child-based data set. Given the age of children this task was quite straightforward for families where there was a child under school age and one of school age. The survey data provides enough detail here to easily split income unit data into one record for the younger child and another record for the older child who would be using 'outside school hours care'. A small number of income units required more complicated imputations to determine how the income unit data could be split between children. Here we used some regression modelling to attempt to predict the hours used, hourly rates.

The ABS survey undercounts the number of families using formal care. To overcome this issue, we have reweighted the childcare records so that the correct number of families and the accurate distribution of families are estimated using the data. PolicyMod reweights to the following benchmarks:

- Type of care (long day care, family day care and outside school hours care)
- CCB recipient family income distribution
- CCR recipient family income distribution
- CCB and CCR maximum rate payments

While we have confidence in most of the imputations undertaken to further improve the quality of the childcare basefile data we have benchmarked to the overall price distribution from a 1 percentile distribution of administration data from the Department of Education. The original price and hours data imputed/observed in PolicyMod is ranked for the observations and this ranking is then merged with the percentile data to ensure the correct price and hours distribution. For example, if our initial PolicyMod estimate for price was \$14.50 and this was ranked at say the 90th percentile then we replace the \$14.50 price with the actual 90th percentile price using the administration data.

Person file

'%INCLUDE PERSKEEP' keeps the required variables from person file for the PolicyMod basefile creation. Person information is important for the calculation of taxable income for the purpose of calculating tax liability but is also important for building up income data at the income unit level.

For example, in calculating family income for the purpose of calculating family tax benefits we add up the income of the reference and spouse's individual income.

Some variables are constructed using the available data from the person file includes:

- IINTCP: interest income including trust income (\$pw)
- IWCOMPCP: weekly income from workers compensation, accidents, and sickness
- INTRTRCP: weekly income from trusts
- IRENTCP: weekly income from property (residential and non- residential)
- IOBTCP: unincorporated business income

Several imputations and adjustments are applied at the person level survey data. This includes the imputation of whether the student is going to high school (using the ABS RADL proportion) and the extraction of information about the labour force status, industry of occupation and the relationship to the reference person.

PolicyMod creates a flag for income support recipients and the eligibility and entitlement of many payments (pensions and allowances) are determined based on this flag (ISonfile). This value of this flag is based on the data provided in the survey data.

PolicyMod assumes 10 per cent salary sacrifice for self-employed people. The wealth and assets of each person in PolicyMod includes:

- Government superannuation funds
- Non-Government superannuation funds
- value of accounts held in financial institutions (exc. offset accounts)
- value of offset accounts
- value of debentures and bonds
- value of loans to persons not in the same household
- value of other financial investments
- value of public unit trusts - person level
- value of private trusts - person level
- value of shares - person level

Considerable effort is made to calculate the amount of private and government superannuation benefit, before applying drawdown for calculating taxable and non-taxable superannuation benefits in the uprating module. The 'Supervariables' macro is used to differentiate superannuation income.

Uprating

An important element of basefile creation is to uprate all dollar values in the survey data to represent the currency of the basefile world. The underlying survey data is from 2019-20, so all income and housing dollar variables need to be uprated along with any other dollar values. '%INCLUDE INFLATE' reads in inflators and applies to various variables in the survey data. The inflators to uprate variables are located "&drive\Basefile\Uprating\Uprating.xlsx". The data used for uprating are the annual Consumer Price Index and Average Weekly Earnings. PolicyMod has

inflaters from 2013 to over the forward estimates, and further projection up to 2059. The following table shows the inflators in PolicyMod and the index used to update the inflators each year.

Variables	Inflation method
Wage	Wage Price Index by state, Characteristics of Employment for distributional and overall wage increase
Childcare price	Dept of Education childcare reports, CPI beyond latest financial year
Rent	CPI, CPI budget projections
Mortgage	ABS house prices (10 year average) adjusted for interest rate, AWE for forward estimates and beyond. Interest and principal inflated separately.
House price	Corelogic house price
Superannuation	Projection using SIH 2003-04 and SIH 2019-20 growth rates for different age/gender cohorts.
Council rates	CPI for council property rates
Income from own unincorporated business	National Accounts, AWE
Interest rates	RBA standard variable rate
Dwelling rent (investment)	CPI rents and CPI projections from budget
Dividends	CPI and AWE for projections
Royalties	CPI and AWE for projections
Interest from investments	National Accounts, CPI and AWE for projections
Loan (other)	National Accounts, CPI and AWE for projections
Other investments	National Accounts, CPI and AWE for projections

Table 1: Updating variables and inflation method

These inflators are applied to the relevant variables in the person, income unit and household file. Some inflators have different inflation rates for each state. For some variables the average inflation rate of all states is used. For instance, variables like workers compensation in the survey data is updated using the average wage inflation of all states.

After applying inflators to relevant variables in the survey data, PolicyMod creates an income unit file which consists of:

- Reference person (r)
- Spouse (s)

- Student 1 (s1)
- Student 2 (s2)
- Student 3 (s3)

For each income unit in the ABS survey file there are a range of variables including person based information. For example, taxable income in the income unit file consists of r_tinc, s_tinc, s1_tinc, s2_tinc and s3_tinc. Similarly, r_ageec and so on pertains to the age of each person noting that the ageec component of the variable is the original SIH variable and the prefix is the position of the person in the income unit.

This is allocated based on the income unit position (IUPOS) and the person id (ABSPID) in the survey data. The Income unit file in PolicyMod is called IU_2. Some important variables are constructed in IU_2 for the simulation of some policy modules like the wealth of an income unit (summation of the wealth of all members in an income unit with calibration to their 'parent' household).

Read in parameters

The macro **%parms** reads in the payment rates and income threshold of majority of the payments in the tax and welfare system. It also includes the marginal tax rate of personal income taxation. The parameters are merged into the income unit file of the PolicyMod (IU_2).

The income variables constructed for the PolicyMod basefile is explained in Section 3.

The parameters spreadsheet is commonly called 'Parameters.xls' and is in &drive\Policy\Parameters. The alternative spreadsheet is typically called 'Parameters_ALT.xls'. Unless changes have been made to the ALT version the spreadsheets are identical.

The parameters spreadsheets link to various spreadsheets with input data such as ABS CPI and AWE spreadsheets.

Policy Modules

The policy modules then simulate the tax and transfer system. As mentioned PolicyMod removes the ABS estimates of welfare payments and simulates these payments, and personal income tax in their place. The main modules include:

a) Age Pension

Age Pension (&Pen) which simulates the age pension. This module, or macro, establishes eligibility depending upon age, tenure type and income unit type. Where eligible PolicyMod then estimates entitlement based on assessable income and wealth and includes any rent assistance for eligible renters.

b) Parenting Payment Single

Parenting Payment Single (&PPS) macro simulates the parenting payment for single parents. This module, or macro, establishes eligibility depending upon age of children, and income unit type. Where eligible PolicyMod then estimates entitlement based on assessable income and wealth and includes any rent assistance for eligible renters.

c) Allowances

Allowances include JobSeeker, Youth Allowance, Austudy, Abstudy, Parenting Payment Partnered are modelled differently to the age pension and parenting payment single. These payments are fully simulated assuming full take up based on a range of eligibility criteria as described above. Allowances are more difficult to model as eligibility is contingent on a range of factors that aren't readily available in the underlying survey data or easily modelled such as waiting periods, mutual obligations, liquid asset test or in the case of Abstudy indigenous status or, where necessary, in the case of youth payments the income of their parents. With this limitation the eligibility is simply based on whether the respondent receives the payment in the survey. Where they do, entitlement is then based on an income and asset test. In the case of Youth Allowance, Austudy and Abstudy we simply include the ABS survey payment amount and uprate the payment in line with known changes in the payment since the survey's midpoint (usually December of the given financial year). This approach is not ideal and is somewhat limiting regarding the ability to model policy change for these payments, however, these payments are typically small in number and expense so generally don't impact policy proposals that are broader in nature.

A complexity that PolicyMod includes is that the code ensures that any allowance recipient cannot have any other payment. Likewise, pension recipients can't have multiple 'base' payments. PolicyMod does not allow for dynamic changes that may occur where a policy change means that one payment becomes more generous than another and recipients may attempt to switch payments. Old versions of STINMOD (NATSEM/Treasury) did allow such changes. Under the current welfare payment system in Australia such switching is generally unlikely to occur. An example could be that if JobSeeker became more generous than parenting payment then a dynamic change would allow the recipient to switch to JobSeeker. PolicyMod works best within the current welfare system's logic and that is one where allowance payments are less generous than pension payments. It's possible to change the code to incorporate dynamic changes but the standard model does not currently incorporate this functionality.

