THE UNIVERSITY OF MELBOURNE

HILDA PROJECT TECHNICAL PAPER SERIES
No. 1/09, February 2009

Updates and Revisions to Estimates of Income Tax and Government Benefits

Roger Wilkins*

MELBOURNE INSTITUTE
of Applied Economic and Social Research

1. Introduction

Although a great deal of income information is collected in the Person Questionnaire of the HILDA Survey every wave, the production of estimates of individual and household disposable income – total income after receipt of government cash benefits and payment of income taxes – has required the calculation or imputation, for all sample members, of income taxes as well as some government benefits. As proposed by Headey (2003), substantial revisions to tax and benefits imputation were implemented from Release 4, general information on which is provided in the Release 6.0 User Manual (Watson, 2008). This resulted in tax estimates that much better reflected actual taxation receipts of the Australian Taxation Office (ATO), which in turn is likely to have generated more accurate estimates of disposable incomes.

Since 2004, various changes to tax and benefit rules have made it necessary to update and in some cases revise the imputations. We have also taken the opportunity presented by our recent review of the tax and benefit system to make some further refinements to the imputation model. The purpose of this technical paper is to detail the methods for estimating taxes and benefits (and hence disposable income), highlighting the changes that have been made in Release 7.0 and providing indicative information of the effects of these changes on disposable income estimates provided in the data made available to users.

1.1 Overview of the tax and benefit model

Although some information on current income is collected in the Person Questionnaire – specifically, wages, salaries and government benefits – it is only for the (entire) preceding financial year that the HILDA Survey attempts to collect complete income information. Correspondingly, the tax and benefit model which is used to produce estimates of total gross and disposable incomes is only applied to annual income in the preceding financial year. The process of applying the model essentially comprises the following five steps:

1. Obtain imputed income components, comprising Family Tax Benefit, Maternity Allowance or Payment and Rent Assistance.[1]

2. Calculate gross income as equal to the sum of reported and imputed income components.

3. Obtain taxable income by subtracting from gross income non-taxable income components and estimated tax deductions.

4. Estimate tax on taxable income, taking into account income tax rates, the Medicare levy and applicable tax offsets and credits.

5. Calculate disposable income as equal to gross income less calculated income tax.

Sections 2 to 6 below provide details on how each of these steps is implemented. Note that the changes to the imputation of benefits and taxes have been applied, as appropriate, to all waves of data. Release 7.0 income data for Waves 1 to 6 may therefore be different from that in previous releases for some sample members. Some indicative information on the extent and nature of changes is provided in Section 7, which compares overall distributions of gross

---

[1] Note that imputations referred to here are of income components deliberately not obtained from respondents. Imputations are also made for non-respondents (to individual income questions or the Person Questionnaire as a whole). These imputations are not the subject of this paper.

income, disposable income, taxes and family benefits in Waves 1-6 before and after the changes.

2. Imputed income components

Two sets of income components, both government benefits, are imputed rather than directly obtained from respondents. These are family benefits, which have been imputed for all HILDA data releases, and Rent Assistance, which has only been imputed from Release 7.0.

2.1 Family Benefits

Respondents are not asked to report Family Tax Benefit Part A (FTB A), Family Tax Benefit Part B (FTB B), Maternity Allowance (paid up to 30 June 2004) and Maternity Payment (paid since 2004-05). These are instead calculated based on eligibility criteria and payment rates and added to the other income components to produce total financial year income. Child Care Benefit is also calculated but is not included in total financial year income (as it is considered a social transfer in kind rather than a cash benefit).[2] Note that the HILDA Survey measures income at the person level and at the household level. In constructing personal income, all family benefits are assigned to the parent in sole parent families and are split evenly between the two parents in couple families. Implicit in the latter decision rule is that resources are shared equally within the family.

FTB A and FTB B were introduced on 1 July 2000, coinciding with the first financial year for which income data were gathered by the HILDA Survey. FTB A depends on the taxable income of the family, the number and the ages of dependent children, and child support payments received. Payment levels are determined by a quite complicated set of rules. The basic formula for determining FTB A is as follows:

$$\text{FTB A} = \begin{cases} F_{\max} & \text{if } Inc \leq Inc_{T1} \\ \max\left(F_{base}, F_{\max} - t_1 * \left(Inc - Inc_{T1}\right)\right) & \text{if } Inc_{T1} < Inc \leq Inc_{T2} \\ \max\left(0, F_{base} - t_2 * \left(Inc - Inc_{T2}\right)\right) & \text{if } Inc > Inc_{T2} \end{cases}$$

(1)

$$\text{where: } F_{\max} = F_{\max}^{0-12} N^{0-12} + F_{\max}^{13-15} N^{13-15} + F_{\max}^{16-17} N^{16-17} + F_{\max}^{18-24} N^{18-24}$$

$$F_{base} = F_{base}^{0-17} N^{0-17} + F_{base}^{18-24} N^{18-24}$$

F_{max} is the maximum rate of FTB A, which depends on the number of dependent children in each of four age ranges (0-12, 13-15, 16-17 and 18-24). F_{base} is the base rate of FTB A, and depends on the number of dependent children in each of two age ranges (0-17 and 18-24). t_1 is the taper rate for reduction in FTB A from the maximum rate to the base rate. This was 30% until 2003-04, and since 2004-05 has been 20%. t_2, equal to 30%, is the taper rate for reduction of FTB A from the base rate to zero. Inc is the taxable income of the parent(s) for the financial year. $F_{max}^{0-12}, F_{max}^{13-15}, F_{max}^{16-17}$ and F_{max}^{18-24} are maximum rates payable per child in each age range and F_{base}^{0-17} and F_{base}^{18-24} are base rates payable per child in each age range. Note that, since 2003-04, all of the maximum and base rates have included an FTB A supplement, payable at the end of the financial year on final determination of FTB A entitlement for the

---

[2] This change has been in place since Release 4.0. In earlier Releases, the Child Care Benefit was included in the total financial year income and the Maternity Allowance was only recorded if the respondent reported it.

year. Although the supplement is not received until the financial year after that to which it relates, we nonetheless assign it to the year in respect of which it is paid (in much the same way as a tax refund due to overpayment of income taxes is treated).