Each welfare payment mentioned above is considered part of taxable income, however, some components are not taxable such as rent assistance or energy supplements and those components are included in disposable income but not taxable income.

d) Family Tax Benefit

After modelling various income tax deductions that lower taxable income and adjusted taxable income (ATI) (discussed in Section 3) the next module is family tax benefits (FTB).

FTB is comprised of three major elements:

- 1) FTB A;
- 2) FTB B;
- 3) rent assistance for FTB A recipients.

FTB A is a per child payment designed to offset the direct cost of children for low-income families. FTB B is a payment to the income unit designed to mostly assist single income families.

FTB A code is split between 'method 1' and 'method 2'. Method 1 payment per child up to a maximum fortnightly amount. That amount is then tapered away to zero as ATI increases. Method 2 provides a base payment per child that is after a certain ATI (usually considerably higher than the point at which FTB A start reducing) is also reduced. The FTB A amount paid is the higher of method 1 and 2. Included in the FTB A 'stack' of payments is the FTB A maximum amount, energy supplement and any rent assistance.

FTB B is an annual payment that is set to a maximum amount for an income unit that is available to all income levels up to a set maximum amount. Also, as a secondary income of either the reference or spouse increases beyond a certain point (currently very low) FTB B is lowered.

FTB payments are not taxable, but it is important to note that other payments such as parenting payment and allowances are included in the FTB B means testing. A welfare recipient will automatically receive the maximum method 1 amount of FTB A under current arrangements.

The FTB A and B amounts are dependent upon the age of children and PolicyMod does estimate payments including such detail.

e) Childcare Subsidy (CCS)

&CCS is the macro that calculates eligibility and entitlement to the CCS. The CCS provides a subsidy for formal childcare (long day care, family day care, occasional care and out of school hours care). For eligibility a family must have children in approved formal daycare. Their entitlement is based on their adjusted family taxable income, number of children, hours used, the fees charged by the centre and an activity test is applied to ensure that parents are undertaking work, study or some other form of eligible activity.

Means testing calculated a subsidy rate for each family that is largely based on their income. The current subsidy applies a maximum rate of 90 per cent to families with an income below \$80,000 per year and this reduces in a linear fashion to 0 until their income is \$530,000 per year. The subsidy only applies up to a per hour cap and can only apply up to a maximum of 50 hours per week. An activity test may lower this number of hours where their hours of activity are below certain thresholds.

The childcare subsidy detracts from their gross cost of childcare to produce out-of-pocket costs estimate. For 'winners' and 'losers' style analysis the subsidy is included in their disposable income. For analysis of childcare costs as a share of income it is advisable to remove the subsidy from disposable income.

f) Income tax

Macro 'inctax' calculates a person's standard income tax liability. This is based on a combination of their taxable income and the tax thresholds and rates as defined in the parameters spreadsheet. In addition to these basic personal income tax calculations there are several other elements that are considered to establish the final tax liability for an individual. The macro 'loincreb' calculates the low-income tax offset and a further rebate called 'lomidreb' calculates the low and middle income tax rebate which applied up until 2021-22. For pensioners there is a Seniors and pensioners tax offset available to Australians over the age of 60 and to individuals who receive a pension such

as the age pension or disability support payment. Some other government beneficiaries such as those on the JobSeeker payment are eligible for the beneficiary tax offset which is designed to ensure that such recipients don't pay tax on their taxable base welfare payments.

Additional tax is liable on income in the form of the medicare levy. The macro 'medlev' calculates the medicare liability for each person based on income and family circumstances.

Dividend rebate is calculated in the 'incdiv' macro to estimate a grossed-up form of taxable income and to estimate any dividend rebate that should be applied to tax paid.

In calculating taxable income PolicyMod includes a macro 'ded' that calculates a range of deductions (work, investment and 'other') based on ATO tax deductions in the 2 per cent taxpayer file. These deductions are used in the calculation of taxable income.

Benchmarking

The final element of basefile creation is benchmarking. This ensures the basefile of the PolicyMod represents the Australian population with various cohorts. PolicyMod uses Gregwt.sas program developed by the ABS to generate/adjust weights. This program alters the initial weights in the underlying ABS survey data and adjusts the weights so that the new weights simultaneously match up with a range of benchmarks, both demographic, socioeconomic and administration for various payments and taxation.

The ABS Survey data allocates a weight to each observation to represent persons and households for the whole population for that base survey year (2019-20). But these weights need to be updated to line up with the population distribution in the basefile year, through the forward estimates and projections up to 2059. The benchmarking module in PolicyMod updates the SIH weights using the benchmark data for each year up to the projections.

The SIH weight for the survey year is used as the input weights to GregWt.sas to benchmark in the base year, then the output weight becomes the input weights for the following year and the process continues up to the final year.

The benchmark module is run after estimating all policy modules in PolicyMod. PolicyMod, except for allowances, does not use the information or flag from the survey data to estimate who is eligible for different payments (like pensions, family payments, childcare and so on) and taxation. Rather, it uses the estimates for eligibility and entitlement in the PolicyMod code.

Benchmark categories: PolicyMod currently uses five categories include:

- Age by Sex
- Labour Force
- Administrative data (includes all welfare payments)
- Income data
- Investor data

Benchmark input: The benchmark spreadsheet in PolicyMod is located "&drive\Basefile\Benchmarks". It contains all the benchmarks used in the PolicyMod

Variable	Bnch	Type	Count14	Count15	Count16	Count17	Count18	Count19
AgePen	Age1	65_70	654,514	671,105	689,093	662,218.00	672449.801	672449.801
	Age1	70_75	632,255	628,658	665,658	639,697.00	649580.8334	649580.8334
	Age1	75+	1,154,335	1,215,090	1,215,321	1,167,924.00	1185969.366	1185969.366
	Age2	full	1,441,597	1,472,678	1,505,014	1539000	1,563,000	1,607,000
	Age2	income	579,333	586,355	599,230	613000	627000	564000
	Age2	asset	420,174	455,820	465,829	317,839.00	318000	337000
DSP	dsp1	<35	139,631	133,383	127,612	122090.6903	120,137	120,498
	dsp1	35_45	126,976	120,743	113,915	107473.1225	105,754	106,071
	dsp1	45_55	206,869	199,451	191,824	184488.6562	181,537	182,081
	dsp1	55+	350,994	343,635	338,962	334352.5469	329,003	329,990
Carer	car1	max	189,185	196,509	203,000	209705.4079	216,632	223,788
	car1	part	58,195	59,593	61,000	62440.21949	63,914	65,423
DVA	dva	all	323000	303000	284238	266638	250128	234640
NSA	nsa1	<25	76,051	74264	71,150	68166.57465	62500	60,700
	nsa1	25_35	168,968	172,158	167,545	159000	149900	149800
	nsa1	35_45	177,658	180,021	177,063	168000	158000	155000
	nsa1	45_55	165,592	172,812	177,622	175000	168700	167000
	nsa1	55+	139,509	154,036	165,912	183000	183900	195800
	nsa2	single	565,484	585,307	589,970	588166.5747	572200	580400
	nsa2	couple	162,294	167,984	169,322	165000	150700	148000
	nsa3	kids	99,706	103,201	104,023	103,184	99,037	99,791
	nsa3	nokids	628,072	650,090	655,269	649,983	623,863	628,609
PPS	pps1	max	201,265	201,296	199,000	190000	175200	167,400
	pps1	part	58,152	58,579	59000	59000	59500	58600
PPP	ppp1	all	102,228	100,457	97000	89000	76100	68100
Youth	yth1	student	227,600	220,500	196,400	146000	133,500	134,500
	yth1	other	112,900	105,700	100,000	98000	89,300	85,300
	yth2	home	170,250	163,100	148,200	122000	111400	109900
	yth2	away	170,250	163,100	148,200	110000	100350	97600

The main outputs of GregWt program includes:

- overall convergence report and
- benchmark report for different categories.

a) The overall convergence report of GregWt.sas is shown below.

iters used	result code	!---- non-nils	unit nils	count -ve input	----! -ve final	!---- non-nils	group nils	count -ve input	----! -ve final
3	C	26945	0	0	0	14160	0	0	0
		26945	0	0	0	14160	0	0	0

- 'iters used' represents the number of iterations of the algorithm to estimate the weights that ensure convergence requirements are satisfied. In this case the number of iterations required was 3.

- ‘result code’ is an indicator whether the benchmarking was successful or not. It can return four values:
 - C : successful convergence (met benchmarks)
 - I : Impossible
 - N : not converged
 - R : met benchmarks but a replicate did not meet the weights

When considering the benchmark output for each category, ‘.’ indicates a successful convergence otherwise the final weight needs to be close to the benchmark, ideally with an error within a few per cent. The current set up of the gregwt macro in PolicyMod only converges if all benchmark targets are within 1 per cent of the benchmark target.