Several other factors that impact on FTB A payments are not included in the above formula but are taken into account in the HILDA FTB A imputation. First, there is a separate income test for child support income, which reduces FTB A payments above F_{base} at a rate of 50% once child support exceeds a certain threshold that depends on partner status and the number of dependent children. A child income test also applies for FTB A eligibility in respect of that child. The above formula also excludes the large family supplement, paid for each child after the second, and the multiple birth allowance, for families with triplets or more, both of which are included in HILDA's imputed FTB A.

Up until 30 June 2008, FTB B depended only on the taxable income of the lower-income member of a couple and the age of the youngest child. It is given by:

$$\text{FTB B} = \begin{cases} FB_{\max} \text{ if } Inc_S \leq Inc_B \\ \max\left(0, FB_{\max} - t_b * \left(Inc_S - Inc_B\right)\right) \text{ if } Inc_S > Inc_B \end{cases} \tag{2}$$

where FB_{max} depends on whether the youngest child is aged 0-5 or over 5, and t_b is the taper rate for withdrawal of FTB B for 'secondary earner' taxable income Inc_S in excess of Inc_B.

Lone parent families do not have a secondary income as defined for FTB purposes, such that all lone parent families with FTB-eligible children were entitled to the maximum FTB B up until 2007-08. However, since 1 July 2008, an income test has been added for sole parents and the higher-income earner in couple families: in 2008-09, couples in which either member's income exceeded $150,000, and lone parents with an income in excess of $150,000, were not eligible for FTB B.

Maternity Allowance was paid on the birth or adoption of a child to all recipients of FTB A up until 30 June 2004. It was replaced from 1 July 2004 with Maternity Payment, a universal lump-sum payment to families on birth or adoption of a child. On 1 July 2007, Maternity Payment was renamed the Baby Bonus and from 1 January 2009 is only payable to families with incomes less than $75,000 in the six months immediately following birth or adoption of a child. It has also been converted from a single lump sum payment (for almost all families) to 13 instalments paid over 6 months. As a consequence of these policy changes, starting in Wave 9, HILDA Survey respondents will be asked to report Baby Bonus income and it will no longer be imputed.

Further details on eligibility criteria and payment rates for family benefits can be found in the quarterly Centrelink publication *A Guide to Australian Government Payments* and on the Department of Families, Housing, Community Services and Indigenous Affairs web site: http://www.facsia.gov.au/Guides_Acts/fag/faguide-3/faguide-3.6.html (as at 12 February 2009).

For all family benefit imputations, implicit is an assumption that all eligible persons receive these benefits. The actual take-up rate is likely to be very high, but it will not be 100%. It is therefore to be expected that HILDA will slightly over-estimate family benefits received. We indeed find that population-weighted estimates of total FTB A and FTB B payments derived from HILDA are between 2% and 7% higher than actual payments reported by the Department of Families, Housing, Communities and Indigenous Affairs. However, total estimated Maternity Allowance and Maternity Payment outlays are in most waves lower than actual outlays. This appears to reflect slight under-representation of new births in the HILDA data.

While the approach to imputing family benefits has not changed for Release 7.0 compared with earlier releases, a review of the imputations identified several errors that have now been rectified:

1. The Disability Support Pension was previously treated as taxable for the purposes of determining Family Tax Benefit, when it is not, leading to underestimation of Family Tax Benefit in a small number of cases.

2. An annual FTB B supplement has been paid to families receiving FTB B since 1 January 2005. The supplement was $150 per eligible family in 2004-05, $306.60 in 2005-06 and has since been indexed to the CPI. Prior to Release 7.0, this supplement was assumed payable for each eligible child in the family, when in fact only one supplement is payable per family.

3. Some sole parents were not assigned FTB B income in previous releases. Between 2000-01 and 2006-07, all sole parents were eligible for the maximum FTB B payable (given the age of the youngest child), since no income test was applied to the primary income earner for FTB B.

4. Previously, children born after 30th June but before the time of interview (typically 3-4 months after 30th June) were included in family benefit calculations for the preceding financial year. This was incorrect. No benefits would have been payable in respect of those children in the financial year, since those children had not been born by the time the financial year concluded. The previous approach had also caused children born between 30th June and the time of interview to attract two payments of Maternity Allowance or Maternity Payment: once in the first financial year, when they had not yet been born, and once in the next financial year, when the benefit would have actually been received. Children born between 30th June and the time of the interview are now excluded from family benefit calculations.

5. Maternity Payment (known as the Baby Bonus as of 1 July 2007) was assumed payable only to families eligible for FTB A. This was incorrect – indeed the payment had no income test at all until 1 January 2009. As a consequence, some families who should have been assigned Maternity Payment were not. This has been rectified for all affected waves, namely, Waves 4 to 7.

As well as affecting gross income, disposable income and tax estimates, the above-listed changes affect _hifftg, _hifmat, _hifapti, _bnfftba, _bnfftbb, _bnfmat, _bnfapti, _bnftaf1, _bnftaf2, _bnftaf3, _bnftbf1, _bnftbf2, _bnftbf3, _bnmatf1, _bnmatf2 and _bnmatf3 in all waves.