The benchmark outputs of Disability Support Pension and Family Tax Benefits Part B are shown below:

dsp111	count	bench -mark	vs	input weight	final weight
35_45	164	126976	>	103608	..
45_55	272	206869	>	163172	..
55+	468	350994	>	265829	..
<35	165	139631	>	122073	..

ftbb2	count	bench -mark	vs	input weight	final weight
5+	1206	767352		752677	..
und5	1086	672333		723464	671683

- ‘count’ column indicates the actual sample number of recipients in the basefile having that characteristic.
- ‘benchmark’ column is the target of each benchmark.
- ‘input weight’ is the given input weights (start weight prior to reweighting).
- In the FTB example the final weight was 671,683 which is within a 1% margin of error of the target so convergence is met.

Both these outputs are available as output from PolicyMod.

PolicyMod also benchmarks to the population data. The base year for the population estimate is 2019 and we update the data for each year using the ABS demographics statistics. For years beyond the population estimates available from the ABS we update age and sex populations by the growth rates from the latest ABS population projections.

Section 3: Definition of income variables

This section describes all the income variables included in PolicyMod required for the modelling of some components of the Australian Tax and Transfer system. It includes:

- Taxable income
- Private income
- Deemed income
- Social Security income
- Assessable income
- Adjusted taxable income
- Rebate Income
- Transfer Income

Taxable Income: Taxable income is defined as gross income or adjusted gross income minus any deductions allowed in that tax year. This is the income an individual has to pay tax on.

$$\text{Taxable income} = \text{Assessable income} - \text{allowable deductions}$$

The deductions reduce the amount of income you pay tax on, it does not deduct directly from the tax amount.

In the ABS survey data, there is no information about the various deductions for individuals. So PolicyMod imputes the amount of deductions using ATO's 2% sample file. We use a logistic regression to determine if they are getting any deductions based on the independent variables we have chosen which include occupation, wage and salary level, self-employed flag and pensioner/allowee flag. Then we use a linear regression to predict the actual amount of deductions where the person was deemed to have a deduction using the logistic regression using the same independent variables. This same approach is used for different types of deductions in PolicyMod includes:

- **Work deductions** include expenses related to car, travel, uniform, self-study and so on. The probability of getting work deduction and the actual amount is based on individual's occupation, salary, income through unincorporated business and also depends whether they are pensioners or allowees.
- **Investment deductions** consist of dividend and interest deductions amount. This is determined based on the income from all investment sources, dividend income, financial institutions, and age of the person.
- **Other deductions** mainly include gift amount and other deduction amount. The regression for 'other deductions' is based on the income from all sources, age of the person and whether the person is receiving any pension or allowances.

The total deductions is calculated as the summation of work, investment and other deductions.

Taxable Income: Taxable income is defined as the income that your tax liability is based on. The main components of Assessable Income are:

- salary and wages
- business income
- pensions
- rent income

- allowances for things like car, travel, and clothing
- interest from bank accounts
- dividend and other income from your investments

Social Security Income in PolicyMod, the social security income includes following components for the reference person and spouse from the survey data. It also includes deemed income for the income unit.

- deeming income for the income unit
- total current weekly employee income
- weekly cash income from own unincorporated business flag
- rental property income
- weekly income from royalties
- workers compensation
- salary sacrificed contributions
- other regular incomes and
- overseas pensions and benefits

Any losses reported in the survey data is assigned to '0' in PolicyMod.

Social security income also includes salary sacrificed deductions and rental losses.

Adjusted Taxable Income: Adjusted Taxable Income is used to assess the eligibility and entitlement for family payments and childcare benefits/subsidy. It includes:

- taxable income
- foreign income
- total net investment losses
- reportable fringe benefits
- reportable superannuation contributions
- superannuation income stream benefits, including both taxable and non-taxable components

In PolicyMod, we calculate the Adjusted Taxable Income for both the reference person and spouse of an Income Unit.

Deemed Income: Deeming rules are used to work out the income created from the financial assets. It assigns to a set rate of income regardless of what an individual earns. So, the payment rate depends on your deemed income. This helps to keep the payments steady instead of fluctuating based on the performance of the financial assets.

Deemed income is used as part of the income test for Pensions.

SAPTO Assessable Income

Includes taxable income and adds in super income, rentals losses and salary sacrifice income.

/ calculate SAPTO assesable income */*

$$r_otinc = \text{sum}(r_tinc, (r_ss_flag=1)*(r_issscp*52), (r_ss_flag=1)*(r_ssfcp*52), \\ r_non_ssfcp*52, (r_irentcp < 0)*ABS(r_irentcp*52), r_NG_shares*52);$$

Rebate Income: Rebate income is used to calculate the Beneficiary Tax Offset (BENTO). Rebate income includes the total amount of taxable income plus the following components.

- adjusted fringe benefits
- reportable employer superannuation contributions
- deductible personal superannuation contribution
- net financial investment and rental property loss

Transfer Income: Transfer income defines as the income provided through welfare including pensions and allowances.

Section 4: Policy Modules in Detail

Pensions: DVA, AGE, DSP, PPS and CARER

Pensions are available to people above the official working age, principal carers of children, some widows, veterans, and disabled people. Most government pensions are subject to income testing. Some additional supplements are available to pensioners. Rent Assistance is also available to some pensioners depending on the amount of rent. An individual/couple is only eligible for either pension or allowance/benefits. Most of the pensions get paid at the same rate as the Age Pension rate.

PolicyMod models the eligibility and entitlement for each pension based on the available survey data. But some payments require imputations of the survey data for the accurate estimation of the components in the Pension.

Age pension/Disability Support Pension/Carer pension: Age pension is a regular payment for people aged 65 or over. It is also means tested based on the income and assets of pensioners. From 1 July 2017, the Age Pension age will be 65 years and 6 months and it will go up by 6 months every two years until 1 July 2023 at which point the age pension age for all persons will be 67 years of age.

The maximum rate of Age Pension includes:

- the maximum basic rate
- Pension Supplement basic amount
- Pension Supplement Minimum amount
- Pension Supplement remaining amount
- Energy Supplement

For singles, the maximum rate of Age Pension including Pension Supplement and Energy Supplement is \$1097 per fortnight as of December 2023 whereas if you are a member of a couple, the payment rate will reduce to \$827 per fortnight.

The **macro %pen** calculates the eligibility and entitlement of Age pension, Disability Support Pension (DSP) and Carer Pension. The eligibility for DSP and Carer pension is based on receipt of the payment in the survey whereas the Age Pension eligibility is based on recorded age in the survey only.

The rate of Age pension is subject to an income test and is reduced by 50 cents in the dollar (for singles), and 25 cents in the dollar (for couples each). Similarly, the value of your assets can affect how much Age pension you receive. It also depends on the family type (couple/single) and whether you are Homeowners or Non-homeowner.

In PolicyMod, the entitlement for Age/DSP and Carer and DVA Pension is subject to both income and assets test. So, the final entitlement is the minimum of the payment rate after income and assets testing.

We also estimate the taxable component of pensions through the macro variable 'pensiontaxable'. This is used to calculate the taxable income of individuals which is relevant to estimate majority of the payments in the tax and welfare system. For instance, the additional components in the maximum rate of pension includes supplements/ extra assistance like Energy Supplement, Rent Assistance which are non-taxable payments. The macro variable 'pensiontaxable' calculates the taxable income for all pensions which is used later in the model to assess the eligibility/entitlement of different payments.

Eligible pensioners receive Rent Assistance with their Age Pension. PolicyMod allocates 50 per cent Rent Assistance for pensioner couples. I.e., if both members of a couple are eligible for Rent Assistance, the rate is split evenly between the reference person and spouse. There is no optimization behind this allocation.

Parenting Payment Single: Parenting Payment Single (PPS) is the main income support payment for single parents and other principal carers to help with the cost of raising children. To be eligible for the payment, you need to have a child under the age of eight. From September 2023 this age was increased to 14 years.

The amount of PPS is indexed according to the maximum of the movement in the CPI or PBLCI (Pensioner Beneficiary Living Cost Index) or 25 per cent of MTAW (Male Total Average Weekly Earnings) – whichever is higher. The current base maximum payment rate for December 2023 is around \$970 pf.

In PolicyMod, the amount of PPS includes:

- the maximum rate of PPS
- Pension supplement
- Energy Supplement
- Pharmaceutical Allowance
- Income Support Bonus
- Telephone Allowance

Means testing: The maximum amount of PPS is subjected to an income test. For maximum payment, the recipient's income must be less than around \$215 per fortnight, plus \$24.6 cents for each additional child. Income over this limit reduces the payment by 40 cents in the dollar.

A part payment is available if the recipient's income is less than \$2687 per fortnight, plus 24.60 for each additional child. This amount may be higher if you are eligible for Pharmaceutical Allowance.