2.2 Rent Assistance

Rent Assistance is a government cash benefit paid to renters residing in private accommodation (as opposed to public housing). Income support recipients and families receiving more than the base rate of FTB A are eligible for the benefit. Prior to Release 7.0, it was assumed that Rent Assistance was included in respondents' reported pensions and/or allowances. Respondents were therefore not asked to explicitly report Rent Assistance received; nor was it imputed. In terms of arriving at accurate estimates of gross income, this would appear to be appropriate for pension and allowance (income support) recipients. For income support recipients without dependent children, Rent Assistance is rolled into the main benefit payment and is therefore likely to be reported as forming part of that benefit. For income support recipients with dependent children, Rent Assistance is paid as part of FTB, but since respondents are directed to exclude only FTB from reported government benefits, Rent Assistance is still likely to be reported by these respondents. There is, however, one

group of recipients of Rent Assistance who are unlikely to report it, which is families not on income support but receiving more than the 'base rate' of FTB A. The combined effects of not explicitly asking for Rent Assistance, asking that FTB be excluded, and the fact that Rent Assistance is paid as part of FTB for these individuals, will very likely mean these respondents do not report it.

In addition to underestimating gross income of persons not on income support, but in receipt of more than the base rate of FTB A, there is a further reason for imputing Rent Assistance, one which applies to *all* persons eligible for the benefit. Rent Assistance is non-taxable and therefore should be subtracted from gross income to obtain taxable income. Prior to Release 7.0, by assuming Rent Assistance is reported but not excluding it from taxable income, Rent Assistance has implicitly been treated as taxable income. For Release 7.0, we have consequently imputed Rent Assistance for all eligible persons, and exclude it from taxable income.

Rent Assistance is paid at the 'family' level, where a family comprises a single person or couple together with any dependent children (as defined for FTB purposes). It is calculated as:

$$RA = \max\left[0, \min\left(0.75 * (\text{annual rent} - R_{\min}), RA_{\max}\right)\right] \tag{3}$$

where $R_{\min}$ is the minimum annual rent payable in order to be eligible for Rent Assistance and $RA_{\max}$ is that maximum level of Rent Assistance payable. Both $R_{\min}$ and $RA_{\max}$ depend on partner status and the number of dependent children. In 2006-07, $R_{\min}$ ranged from \$2393.23 for a single person to \$4759.60 for a couple with one or more dependent children. $RA_{\max}$ ranged from \$2539.22 for a couple with no dependent children to \$3573.35 for a sole parent or couple with three or more dependent children.

To impute the benefit, reported household monthly rent at the time of interview, annualised and deflated back to the previous financial year using the ABS rent CPI, is used as the measure of annual rent for each household. To obtain *family* rent, which determines Rent Assistance, household rent is assumed to be shared equally amongst all non-dependent household members. Thus, for example, a couple sharing with another unrelated person are assumed to pay two-thirds of the household's rent. For recipients on income support, the calculated Rent Assistance obtained as per Equation (3) is multiplied by the proportion of the year the family received income support in the preceding financial year. In couple families, half the imputed Rent Assistance is assigned to each member of the couple. To allow for imperfect take-up by eligible persons not on income support, as an approximation we impose the requirement that FTB A received be at least twice the base rate rather than simply greater than the base rate. That is, Rent Assistance is assumed to be zero for families not on income support if calculated FTB A is less than twice the base rate.

For recipients on income support, as noted, Rent Assistance is assumed to have been reported as part of the main benefit, so that imputed Rent Assistance is simply used to determine taxable income (by subtracting it from gross income). Imputed Rent Assistance therefore affects disposable income only via its impact on estimated tax. For Rent Assistance recipients not on income support, imputed Rent Assistance is added to gross income and disposable income (but not taxable income) via incorporation into estimated FTB A. These changes apply to all seven waves of data. As well as affecting gross income, disposable income and tax estimates, the imputation of Rent Assistance affects _hifftb, _hifapti, _bnfftba, _bnfapti, _bnftaf1, _bnftaf2 and _bnftaf3.

3. Gross income

Income is measured at the person level and at the household level. Gross personal income – income from all sources before the deduction of income taxes – is the sum of wages and salary, business income, investment income, private pensions (superannuation), government income support payments (including pensions, allowances and parenting payments) and non-income support payments (including family benefits and Rent Assistance), workers' compensation payments, private transfers (including child support) and foreign pensions. Gross household income is the sum of personal incomes of the household's members. Components are directly reported by respondents, with the exception of the imputed components discussed in Section 2.

Since Release 4, the income components have been imputed for both respondents and non-respondents within responding households. The enumerated file, as a result, contains component level data (rather than just total financial year income and windfall income as occurred in earlier releases). This has also permitted the calculation of these components at the household level. Market income, private income and Australian public transfers have also been calculated.

4. Taxable income

4.1 Components of income subject to income tax

The input data are the imputed income variables and the data collected in the Person Questionnaire. The components which the ATO treats as taxable income are summed: wages and salaries (including workers' compensation), business income, investment income, private pensions and taxable Australian public transfers. Taxable public transfers are obtained by subtracting from public transfer income Family Tax Benefit Parts A and B, Maternity Allowance, Maternity Payment, the Disability Support Pension and estimated Rent Assistance, none of which are taxable.

Previously, the Disability Support Pension was treated as taxable, but it is now treated as non-taxable. Note that Carer Payment and Wife Pension are also non-taxable if the recipient is the primary carer of a Disability Support Pension recipient. We do not attempt to infer this information from the HILDA data and so continue to treat Carer Payment and Wife Pension as taxable. The practical effect of this is in most cases likely to be zero, since few Carer Payment and Wife Pension recipients are estimated to have a tax liability.

As discussed, we impute Rent Assistance for all persons, but assume it is not reported by FTB recipients who are not in receipt of income support payments, and reported as part of benefit income by income support recipients. Since Rent Assistance is non-taxable, we subtract imputed Rent Assistance from gross income in generating an income measure that comprises only taxable components. This reduces taxable income of all income support recipients renting private accommodation in Release 7.0 compared with earlier HILDA data releases.

4.2 Deductions

Deductions for work-related and other expenses incurred in earning income need to be subtracted from gross income subject to tax to obtain taxable income. Deductions are not reported and so are assumed to be a fixed percentage of income that depends on the level of the individual's income. ATO data on average deductions as a proportion of income for each of 20 income ranges are used to determine the applicable percentage. That is, the proportion of gross income that is assumed to be claimed as a tax deduction depends on the income category into which the individual falls. Average deductions for each income category range from around 6-7% for those with low incomes down to around 4-5% for those with the

highest incomes. The ATO data is obtained from Table 5C in the detailed tables of the 'Personal income tax' section of the annual ATO publication *Taxation Statistics*. Note that the most recent ATO data available at the time of production of Release 7.0 is for 2005-06; it is assumed that the deduction rates in this year also hold in 2006-07 (Wave 7). In Release 8, the 2006-07 deduction rates will be updated to reflect the 2006-07 ATO data.

Estimated deductions are subtracted from the total income obtained in Section 4.1 above to obtain taxable income. There has been no change in method in Release 7.0 compared with earlier releases, but, up until Release 6.0, deduction rates were not updated every year. It is intended that in future deduction rates will be updated as each new issue of *Taxation Statistics* becomes available.

5. Income tax

In order to produce the disposable income variable, an income tax model is applied to each sample member that calculates the financial-year tax typically payable for a permanent resident taxpayer in the circumstances akin to those of the respondent. The information collected in the HILDA Survey does not permit accounting for every individual variation in tax available under the Australian taxation system, but most major sources of variation are accounted for.

5.1 Income tax rates

For non-retired people, the four standard marginal tax rates (Table 2) are applied to the taxable income estimate obtained as per Section 5.1 above. This produces an estimate of income tax payable prior to addition of the Medicare levy and subtraction of applicable tax offsets and credits.

The standard marginal rates are not applied to retired people, reflecting the reality of low average tax rates among the retired. Instead, the income tax payable that we impute reflects the actual average tax rates paid by persons aged 65 years and over in each of a number of categories for taxable income. The data come from the detailed tables of the 'Personal tax' section of each issue of *Taxation Statistics* – Table 12 in the issues up to 2003-2004 and Table 11 in the 2004-2005 and 2005-2006 issues. Up until 2004-2005, 11 taxable income categories are distinguished in the ATO data, while in 2005-2006, 14 taxable income categories are distinguished. As with imputations of deductions, Wave-7 (2006-07) tax imputations for retired persons are based in the 2005-2006 tax data for Release 7.0.

Non-respondents are assumed to be retired if aged over 65. Note that in previous HILDA data releases, estimates of tax rates for retired persons were based on those aged 75 and over. In addition, private pensions were separated from other income and taxed at a flat rate of 5% for private pension income in excess of $25,600. We have removed this element because the average tax rates applied to retired persons calculated from the ATO's *Taxation Statistics* publication are for total income inclusive of private pensions. Further work refining taxation imputation for retired persons is intended to be undertaken in future.

A further change from earlier releases of the HILDA data in Release 7.0 relates to business income. In earlier releases, business income of individuals was separated from other income – that is, excluded from the income to which the above tax rates are applied – and taxed at low rates as per ATO statistics on tax paid on business income. This approach was not correct, since the business income information gathered by HILDA – 'net realised profit' received by individuals – is treated identically to taxable income from other sources. The tax rates applied to business income in previous HILDA data releases were in fact derived from personal taxes paid on business income as a proportion of business income before the deduction of expenses,

which is not the HILDA profit-based measure of business income. We therefore no longer separate out business income.

Table 1: Australian Resident Income Tax Rates, Waves 1- 7

Wave	Income	Tax Rate
1, 2, 3 (Financial Years 2000-01, 2001-02, 2002-03)	$0 - $6000	Nil
	$6001 - $20000	Nil plus 17c for each $ over $6000
	$20001 - $50000	$2380 plus 30c for each $ over $20000
	$50001 - $60000	$11380 plus 42c for each $ over $50000
	$60001 and over	$15580 plus 47c for each $ over $60000
4 (Financial Year 2003-04)	$0 - $6000	Nil
	$6001 - $21600	Nil plus 17c for each $ over $6000
	$21601 - $52000	$2652 plus 30c for each $ over $21600
	$52001 - $62500	$11772 plus 42c for each $ over $52000
	$62501 and over	$16182 plus 47c for each $ over $62500
5 (Financial Year 2004-05)	$0 - $6000	Nil
	$6001 - $21600	Nil plus 17c for each $ over $6000
	$21601 - $58000	$2652 plus 30c for each $ over $21600
	$58001 - $70000	$13572 plus 42c for each $ over $58000
	$70001 and over	$18612 plus 47c for each $ over $70000
6 (Financial Year 2005-06)	$0 - $6000	Nil
	$6001 - $21600	Nil plus 15c for each $ over $6000
	$21601 - $63000	$2340 plus 30c for each $ over $21600
	$63001 - $95000	$14760 plus 42c for each $ over $63000
	$95001 and over	$28200 plus 47c for each $ over $95000
7 (Financial Year 2006-07)	$0 - $6000	Nil
	$6001 - $25000	Nil plus 15c for each $ over $6000
	$25001 - $75000	$2850 plus 30c for each $ over $25000
	$75001 - $150000	$17850 plus 42c for each $ over $75000
	$150001 and over	$49350 plus 45c for each $ over $150000