The entitlement of PPS is based on the social security income (SSINCOME) and the number of dependent kids under the age of eight. Section 2 explains how PolicyMod calculates the social security income from the survey data.

The minimum payment of PPS is summation of Energy supplement, Pharmaceutical Allowance, Telephone Allowance, and Income Support Bonus. The **macro %PPS** also estimates the non-taxable components of PPS (like Pharmaceutical Allowance, Telephone Allowance, Energy Supplements, and Income Support Bonus).

For families with children, Rent Assistance is normally paid with Family Tax Benefit Part A if they are renting privately.

The macro variable 'pentype' shows the type of pension an individual is entitled to.

DVA (Department of Veteran's Affairs): The DVA provides compensation and income support entitlements to veterans, war widows and widowers, serving and former Defence Force members. DVA service pension is means-tested and, is paid at the same rate as Age pension. The main income support provided by DVA are Disability pension, service pension and war widow's pension.

PolicyMod **does not** model DVA, it is based on the survey data. In PolicyMod, the DVA amount of the reference person and spouse is the summation of three variables from the survey data includes:

- weekly income from disability pension (IDISBCP)
- weekly income from service pension (ISERVCP)
- weekly income from war widows pension (IWARWCP)

Allowances: Youth Allowance, Newstart Allowance, Parenting Payment Partnered

There are three main allowances available to eligible Australians through the welfare system. Allowances are less generous compared to the pensions and has an obligation of workforce participation in some allowances like JobSeeker Allowance. All allowances are subjected to person's and their partner's income and assets testing. Recipients can only receive a pension or allowances.

JobSeeker Allowance: JobSeeker Allowance (JSA) is a fortnightly benefit to eligible people aged 22 or over who are considered unemployed or looking for jobs. This allowance has an obligation of 15 hours of workforce participation.

The payment rate is means tested based on the recipient's income and partner's income (if apply). It is also subject to an assets and activity test. PolicyMod **does not** include the assets test for JobSeeker. If the survey data shows the person receives JobSeeker, we consider them to pass the assets test. The payment rate depends on the family status- single or member of a couple and whether recipients have dependent children or not.

A single person with dependent child receives an amount of \$749 per fortnight whereas for a couple, the payment is \$686 as at December 2023.

JSA recipients renting privately are eligible for Rent Assistance. This gets paid in addition to the maximum amount of JSA.

The payment rate of JSA is indexed to changes in the CPI, twice per year (in March and September).

Means testing

Personal income test: The payment has an income free area but if the fortnightly income is between \$150 and \$256, the entitlement reduces by 50 cents in the dollar. For income above \$256 per fortnight the payment reduces the allowance by 60 cents in the dollar. Single principal carers of dependent children have more generous income test compared to other single recipients.

Partner Income test: If the partner income exceeds the income free area, it reduces the fortnightly payment of the recipient by 60 cents in the dollar. There is no partner income test if recipient's partner is receiving any social security pension. If the partner is receiving any pension, the partner's income is combined with recipient's income for the personal income test.

Rent Assistance is calculated for the families without dependents otherwise it gets paid with Family Tax Benefits Part A.

Youth Allowance, AUSTUDY/ABSSTUDY: This payment provides financial assistance to young people aged 16 to 24 years, who are looking for full time work or doing Australian Apprenticeship or studying full time (18-24 years) or 16 to 17 years and independent or needing to live away from home to study. The eligibility of Youth Allowance assesses if the individual is independent or dependent. The payment rates depend on the income and assets of the individual.

The survey data has limited information of young people regarding if they are independent or staying away from home but still depends on family for their income. There are also limitations to impute this information from the available data. For these reasons, PolicyMod does not model Youth Allowance, and it is based on the survey data amount but updated using the CPI and includes any policy adjustments.

From the survey data, the following variables are used directly to estimate the amount YA and Austudy/Abstudy an individual receives. These values are adjusted to fortnightly values in the PolicyMod basefile.

- weekly income from Austudy/Abstudy (IAUSTCP)
- weekly income from Youth Allowance (IYOUTHCP)

Parenting Payment Partnered (PPP): PPP is an allowance for partnered parents to assist parents with the cost of living. To be eligible for this payment, you need to have a child under the age of 6.

PPP is a social security benefit paid at the same rate as NSA for couples with children under the age of 6. The entitlement of PPP also depends on the personal and partner income test like NSA.

For maximum payment (\$686 pf – December 2023), the recipient's income must be less than \$150 per fortnight as of December 2023. The amount of parenting payment depends on you and your partner's income. The amount of PPP will reduce by 50 cents for each dollar between \$150 and \$256

and by 60 cents for each dollar above \$256 per fortnight. The personal income test works the same way as the JSA testing.

As per most other allowances in PolicyMod eligibility is based on the ABS survey recording a positive payment rather than developing a modelled estimate.

The maximum rate of PPP in PolicyMod includes:

- the maximum rate of PPP
- Energy Supplement
- Pharmaceutical Allowance
- Income Support Bonus
- Telephone Allowance

Family Tax Benefits

Family Tax Benefits part A: Family Tax Benefits Part A helps with the cost of raising children. To be eligible for FTB Part A you need to have at least one dependent child who is:

- 0 to 15 years of age or
- 16 to 19 years of age and in full time secondary (including those who are repeating year 12)

The maximum rate of FTB Part A depends on the age of the FTB child whereas the base rate is paid at the same rate for all age groups. The means testing (using two methods which is explained in this section) of FTB Part A estimates whether the recipient is on the maximum rate of the payment or a tapered or base payment rate.

The maximum annual rate of FTB Part A includes the end of year supplement of \$880 per child. The supplement is paid at the end of financial year if you and your partner's adjusted taxable income is less than \$80,000 per annum. In PolicyMod the payment is the annual expected payment paid on a weekly basis. The recipients are also eligible for Rent Assistance if they are getting paid more than the base rate of FTB Part A. In addition to this, you are also eligible for the Energy supplement regardless of the method of payment.

PolicyMod calculates the entitlement of FTB Part A by two income test methods. Unlike most other payments, the entitlement of Family Tax Benefits are means tested based on the Adjusted Taxable Income of the income unit (both reference person and spouse). Section 2 explains the main components of Adjusted Taxable Income in PolicyMod.

There is no assets test for Family Payments (both FTB Part A and Part B).

Method 1 income test: The method 1 income test reduces the **maximum rate** of FTB part A by 20 cents for each dollar above the Free Income Area threshold (Adjusted taxable Income).

Maintenance Income test: Maintenance reduction is included in the entitlement of FTB Part A. Maintenance income test reduces the maximum rate by 50 cents for each dollar above the Maintenance Income free area if one of the parents receives any maintenance payment (if the recipient or their partner has any child from the previous relationship, they can receive child support and spousal maintenance and this is called the Maintenance Income Free Area). PolicyMod calculates

the Maintenance Income test for the recipients who receive maintenance income and on the maximum rate of the payment.

PolicyMod **does not** model the Maintenance payment, it is based on the Survey data. The variable 'ICHLDSCP' (weekly income from child support/maintenance) from the ABS survey data is used to calculate the maintenance reductio.

In PolicyMod, the entitlement of FTB Part A using Method 1 includes:

- the maximum rate of FTB Part A
- FTB Part A supplement
- Rent Assistance
- Energy Supplement

Method 2 income test: The method 2 income test reduces the **base rate** of FTB Part A by 30 cents for each dollar of the Adjusted Taxable Income above \$111,398. It is paid at the same rate for all age groups and an additional FTB Part A supplement is paid at the end of each financial year.

The entitlement of FTB Part A using Method 2 includes:

- the base rate of FTB Part A
- FTB Part A supplement
- Energy Supplement

After calculating the entitlement using two methods, PolicyMod takes the maximum entitlement out of the two methods.

FTB Part A recipients are also eligible for Newborn Upfront Payment and Newborn Supplement if you recently become a parent through birth or adoption. Newborn Supplement is paid up to 13 weeks with the regular fortnightly FTB Part A payment.

Family Tax Benefits Part B: Family Tax Benefits Part B gives extra assistance to:

- single parents
- Non-parent carers such as grandparents, great grandparents, and
- couples with one main income

The payment rate of FTB Part B depends on the age of the youngest child. The maximum rate of FTB Part B includes the supplement of \$354.05 per annum.

FTB Part B cannot be paid during a Paid Parental Leave period but PolicyMod does not include the PPL payment so is ignored.

Income test: PolicyMod does two income tests for the FTB Part B entitlement and depends on the recipient's income and their partner (if any).

(a) Single parents automatically receive the maximum rate of FTB Part B, if their Adjusted Taxable Income is \$100,000 or less per year.

(b) Eligible couples receive the maximum rate of FTB Part B, if the higher income earner's ATI (Adjusted Taxable Income) is \$112,578 per year or less and the other parent's income (lower earner) is less than or equal to \$6,497 per year. The payment rate gets reduced by 20 cents for each dollar above \$6,497.

Special Supplements and other payments:

Rent Assistance (RA): It provides financial assistance to recipients of pension, allowance or benefits and Family Tax Benefits who are renting privately. The amount of Rent Assistance depends on the rate of the rent you pay. To get any Rent Assistance, there is a minimum amount of rent you need to pay. For every dollar above this minimum amount, you will get 75 cents up to the maximum amount of Rent Assistance you can get.

The amount of Rent Assistance gets updated twice per year, 20 March and 20 September and is indexed according to the movements in the CPI.

The payment rate of RA depends on whether you have a dependent child or not.

If you have a dependent child, Rent Assistance gets paid with the maximum rate of FTB Part A. The entitlement of RA is calculated as follows:

$$\text{Rent Assistance} = \text{Minimum of } \{ \text{maximum rate, (amount of rent paid - rent threshold)} * 75 \}$$

In PolicyMod, Rent Assistance is split evenly between couples if both members of the couple are entitled to RA. Rent assistance is not treated as taxable income.

Energy Supplement: Energy Supplement payments are paid automatically to pensioners, other income support recipients, families receiving FTB, youth and student recipients and DSP recipients under 21 without dependent children.

Carer allowance: This allowance provides income supplement paid to someone who provides daily care and attention at home to a person with disability or medical condition.

Carer Supplements: This is a non-indexed lump sum payment per annum (in July) to the recipients of Carer Allowance, Carer Payment and DVA pension.

Pensioner Education Supplement: It helps to undertake full-time or part-time study and it gets paid automatically if you are receiving any pension.

Childcare

The Childcare Subsidy was introduced in July 2018 (replacing the childcare benefit and childcare rebate) and assists with the cost of approved childcare and registered childcare.

CCS was recently (July 2023) reformed with more generous tapering and a higher overall rate of subsidy. This reform followed the 2022 reform whereby eligible second and subsequent children in long day care entitled the parents to a greater rate of subsidy for the additional children in care.

The current CCS provides a subsidy of 90 per cent for families with an adjusted taxable income below \$80,000 per year. This rate reduces to 0% in a linear fashion once incomes reach \$530,000 per year.

Subsequent children in long day care receive a boosted subsidy of their normal rate plus 30 per cent up to a maximum of 95 per cent.

The subsidy is only applied to childcare hourly rates of up to a cap of \$13.70 per hour for long day care and lower for outside school hours care.

There is an activity test that can also limit the hours for which the subsidy applies, however, the underlying basefile in PolicyMod does not contain enough information to accurately apply this test and is generally not applied. The activity test includes a range of activities (beyond the standard hours worked or student status) such as volunteering work and jobsearch activity that are not collected in the ABS survey. The activity test is generally only constraining for a small number of families ([Child Care Package Evaluation: Final report | Australian Institute of Family Studies \(aifs.gov.au\)](#)) and its exclusion generally is not expected to alter the modelling results for childcare substantially. However, it remains the case its exclusion will mean that results will include a small upward bias in the CCS from this omission.

The CCS calculated in in PolicyMod does not include the additional childcare subsidy that a small number of very low income families receive. This exclusion will mean a small understatement of the overall CCS from this omission.

The ABS microdata is based on summary information at the income unit level, about the number of hours per child spent in a childcare and costs in PolicyMod, we have imputed this information on a per-child basis to enable the correct entitlement of Childcare benefits and rebate.

Types of childcare in PolicyMod includes:

- Long day care
- Family day care
- Occasional Care
- Outside school hours care

PolicyMod does include the childcare cap on the total subsidy for higher income families (beyond around \$180,000) for the years prior to 2022-23. Older versions of PolicyMod include the old childcare benefit and rebate prior to their replacement in 2018.

[Tax and Medicare levy](#)

Personal Income Tax:

The Australian personal income tax system is comprised of a series of tax thresholds with progressively higher tax rates for higher income thresholds. In addition, there is a Medicare levy of 2 per cent on all income and a complex array of tax offsets and shade-in-rates.

Tax rates 2023-24:

Taxable Income	Tax on this income
0 – \$18,200	Nil
\$18,201 – \$45,000	19c for each \$1 over \$18,200

\$45,001 – \$120,000	\$5,092 plus 32.5c for each \$1 over \$45,000
\$120,001 – \$180,000	\$29,467 plus 37c for each \$1 over \$120,000
\$180,001 and over	\$51,667 plus 45c for each \$1 over \$180,000

The **macro %inctax** estimates the taxable income and the personal income liability of the individuals in the basefile. The array called 'taxarray' calculates the cumulative tax based on the tax rates (above table). PolicyMod estimates the income tax liability of each person in an income unit.

Section 2 explains how PolicyMod calculates Taxable Income using the ABS survey data.

$$\text{Taxable income} = \text{Assessable income} - \text{allowable deductions}$$

where Assessable Income = Sum (private income, allowtaxable, pensiontaxable)

**Taxable components
of allowance**

**Taxable
components of
pension**

$$\text{Net Income Tax liability} = \text{Personal income Tax} + \text{levies} - \text{Tax offsets}$$

**Medicare levy
& Budget Repair Levy**

**- LITO
- BENTO
- SAPTO**

Tax Offsets can reduce the tax liability.

Low income rebate (Low Income Tax Offset (LITO)) is a tax offset for low income earners. If your taxable income is less than the low income threshold, you are entitled to a low income tax offset. The offset can reduce the amount of tax your tax liability. The maximum tax offset available is \$445 if your income is below the low-income threshold and the offset get reduced by 1.5 cents for each dollar above the income free area.

$$\text{LITO} = \text{Low income rebate} - \{(\text{Taxable Income} - \text{low income threshold}) * 0.125\}$$

SAPTO (Seniors and Pensioners Tax Offset): The Seniors and Pensioners Tax Offset (formerly known as the Senior Australians Tax Offset (SATO)) is a tax offset available for retirees who are Age Pension age or older, or Service Pension Age. The rebate value reduces by 12.5 per cent once the income reaches beyond the SAPTO reduction threshold.

In PolicyMod, the eligibility for SAPTO is determined by an individual/couple are pensioners or not. The entitlement of SAPTO is based on the taxpayer's Rebate Income. Section 2 explains the main components of Rebate Income in PolicyMod.

The macro %SAPTO calculates the entitlement of SAPTO for the reference person and spouse. PolicyMod assigns SAPTO for other members in the income unit (S1, S2 and S3) as zero.

The SAPTO of a single taxpayer is calculated as follows:

$$\text{SAPTO} = \text{Rebate amount} - \{0.125 * (\text{Rebate income} - \text{Rebate Threshold})\}$$



Rebate amount gets reduced by 12.5 cents for each dollar above the rebate threshold.

PolicyMod includes the transferability of **unused SAPTO** between partners. It includes two scenarios:

a) where reference person has larger income

If the reference person has larger income, the unused SAPTO of spouse is calculated as

$$\text{Unused SAPTO} = \text{Max} \{0, (\text{Rebate amount} - \text{Max} (0, 0.15 * (\text{Taxable Income} - 6000))\}$$

Then we need to recalculate the rebate threshold to calculate the SAPTO of the reference person

b) where spouse has larger income

Similar approach is applied for the scenario where spouse has the more income than the reference person.

BENTO (Beneficiary Tax Offset): The Beneficiary tax offset is available to taxpayers who receive certain benefits or allowances (like Newstart Allowance). BENTO is calculated based on the Rebatable Benefits. The BENTO varies according to the amount of allowance or benefits (rebatable benefits) you are entitled to. PolicyMod does not model the case if rebatable benefits more than \$37,000 per year as it is very unusual to receive benefits more than \$37,000.

Rebatable Benefits	BENTO Calculation
\$0 to \$37,000	15 % [Rebatable Benefits - \$6000]
Over \$37,000	15% of [Rebatable benefits – \$6,000] + 15% of [Rebatable benefits – \$37,000]

Medicare Levy:

Medicare levy is 2% of an individual's taxable income. An individual is only liable for Medicare levy if their income is above the threshold. These thresholds can vary based on your family status; single or couple/ couple with dependants or single parent with dependent children.

Medicare Levy is calculated as follows:

- If an individual's taxable income is less than Medicare levy threshold (currently \$21,655 per annum, as at 2016-17), then you don't pay any Medicare Levy.
- When individual's taxable income is above the shade-in-limit, then the Medicare Levy is:

$$\text{Medicare Levy} = \text{Taxable income} * \text{Medicare levy standard rate}$$

Where,

Medicare standard rate is 2% (as at 2016-17).