5.2 Medicare Levy

The Medicare Levy is estimated as applicable in the relevant financial year and added to income tax estimated in Section 5.1. For single persons, it is equal to:

$$ML_I = \begin{cases} 0 \text{ if } Inc^I \leq Inc_L^I \\ t_1^{ML} * \left(Inc^I - Inc_L^I \right) \text{ if } Inc_L^I < Inc^I \leq Inc_H^I \\ 0.015 * Inc^I \text{ if } Inc^I > Inc_H^I \end{cases} \tag{4}$$

The levy is zero if taxable income of the individual Inc^I is less than threshold Inc_L^I, a fraction t_1^{ML} (equal to 0.1 up until 2005-06 and 0.2 in 2006-07) of the difference between Inc^I and Inc_L^I if Inc^I is between lower threshold Inc_L^I and upper threshold Inc_H^I, and 1.5% of taxable income if Inc^I exceeds threshold Inc_H^I.

The single-person formula also applies to persons in sole parent or couple families, but is augmented by a formula based on family income. Expressed in terms of the Medicare Levy payable by the individual (rather than the family), the family income formula is given by:

$$ML_F = \begin{cases} 0 \text{ if } Inc^F \le Inc_L^F \\ t_1^{ML} * \left(Inc^F - Inc_L^F\right) * \left(Inc^I \middle/ Inc^F\right) \text{ if } Inc_L^F < Inc^F \le Inc_H^F \\ 0.015 * Inc^I \text{ if } Inc^F > Inc_H^F \end{cases} \tag{5}$$

where Inc^F is the taxable income of the family (as defined for FTB purposes). The individual's Medicare Levy is then the lesser of ML_I and ML_F.

The thresholds Inc_L^I, Inc_H^I, Inc_L^F and Inc_H^F depend on the year (increasing in most years), whether the individual is a pensioner (including Parenting Payment Single recipient), and whether the individual is above the age of eligibility for the Age Pension.[3] The family thresholds additionally depend on the number of dependent children in the family. In 2006-07, Inc_L^I ranged from \$16,740 for a non-pensioner below Age Pension age to \$24,867 for seniors (above Age Pension age), while Inc_L^F ranged from \$28,247 plus \$2,594 per dependent child for non-senior non-pensioners up to \$41,360 plus \$2,594 per dependent child for seniors.

In previous HILDA data releases, only the single-person formula was applied to calculate the Medicare Levy and the non-pensioner income thresholds were applied to pensioners below the Age Pension age. The Medicare Levy was also set to zero for all persons who received a government income support payment at some stage of the year and had a personal taxable income less than \$20,000, which to some extent corrected for the application of non-pensioner thresholds to pensioners.

Since 1997, persons without private health insurance hospital cover have faced a Medicare Levy surcharge of 1% of taxable income if family income exceeds \$50,000 in the case of single persons and \$100,000 in the case of other persons. HILDA does not collect private health insurance status (except in Wave 4), and so the surcharge is assumed to be zero for all respondents. Aggregate ATO data indicates this averages 0.06% of taxable income and is therefore not a substantial component of taxation (although, of course, it will be substantial for the small number of tax payers to whom it applies – up to 1% of their taxable income).

Note that the Medicare Levy is set to zero for retired persons, because it forms part of the tax paid as reflected in the ATO statistics on average tax rates used to estimate tax paid by retired persons.

5.3 Tax credits and offsets

A variety of tax credits and offsets are potentially applicable to taxpayers. These are subtracted from the income tax liability estimated as described in Sections 5.1 and 5.2 to arrive at income tax payable. Prior to Release 7.0, only one of these offsets – the Low Income Tax Offset – was directly estimated. We now calculate five of these offsets based on the criteria that apply to each: the Low Income Tax Offset (LITO), the Senior Australians Tax Offset (SATO), the Pensioner Tax Offset (PETO), the Mature Age Workers' Tax Offset (MATO) and the Dependent Spouse Tax Offset (SPOUTO).

LITO accrues to persons with low personal taxable incomes. It is calculated as:

---

[3] The Age Pension age is 65 for males. For females, it was 61.5 in 2000 and 2001, 62 in 2002 and 2003, 62.5 in 2004 and 2005 and 63 in 2006 and 2007. It will continue to increase by half a year every two years until it reaches 65 in 2014.

$$LITO = \begin{cases} LITO_{\max} \text{ if } Inc \le Inc_L^{LI} \\ LITO_{\max} - 0.04*\left(Inc - Inc_L^{LI}\right) \text{ if } Inc_L^{LI} < Inc < Inc_H^{LI} \\ 0 \text{ if } Inc \ge Inc_H^{LI} \end{cases} \tag{6}$$

$LITO_{\max}$ was \$150 from 2000-01 to 2002-03, \$235 from 2003-04 to 2005-06 and \$600 in 2006-07, while the maximum taxable income before LITO begins to reduce, Inc_L^{LI}, was \$20,700 from 2000-01 to 2002-03, \$21,600 from 2004-04 to 2005-06 and \$25,000 in 2006-07.

SATO applies only to persons over the Age Pension age. It is applied in addition to LITO and is calculated in the same manner as LITO, based on personal taxable income:

$$SATO = \begin{cases} SATO_{\max} \text{ if } Inc \le Inc_L^{SA} \\ SATO_{\max} - 0.012*\left(Inc - Inc_L^{SA}\right) \text{ if } Inc_L^{SA} < Inc < Inc_H^{SA} \\ 0 \text{ if } Inc \ge Inc_H^{SA} \end{cases} \tag{7}$$

The maximum offset, $SATO_{\max}$, and the maximum taxable income before the offset starts reducing, Inc_L^{SA}, both depend on whether the individual is living with a partner. For singles, $SATO_{\max}$ was \$2,230 in all years, while Inc_L^{SA} was \$20,000 from 2000-01 to 2002-03, \$20,500 in 2003-04 and 2004-05, \$21,968 in 2005-06 and \$24,867 in 2006-07. For each member of a couple, $SATO_{\max}$ was \$1,602 in all years, while Inc_L^{SA} was \$16,306 from 2000-01 to 2002-03, \$16,806 in 2003-04 and 2004-05, \$18,247 in 2005-06 and \$20,680 in 2006-07.[4]

PETO is payable to working-age persons (below Age Pension age) who received any government pension or allowance other than the Disability Support Pension at any stage of the financial year. The formula for PETO is the same as for SATO, although the maximum offset differs somewhat, as does the income threshold at which the offset begins to reduce. As with SATO, it accrues in addition to LITO.

MATO applies to employed persons aged 55 years and over and is in addition to any other offsets applicable. Introduced from 2004-05, MATO is equal to 5% of wage and salary income net of deductions up to a maximum of \$500. It is reduced for wage and salary income net of deductions in excess of a threshold (\$48,000 in 2004-05 and \$53,000 thereafter) at a rate of 5%. That is,

$$MATO = \begin{cases} 0.05*Earn \text{ if } Earn < \$10,000 \\ \$500 \text{ if } \$10,000 \le Earn < Earn_L \\ \$500 - 0.05*(Earn - Earn_L) \text{ if } Earn_L < Earn < Earn_H \\ 0 \text{ if } Earn \ge Earn_H \end{cases} \tag{8}$$

where $Earn_L$ was \$48,000 in 2004-05 and \$53,000 thereafter.

---

[4] Note that, because actual tax paid by retired persons by income level is used to estimate their tax, we do not apply SATO to retired persons.

SPOUTO is also accrued in addition to any other offsets to which the taxpayer is eligible:

$$SPOUTO = \begin{cases} SPOUTO_{max} \text{ if } SPInc \leq SPInc_L \\ SPOUTO_{max} - 0.25 * \left(SPInc - SPInc_L \right) \text{ if } SPInc_L < SPInc < SPInc_H \\ 0 \text{ if } SPInc \geq SPInc_H \end{cases} \qquad (9)$$

where $SPInc$ is the taxable income of the taxpayer's spouse. Throughout the period since 2000-01, $SPINC_L$, the maximum taxable income of the spouse before SPOUTO begins reducing, has been $282. The maximum offset, $SPOUTO_{max}$, was $1,365 in 2000-01 and increased annually to be $1,655 in 2006-07.

A number of other credits and offsets cannot be reliably estimated. These include, in order of magnitude, dividend imputation credits, termination payments, Superannuation Contributions Tax Offset, Medical Expenses Tax Offset, Child Care Tax Rebate, Baby Bonus Tax Offset Credit, Zone or Overseas Forces Tax Offset, Private Health Insurance Tax Offset, Commonwealth Benefits and Payments Tax Offset, Entrepreneurs' Tax Offset, Income Averaging Tax Offset and Spouse Superannuation Contributions Tax Offset. Furthermore, salary sacrifice arrangements are not obtained by HILDA. To account for these offsets and to account for salary sacrifice arrangements (that is, capture the average value of the reduction in taxable income due to salary sacrifice arrangements), as an approximation, an average national tax reduction of 2% of taxable income is applied as a flat rate to all taxpayers. In addition to estimated LITO, SATO, PETO, MATO and SPOUTO, this 2% of taxable income is subtracted from estimated income tax paid. It replaces a universal 3% reduction in tax to account for offsets that was previously applied when only LITO was directly estimated.

5.4 Calculation of income tax

For non-retired persons, total income tax is calculated as equal to income tax (Section 5.1) plus the Medicare levy (Section 5.2), less estimated offsets and other credits (Section 5.3). In previous HILDA data releases, working-age persons who received a government income support payment at some stage of the year and had a personal taxable income less than $20,000 were assumed to pay no tax or Medicare Levy. This rule is no longer applied in light of the refinements introduced in Release 7.0, such as the estimation of offsets and imputation of Rent Assistance. For retired persons, as in previous data releases, and as described in Section 5.1, total income tax is simply based on actual average tax rates by level of income of persons over 65 years of age.

6. Disposable income

Disposable income is equal to gross income (inclusive of non-taxable components) less estimated income tax paid. Implicitly, as is common practice, we assume that tax deductions, such as for work-related expenses, form part of disposable income.

7. Implications of the changes for reported incomes

The refinements documented in this paper have been applied to all waves for Release 7.0. This ensures a consistent approach to tax and benefit imputation, but does mean there will be some changes for Waves 1-6 compared with earlier data releases. Tables 2-6 provide some indication of the extent and nature of the changes by comparing Release 7.0 data for Waves 1 to 6 with Release 6.0 data for Waves 1 to 6.

Tables 2-5 present, for each of Waves 1 to 6, summary features of the distributions of gross income (Table 2), disposable income (Table 3), income tax (Table 4) and family benefits (Table 5) in Release 6.0 compared with Release 7.0. Estimates are presented for the

enumerated person file (restricting to persons over 15 years of age) and for the household file. Enumerated person file estimates are for personal income, taxes and benefits, while household file estimates are for household income, taxes and benefits (where each household contributes one observation in the wave under consideration). Imputed values of the variables have been used in producing the summary measures. Since there are some changes in income imputations as more waves of data are added, differences between Release 6.0 and Release 7.0 in the distributions of these four variables will arise that do not derive from changes to the tax and benefit model. However, effects of changes in imputations will be small, and as such the comparisons presented in Tables 2-5 provide good indicative information on the effects of the changes to the tax and benefit model. Note also that sample/population weights have not been used to produce the summary measures.