- If individual's income is within the shade-in range, their Medicare Levy is calculated as follows:

$$\text{Medicare levy} = (\text{Taxable Income} - \text{threshold}) * \text{shade-in marginal rate}$$

Where,

shade-in marginal rate is 10% (as at 2016-17).

The individual pays the minimum of these two amounts.

PolicyMod **does not** model Medicare Levy Surcharge.

The **macro %medlev** calculates Medicare Levy for different family types: singles, single/couple with children and couples with no children. The Medicare Levy income threshold varies for individual taxpayers, single/couple with kids and pensioners. The PolicyMod parameters include the Medicare Income thresholds for different family types whereas for couples, family income threshold is estimated based on their combined taxable income.

- Calculate individual levy amount

All single/ individual taxpayers need to pay a levy of 2 per cent of their taxable income if their taxable income is higher than the shade-in-limit. If their taxable income is less than the Medicare threshold, individuals don't need to pay any Medicare Levy.

$$\text{Medicare Levy} = \text{Taxable income} * \text{Medicare standard rate}$$

- Calculate Family Income Threshold and reduction amount

In PolicyMod, a separate Family Income Threshold is estimated for different family types and pensioners include;

- single with kids

- couple with kids
- couple with no kids

The Family Income Threshold is calculated as follows:

Family Income Threshold = Sum {Income threshold for couples/pensioners, (number of dependent kids * increment per dependent child)}

- I. If the combined income of both members (reference person and spouse) in the family is less than the Family Income Threshold, there is no Medicare Levy for both members.
- II. If the combined income is above the Family Income Threshold, Medicare Levy is calculated as follows:

Family reduction amount = MAX (0, (Medicare levy standard rate * family income threshold) – (family Income – family income threshold) * (Medicare Levy shade-in-rate – standard rate))

Medicare Levy = Medicare Levy – Family Reductions

If the Medicare Levy is less than zero for either reference person or spouse, the absolute value of Medicare Levy is reduced from the other person's levy and vice versa.

PolicyMod then calculates Net Income Tax after estimating all levies and tax offsets.

Section 5: How to use PolicyMod

This section describes the main programs of PolicyMod, illustration of conducting distributional analysis in PolicyMod and the interpretation of policy outcomes.

The main components of PolicyMod are:

- Control program: *polycymod control program base and alternative comparison.sas*
- Two main programs for base world and simulation world.
 - *Basefile_create.sas*
 - *Basefile_Alternative_Sim.sas*

To run PolicyMod, the user must gain access to the ABS Survey of Income and Housing 2019-20. The basefile for the distributional analysis for PolicyMod is created based on the survey data.

The '&drive' for PolicyMod is set as:

`&drive= "Q:\RSSS\CAEPR\AcademicGroups\CSRM\models\POLICYMOD\PolicyMod19"`

The user needs to update &drive to the correct directory based on the new location (if necessary).

The control program of PolicyMod is located at `"&drive\RunModelSAS\polycymod control program base and alternative comparison.sas "`. It has two major components: *Basefile_create.sas* and *Basefile_Alternative_Sim.sas*.

Basefile_create.sas program creates basefiles for PolicyMod under the current legislation. The first part of this program creates some important directories and libraries to run the model. This program also includes several imputations and transformation of the survey data (ABS Survey of Income and Housing) to ensure it represents

the current population in Australia. This also helps the modelling process of some payments including childcare and family payments. The imputations are mainly done to the person, income unit and household level data of the survey data.

The macro %parms will import the parameters for pension, allowances or benefits, family payments and tax for several years.

Section 2 explains each module of the main programs in detail.

A similar set of code is designed in the *Basefile_Alternative_Sim.sas* which allows the user to make any changes in the policy or parameters, and then compare it to the current policy settings. This program is called by the macro %AF in the control program. The alternative program of PolicyMod does not include the reweighting as it is necessary to have the same weights for the survey data for the comparison of two basefiles.

To run the analysis for 2019-20 financial year, you need to run the macro “%BF(2019,19,2019,0)”, similarly, for 2020-21 financial year, you will need to run the macro “%BF(2020,20,2020,0)” and so on.

Similar options are available for the alternative policy scenarios, the user can compare basefiles for different years.

The model can project the impact up to 2059-60. The user also has the option to run the model just for the base world (existing policy/current scenarios) or can include the alternative policy scenarios (simulation world) by enabling making certain macros in the control program.

Once the basefiles have been created, you do not need to run the whole program again as it is permanently created. The user can also select specific years by calling specific macros.

Section 6: Using PolicyMod

Making parameter changes

The main parameter spreadsheet of PolicyMod is located at “Q:\RSSS\CAEPR\Academic Groups\CSRM\models\POLICYMOD\PolicyMod19\Policy\Parameters.parameters.xls”. This is read into the main program by calling the macro %parms.

The simplest way to incorporate a new policy is by overwriting parameters. This can be only done when there are simple changes in the policy like increases in the payment rates or thresholds. But more complicated policy changes like re-structuring of an existing policy and the introduction of a new policy needs to be incorporated through the PolicyMod code.

The parameters.xls represents the existing policies of the Australian Tax and Transfer system and we recommend not to make changes unless any modification to the existing legislation. For policy analysis, any changes to the parameters should be included in the Parameters_alt located at the same location as the main parameters.

The following provides a simple example to illustrate a simple parameter change of increasing Medicare levy rate from 2 to 2.5 per cent from 2018 onwards. This can be easily done by overwriting the payment rates in the alternative parameter spreadsheet (parameters_alt).

DATE	Other taxpayers								Taxable pensioners		Seniors		Medicare rates	
	Single	Family			Single	Family	Single	Family	Medicare levy					
	Levy	Levy	Increment per dependant		Levy	Levy	Levy	Levy	Step one	Step one	Step one	Step one	Step one	Shade-in rate
	Step one	Step one	Step one	Step two	Step one	Step one	Step one	Step one	Step one	Step one	Step one	Step one	Step one	Shade-in rate
DATE	MEDTHR1S	MEDTHR1C	MEDINC1	MEDINC2	MEDPEN1S	MEDPEN1C	MEDSEN1S	MEDSEN1C	MEDLEVR1	MEDLEVSHR1				
Dec-14	21,020	35,469	3,233	1,500	32,996	46,272	33,239	46,272	0.02	0.1				
Dec-15	21,335	36,001	3,306	1,500	33,738	46,966	33,738	46,966	0.02	0.1				
Dec-16	21,655	36,541	3,380	1,500	34,497	47,670	34,244	47,670	0.02	0.1				
Dec-17	22,142	37,363	3,456	1,500	35,273	48,743	35,014	48,743	0.02	0.1				
Dec-18	22,640	38,204	3,534	1,500	36,067	49,839	35,802	49,839	0.02	0.1				
Dec-19	23,150	39,063	3,614	1,500	36,878	50,961	36,608	50,961	0.02	0.1				
Dec-20	23,671	39,942	3,695	1,500	37,708	52,107	37,432	52,107	0.02	0.1				
Dec-21	24,262	40,941	3,787	1,500	38,651	53,410	38,367	53,410	0.02	0.10				
Dec-22	24,869	41,965	3,882	1,500	39,617	54,745	39,326	54,745	0.02	0.10				

DATE	Other taxpayers								Taxable pensioners		Seniors		Medicare rates	
	Single	Family			Single	Family	Single	Family	Medicare levy					
	Levy	Levy	Increment per dependant		Levy	Levy	Levy	Levy	Step one	Step one	Step one	Step one	Step one	Shade-in rate
	Step one	Step one	Step one	Step two	Step one	Step one	Step one	Step one	Step one	Step one	Step one	Step one	Step one	Shade-in rate
DATE	MEDTHR1S	MEDTHR1C	MEDINC1	MEDINC2	MEDPEN1S	MEDPEN1C	MEDSEN1S	MEDSEN1C	MEDLEVR1	MEDLEVSHR1				
Dec-14	21,020	35,469	3,233	1,500	32,996	46,272	33,239	46,272	0.02	0.1				
Dec-15	21,335	36,001	3,306	1,500	33,738	46,966	33,738	46,966	0.02	0.1				
Dec-16	21,655	36,541	3,380	1,500	34,497	47,670	34,244	47,670	0.02	0.1				
Dec-17	22,142	37,363	3,456	1,500	35,273	48,743	35,014	48,743	0.02	0.1				
Dec-18	22,640	38,204	3,534	1,500	36,067	49,839	35,802	49,839	0.025	0.1				
Dec-19	23,150	39,063	3,614	1,500	36,878	50,961	36,608	50,961	0.025	0.1				
Dec-20	23,671	39,942	3,695	1,500	37,708	52,107	37,432	52,107	0.025	0.1				

Similarly, you can change any payment rates or threshold for any allowances or benefits, pension, family payments, tax and so on. The alternative spreadsheet will feed into the main programs and, it will then compare to the basefiles for the existing policy. The PolicyMod output will show the impact of this policy in terms of change in disposable income by different household type, Government revenue and number of household impacted by the policy.