Table 2 shows that gross income distributions, potentially affected by changes to family benefits estimates and the addition of Rent Assistance income to some families, have in fact been little-affected by the changes. Very slight decreases in median and mean gross incomes are evident in Waves 1, 3 and 6, and very slight increases are evident in Waves 2, 4 and 5. Table 3 shows there are more substantial differences in disposable income distributions, reflecting the additional impact of the changes to tax calculations that are implemented in Release 7.0. The differences are, nonetheless, still relatively small. In Release 7.0, mean personal disposable incomes are approximately $200 to $400 lower, and mean household incomes are approximately $500 to $1,000 lower. There is no consistent pattern in changes in median disposable income, nor in changes at other points (percentiles) of the distributions. The Gini coefficient for disposable income is slightly lower in Release 7.0 in all six waves, in both the enumerated person and household files, suggesting dispersion in disposable incomes is slightly lower under the revised tax and benefit model.

Differences in distributions of calculated taxes are presented in Table 4, showing that the proportions of persons and households estimated to pay income tax are 1 to 4 percentage points higher under the revised model. Mean and median tax is also on average somewhat higher in Release 7.0. Consistent with the tax model taking into account more factors in determining tax, and thereby in principle allowing for more heterogeneity in tax estimates, the Gini coefficients for the distributions of calculated taxes are higher in Release 7.0. Table 5 indicates that changes to family benefit imputations have had little aggregate effect on the proportions estimated to be receiving benefits, but have slightly increased the mean value of calculated benefits.

Table 2: Distribution of estimated gross income – Comparison of Release 6.0 with Release 7.0

	Wave 1 (2000-01)		Wave 2 (2001-02)		Wave 3 (2002-03)		Wave 4 (2003-04)		Wave 5 (2004-05)		Wave 6 (2005-06)	
	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7
Enumerated person file												
Mean	28,681	28,591	30,043	30,105	31,123	31,142	32,499	32,723	34,814	35,002	37,660	37,476
Median	20,176	20,315	21,244	21,500	22,809	22,536	24,000	24,000	25,667	26,000	28,000	28,000
10th percentile	2,594	2,795	3,468	3,485	3,900	3,970	3,840	3,920	3,931	4,017	4,620	4,599
25th percentile	9,100	9,100	9,800	9,780	10,450	10,452	10,920	10,920	11,784	11,960	12,622	12,740
75th percentile	40,000	40,000	41,500	41,380	43,455	43,300	45,000	45,200	48,000	48,150	51,111	51,000
90th percentile	60,492	60,057	62,749	63,000	65,000	64,594	67,000	67,408	71,463	72,116	77,176	77,098
Gini coef.	0.475	0.471	0.471	0.472	0.465	0.466	0.461	0.462	0.465	0.463	0.461	0.459
Household file												
Mean	56,502	56,315	58,245	58,349	59,814	59,787	62,310	62,703	66,705	67,045	72,563	72,192
Median	45,330	45,200	46,921	46,949	48,723	48,571	50,200	50,800	53,453	54,000	57,303	57,414
10th percentile	11,291	11,400	11,960	11,960	12,526	12,400	13,300	13,162	13,569	13,717	14,755	14,823
25th percentile	22,349	22,358	22,857	22,922	23,600	23,560	24,671	24,640	25,839	26,000	28,815	28,753
75th percentile	75,523	75,643	78,678	78,526	81,564	81,500	84,000	84,342	89,161	90,000	96,447	95,506
90th percentile	109,856	108,730	112,347	113,077	116,623	115,508	121,683	122,215	129,060	128,989	141,100	140,145
Gini coef.	0.418	0.415	0.419	0.420	0.415	0.417	0.413	0.415	0.422	0.419	0.423	0.419

Notes: R6 – Release 6.0; R7 – Release 7.0.

Table 3: Distribution of estimated disposable income – Comparison of Release 6.0 with Release 7.0

	Wave 1 (2000-01)		Wave 2 (2001-02)		Wave 3 (2002-03)		Wave 4 (2003-04)		Wave 5 (2004-05)		Wave 6 (2005-06)	
	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7
Enumerated person file												
Mean	23,397	23,035	24,491	24,140	25,308	24,865	26,405	26,194	28,144	28,018	30,597	30,094
Median	19,050	19,011	19,773	20,026	20,839	20,911	21,765	22,004	23,001	23,719	25,248	25,529
10th percentile	2,594	2,795	3,468	3,485	3,900	3,970	3,840	3,920	3,931	4,017	4,620	4,599
25th percentile	9,083	9,100	9,753	9,733	10,420	10,424	10,849	10,886	11,689	11,879	12,517	12,688
75th percentile	32,768	32,423	33,908	33,711	35,489	35,218	36,914	36,980	38,906	39,197	41,573	41,490
90th percentile	47,042	46,220	48,498	47,784	49,991	48,706	51,919	50,969	55,134	54,940	59,772	58,758
Gini coef.	0.422	0.413	0.419	0.412	0.414	0.405	0.408	0.402	0.413	0.403	0.412	0.400
Household file												
Mean	46,088	45,376	47,466	46,788	48,646	47,775	50,602	50,192	53,897	53,646	58,973	57,973
Median	39,714	39,097	40,836	40,538	41,970	41,788	43,447	43,711	46,069	46,748	49,960	49,858
10th percentile	11,232	11,394	11,942	11,920	12,440	12,331	13,223	13,162	13,537	13,634	14,700	14,710
25th percentile	21,311	21,398	21,775	21,961	22,490	22,568	23,495	23,713	24,636	25,146	27,039	27,242
75th percentile	61,613	61,342	63,901	63,075	65,845	65,231	68,521	68,046	72,025	72,646	77,943	77,011
90th percentile	85,138	83,811	87,364	86,145	90,159	87,970	93,326	92,404	100,516	98,387	110,171	107,141
Gini coef.	0.373	0.367	0.375	0.369	0.373	0.367	0.369	0.365	0.379	0.370	0.381	0.371

Notes: R6 – Release 6.0; R7 – Release 7.0.