Another way to change parameters is to incorporate it in the Basefile_Alternative_Sim.sas program. The following example shows how to change the payment rate of JobSeeker Allowance (JSA) for 2018.

We recommend you make parameter changes under the section "UPDATE PARAMETERS FOR POLICY REFORM IF NECESSARY" in the Basefile_Alternative_Sim.sas program.

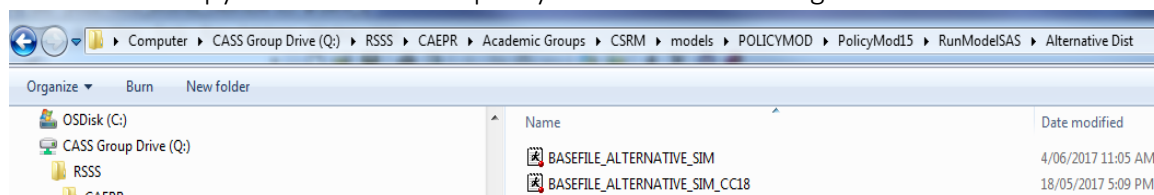
Suppose if you want to increase the payment rate of JSA by \$40pf, you can simply add an 'if' statement with the condition of the new payment rates (or can specify the new value in figures). The user can add more statements for any parameter or threshold changes in the policy. But this can be time

consuming when there are many changes happening in the policy field, especially during the time of Budget and MYEFO.

```
/* UPDATE PARAMETERS FOR POLICY REFORM IF NECESSARY */  
  
if &year=2018 then NSA21_S = NSA21_S + 40;  
  
ARRAY UPDATED (*) PEN_S PEN_C NSA21_S NSA60_S NSADEP_S NSA21_C1 NSA21_C2 PPS YUTH0_18  
FTBA0_19B FTBA0_13 FTBA13_15 FTBA16_19 FTBA16_19NS FTBBO_5C FTBBNC FTBBO_5S FTBBNS  
CCB1 CCB2 CCB1K CCB2K CCB3_K CCR1MAX  
RNTAL0S RNTAL1S RNTAL2S RNTAL0C RNTAL1C RNTAL2C  
PHARALS PHARALC TELALS1 TELALC1 TELALS2 TELALC2 UTVALS UTVALC INCBONS INCBONC  
LOINCSUPP  
PENPAYC_ES PENPAYS_ES PARPAYC_ES PARPAYS_ES YUTH16_17_ES YUTH18__ES YUTH16_17NH_ES YU
```

We recommend to make a copy of *Basefile_Alternative_Sim.sas* and make necessary changes for the policy analysis, then update it in the control program.

Make a new copy of the Alternative policy code in the following location:



Suppose the new program is “BASEFILE_ALTERNATIVE_SIM_CC18” with additional policy or parameter changes. Now we need to update this filename in the control program of PolicyMod.

```
/* CODE FOR DEVELOPING ALTERNATIVE POLICY AND COMPARISON ANALYSIS */  
  
%let month = 12;  
  
filename altcr "&drive\RunModelSAS\Alternative Dist\BASEFILE_ALTERNATIVE_SIM_CC18.sas";  
/*filename altcr "&drive\RunModelSAS\Alternative Dist\BASEFILE_ALTERNATIVE_SIM_cukkoo_HIFA_only.sas";*/  
PROC PRINTTO log="&drive\basefile\alternative_creation2.log" NEW;  
  
%GLOBAL INF;  
%LET INF = 1.0; /* INFLATION RATE FOR POLICY CHANGE - PAYMENT PARAMETERS ONLY */
```

Making policy changes

Any complex policy changes like introduction of a new policy, structural change in the existing policy and so on needs to be incorporated in the alternative code of the main program. To do this, the user requires a stronger understanding of the tax and transfer system and the PolicyMod code.

This section will illustrate an example of a policy change that is incorporated in the PolicyMod.

For example, if you want to implement the policy of increasing Medicare rate from 2 to 2.5 per cent for individuals earn more than \$87,000 per year from 2019 onwards. This is a reasonably simple policy change that you cannot implement using parameter spreadsheet.

The highlighted section in the next figure shows where we have included the policy change of Medicare.

```
/* MEDICARE LEVY */
/*
1. Calculate individual levy amount
2. Calculate family reduction amount
3. Share reduction if couple, transfer any unused amount to other partner
*/

famthr = 0;

%macro medlev(pers= );

/*Increasing Medicare rate from 2 to 2.5% if taxable income > $87,000*/
if &year>=2019 then do;
if &pers.tinc> 87000 then MEDLEVR1=0.025;
end;
```

Analysing Results of PolicyMod

The main output of PolicyMod analysis is located at:

"Q:\RSSS\CAEPR\AcademicGroups\CSRM\models\POLICYMOD\PolicyMod19\output".

The PolicyMod produces variety of outputs in different context including change in disposable income of different income quintiles, winners and losers analysis for different family types and revenue impact. The user can also analyse an aggregate \$ impact of the new policy which implicates the Budget balance of the Government.

The main forms of output are contained in the folders 'Alternative', 'Base', and 'Compare'. The Alternative folder includes a file called 'HHwinners.xls' and a file called 'HHSummaryHHBased.xls'. Both files include a suffix for the year of output.

The winners file includes detailed winner and loser information such as number of winners or losers, average gains and losses for a range of household types such as family type, income and wealth. The winners table also provides total gains and losses for each household type provided. From this table it can be calculated the share of gains or losses for different household types and hence the progressivity or otherwise of any policy change can be gauged.

The summary excel file provides summary information either the base or alternative basefile (depending on the folder you are viewing). The typical information includes welfare and tax aggregates, poverty rates, poverty gaps, housing stress rates, superannuation concessions, financial stress modelled estimates. These variables are available for a range of household types. The output files also include inequality information such as gini coefficients.

The aggregate tables in the 'compare' folder provide a quick analysis of the change in government's fiscal position (also identical to the household budget position). A positive number indicates households are better off or governments are worse off in aggregate financial terms.

The box below shows the overall impact of some policy change. The box indicates that households are worse off by about \$2.7 billion for the given year. This also means that the government's fiscal position is improved by \$2.7 billion.

Policy Change - Aggregate \$impacts pa

diff
Sum
\$-2,773,758,777

Example of PolicyMod policy change – Change to Stage 3 Tax Cuts

There has been considerable interest in the upcoming 'stage 3 tax cuts'. The government plans to lower tax rates for many taxpayers in 2024-25 financial year. PolicyMod already has these tax cuts set in the base world parameters as the 'stage 3 tax cuts' passed parliament many years ago. As such removing these tax cuts or altering them in some way requires a change to the parameter spreadsheet – 'alternative parameters.xls'.

The table below shows the existing tax rates and thresholds in the base parameters file. For 2024 financial year the stage 3 tax cuts are included with lower rates for the parameter MTR3 and MTR4 and a higher threshold for PITHRS5.

DATE	TAX									
	First step in income tax scale	Marginal tax step in first tax step	Second step in income tax scale	Marginal rate in second tax step	Third step in income tax scale	Marginal rate in third tax step	Fourth step in income tax scale	Marginal rate in fourth tax step	Fifth step in income tax scale	Marginal rate in fifth tax step
DATE	PITHRSH1	MTR1	PITHRSH2	MTR2	PITHRSH3	MTR3	PITHRSH4	MTR4	PITHRSH5	MTR5
Dec-14	0.0	0%	18,200	19%	37,000	32.5%	80,000	37%	180,000	45%
Dec-15	0.0	0%	18,200	19%	37,000	32.5%	80,000	37%	180,000	45%
Dec-16	0.0	0%	18,200	19%	37,000	32.5%	87,000	37%	180,000	45%
Dec-17	0.0	0%	18,200	19%	37,000	32.5%	87,000	37%	180,000	45%
Dec-18	0.0	0%	18,200	19%	37,000	32.5%	90,000	37%	180,000	45%
Dec-19	0.0	0%	18,200	19%	37,000	32.5%	90,000	37%	180,000	45%
Dec-20	0.0	0%	18,200	19%	45,000	32.5%	120,000	37%	180,000	45%
Dec-20	0.0	0%	18,200	19%	45,000	32.5%	120,000	37%	180,000	45%
Dec-22	0.0	0%	18,200	19%	45,000	32.5%	120,000	37.0%	180,000	45%
Dec-23	0.0	0%	18,200	19%	45,000	32.5%	120,000	37.0%	180,000	45%
Dec-24	0.0	0%	18,200	19%	45,000	30.0%	120,000	30.0%	200,000	45%

Some commentators have suggested that the stage 3 tax cuts unduly generous to higher income earners. Some are of the view that the 37 per cent rate should remain in 2024. Making this change in PolicyMod is very simple and only requires the Dec-24 row for MTR4 to be changed from 30.0% to 37.0%. This means that some elements of the original stage 3 tax cuts remain – namely the 32.5% rate being lowered to 30% for all those with a taxable income greater than \$45,000 and the top threshold (PITHRSH5) increased from \$180,000 to \$200,000.

The table below shows the one minor change this is required to be made in the alternative parameters file ‘parameters_alt.xls’.

DATE	TAX									
	First step in income tax scale	Marginal tax step in first tax step	Second step in income tax scale	Marginal rate in second tax step	Third step in income tax scale	Marginal rate in third tax step	Fourth step in income tax scale	Marginal rate in fourth tax step	Fifth step in income tax scale	Marginal rate in fifth tax step
DATE	PITHRSH1	MTR1	PITHRSH2	MTR2	PITHRSH3	MTR3	PITHRSH4	MTR4	PITHRSH5	MTR5
Dec-14	0.0	0%	18,200	19%	37,000	32.5%	80,000	37%	180,000	45%
Dec-15	0.0	0%	18,200	19%	37,000	32.5%	80,000	37%	180,000	45%
Dec-16	0.0	0%	18,200	19%	37,000	32.5%	87,000	37%	180,000	45%
Dec-17	0.0	0%	18,200	19%	37,000	32.5%	87,000	37%	180,000	45%
Dec-18	0.0	0%	18,200	19%	37,000	32.5%	90,000	37%	180,000	45%
Dec-19	0.0	0%	18,200	19%	37,000	32.5%	90,000	37%	180,000	45%
Dec-20	0.0	0%	18,200	19%	45,000	32.5%	120,000	37%	180,000	45%
Dec-20	0.0	0%	18,200	19%	45,000	32.5%	120,000	37%	180,000	45%
Dec-22	0.0	0%	18,200	19%	45,000	32.5%	120,000	37.0%	180,000	45%
Dec-23	0.0	0%	18,200	19%	45,000	32.5%	120,000	37.0%	180,000	45%
Dec-24	0.0	0%	18,200	19%	45,000	30.0%	120,000	37.0%	200,000	45%

Before running the alternative basefile code with the alternative parameters spreadsheet it is always good practice to ensure that any old changes that may have been made to the alternative spreadsheet or alternative basefile creation code have been removed. The easiest way to do this is

to run the 'null run'. This means that when you run the alternative code the overall change in household income is 0, implying no change in household or government finances.

Having run the alternative code the first place is to ensure that SAS shows no errors. This can be done by looking at the log file "&drive\basefile\alternative_creation2.log" or the log file in SAS Enterprise Guide.

The next step is to consider the aggregate files in "&drive\output\Compare".

Policy Change - Aggregate \$impacts pa

diff
Sum
\$-7,299,947,317

This output shows that restoring the 37 percent personal income tax rate for persons with an income between \$120,000 and \$200,000 lowers household income by a total of around \$7.3 billion for 2024/25 financial year. Equally, the government's finances are better off by that same amount.

This is the aggregate amount and certainly of interest regarding government finances, but it tells us not a lot about the impact of the policy change on the different household types. The 'HHwinners' spreadsheet in the '&drive\output\Alternative' folder provides the distribution of impact by different household types.

Table 1 within this spreadsheet shows the dollar impact of the policy change on a range of household types. Here are some examples from this sheet. On average, couples with children will be the most impacted in a dollar per year sense with a loss of household income of \$1501. Least impacted are single parents (-\$160). When considering income quintiles (where Quintile 1 or the lowest income quintile) the average impact is \$0, whereas the impact for the top quintile (Quintile 5) the impact is-\$2825.

	Difference \$pa
	Mean
Household Type	
Couple Children	-1501
Couple Only	-550
Lone Person	-249
Other	-476

Single Parent	-160
Quintile	
1	0
2	-2
3	-106
4	-470
5	-2825

The absolute dollar values in the table above may obscure the reality that some household types have quite different levels of income so considering the impact as a per cent of income may be more informative. The table below shows the impact as a percent of income. The impacts are still greatest for higher income households and couples with children.

	Difference % Income (DI)
	Mean
Household Type	
Couple Children	-0.6%
Couple Only	-0.2%
Lone Person	-0.2%
Other	-0.2%
Single Parent	-0.1%
Quintile	
1	0.0%
2	0.0%
3	-0.1%
4	-0.3%
5	-1.1%

The spreadsheet (Table 5) also provides detailed winner and loser tables for the policy change. From this table we can calculate the percentage of winners and loser and for those whom there was no change. Around 39 per cent of couples with children would be worse off compared to just 6 per cent of single parents. Essentially no household (rounding to 0 per cent) in the bottom 40 per cent of the income distribution would be worse off from such a policy change, however 66 per cent of the top 20 per cent of incomes would be worse off.

	Winner/Loser/No Change	
	Loser	No Change
	Sum	Sum
Household Type	1,075,085	1,663,517
Couple Children	434,278	2,509,316
Couple Only	218,947	2,375,947
Lone Person	256,949	1,427,344
Other	42,975	725,149
Single Parent		
Quintile	2,746	2,143,902
1	8,806	2,136,370
2	143,755	2,002,478
3	463,130	1,683,265
4	1,409,797	735,258
5		

Table 17 provides an example of how the dollar gains or losses are distributed amongst different household types. The extract below shows the dollar impact in total for family type and income levels (quintiles). The majority of the impact is felt by couples with children (around \$4.1B or 56 per cent) and the top income quintile (5) with around \$6.1 billion or 83 per cent.

	Difference \$pa
	Sum
Household Type	
Couple Children	
Couple Only	-\$4,111,977,150
Lone Person	-\$1,617,832,912
	-\$646,119,527

Other	-\$801,300,510
Single Parent	-\$122,717,219
Quintile	
1	-\$789,891
2	-\$3,952,882
3	-\$228,341,804
4	-\$1,007,843,437
5	-\$6,059,019,304

The 'HHSummaryHHBased.xls' spreadsheet in the alternative folder '&drive\output\Alternative' provides detailed analysis of the following:

- 1) Aggregates for tax and welfare
- 2) Poverty statistics by detailed household type
- 3) Housing stress by detailed household type
- 4) Income statistics including income distributions by detailed household type
- 5) Gini coefficient
- 6) Predicted financial stress rates. At this stage these are 'experimental'.
- 7) Superannuation concessions by detailed household type

These statistics can be compared with the base folder's base world results.

Section 7: PolicyMod Summary and Potential Future Developments

PolicyMod is a static model of Australia's tax and transfer system. The model is based on actual household data from the ABS Survey of Income and Housing. The model provides the basis for modelling the impact of policy change on persons and households and, in aggregate, budget changes for the Commonwealth government. The model undertakes very detailed modelling of most aspects of the personal income tax and welfare system in Australia. The impact analysis is 'static' in that the model does not consider any behavioural change that may result from policy change. This is the standard approach taken by microsimulation in Australia and around the world, however, there are instances where behaviour change is clearly of considerable interest and potentially a significant factor that requires consideration.

The inclusion of behaviour change does add considerable complexity to such models. The result of such modelling is subject to considerable uncertainty and does detract from the transparency of results. The drawback of static modelling is, however, the lack of behaviour change. The judgement

of the modeler is required in considering the likely importance of behaviour change. There are policy changes that are likely to lead to significant behaviour change and policies that lead to limited change.

A considerable advantage of the microsimulation modelling approach to policy modelling is the ability to model a range, or package, of reform jointly rather than individually. For example, in 2000 Australia undertook a complex array of policy reforms including a GST and a host of welfare and personal income tax changes within the one package. Microsimulation modelling can model all these aspects jointly enabling policy analysis of winners and losers from such reform and to better design packages of reform to ensure that any reform does not unduly harm particular groups such as low-income families.

PolicyMod as outlined in this paper has considerable ability to model a diverse range of current and alternative policy and can provide unique analytical power providing such analysis as distributional analysis of different household types, incentive effects through Effective Marginal Tax Rates, regional analysis, cameo analysis for hypothetical families, dynamic income analysis for retirement incomes, superannuation concessions, and nowcasting of household income by different household type by incorporating the latest available official survey and administration data.

PolicyMod can potentially be expanded or altered by the user to incorporate enhancements. Such enhancements could include behavioural modelling, micro-macro linkages. PolicyMod could also be further enhanced to include new policies or areas of government spending not currently covered such as in-kind government support (eg, health, transport, medicines, education) or elements of the tax system outside of personal income tax such as the goods and services tax, or new tax proposals around land tax and stamp duty.