Table 4: Distribution of estimated income tax paid – Comparison of Release 6.0 with Release 7.0

	Wave 1 (2000-01)		Wave 2 (2001-02)		Wave 3 (2002-03)		Wave 4 (2003-04)		Wave 5 (2004-05)		Wave 6 (2005-06)	
	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7
Enumerated person file												
Percentage > 0	54.1	57.9	54.2	57.6	55.8	58.9	56.9	59.0	58.5	59.7	60.0	61.3
Mean	5,281	5,551	5,539	5,963	5,812	6,272	6,092	6,528	6,675	6,986	7,050	7,380
Median	816	1,397	956	1,463	1,411	1,757	1,647	1,852	2,177	2,170	2,365	2,483
10th percentile	0	0	0	0	0	0	0	0	0	0	0	0
25th percentile	0	0	0	0	0	0	0	0	0	0	0	0
75th percentile	6,970	7,280	7,475	7,754	7,814	8,262	8,121	8,500	8,861	9,181	9,306	9,803
90th percentile	13,584	14,374	14,356	15,004	14,956	15,906	15,722	16,319	16,810	17,434	17,489	18,243
Gini coef.	0.523	0.537	0.513	0.537	0.511	0.537	0.516	0.533	0.518	0.530	0.524	0.538
Household file												
Percentage > 0	68.6	72.9	67.7	71.6	68.9	72.0	69.6	72.1	70.8	72.2	72.5	73.8
Mean	10,404	10,938	10,736	11,560	11,160	12,043	11,678	12,512	12,824	13,403	13,587	14,230
Median	5,777	6,354	6,088	6,553	6,579	7,114	6,665	7,449	7,495	7,847	7,805	8,124
10th percentile	0	0	0	0	0	0	0	0	0	0	0	0
25th percentile	0	0	0	0	0	0	0	0	0	0	0	0
75th percentile	13,976	14,510	14,698	15,484	15,243	16,019	15,996	16,675	17,202	17,720	18,020	18,551
90th percentile	24,905	25,565	25,870	27,098	27,300	28,463	28,624	30,257	29,967	31,450	31,481	32,641
Gini coef.	0.490	0.504	0.479	0.504	0.476	0.501	0.481	0.497	0.490	0.500	0.500	0.510

Notes: R6 – Release 6.0; R7 – Release 7.0.

Table 5: Distribution of estimated family benefits – Comparison of Release 6.0 with Release 7.0

	Wave 1 (2000-01)		Wave 2 (2001-02)		Wave 3 (2002-03)		Wave 4 (2003-04)		Wave 5 (2004-05)		Wave 6 (2005-06)	
	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7	R6	R7
Enumerated person file												
Percentage > 0	27.1	27.3	26.3	26.2	25.7	25.7	24.8	25.0	24.6	24.9	23.2	23.8
Mean	840	863	849	863	839	861	979	1,008	913	1,102	1,107	1,144
Median	0	0	0	0	0	0	0	0	0	0	0	0
10th percentile	0	0	0	0	0	0	0	0	0	0	0	0
25th percentile	0	0	0	0	0	0	0	0	0	0	0	0
75th percentile	487	487	515	513	466	530	0	42	0	0	0	0
90th percentile	3,314	3,435	3,269	3,362	3,303	3,294	3,732	3,893	3,508	4,232	4,359	4,526
Gini coef.	0.426	0.425	0.428	0.424	0.433	0.430	0.408	0.405	0.437	0.402	0.394	0.390
Household file												
Percentage > 0	30.3	30.5	29.0	29.0	28.6	28.6	27.5	27.7	27.4	27.8	25.8	26.6
Mean	1,653	1,699	1,645	1,673	1,623	1,665	1,883	1,940	1,749	2,113	2,129	2,199
Median	0	0	0	0	0	0	0	0	0	0	0	0
10th percentile	0	0	0	0	0	0	0	0	0	0	0	0
25th percentile	0	0	0	0	0	0	0	0	0	0	0	0
75th percentile	1,949	1,949	2,059	2,053	1,873	1,978	2,037	2,037	1,508	2,234	1,763	1,774
90th percentile	6,059	6,412	6,410	6,392	6,168	6,441	6,951	7,293	6,524	8,103	8,373	8,383
Gini coef.	0.377	0.378	0.374	0.372	0.378	0.377	0.349	0.349	0.376	0.346	0.338	0.338

Notes: R6 – Release 6.0; R7 – Release 7.0.

Table 6 examines individual-level differences in disposable income between Release 6.0 and Release 7.0. It presents the proportion of persons and households with calculated disposable income higher in Release 7.0 than in Release 6.0, and the proportion with it lower in Release 7.0 than in Release 6.0. Summary measures of the distribution of absolute changes are also presented in the table. In all waves other than Wave 1, disposable income is changed by the revisions to the tax and benefit model for approximately 70-80% of persons and households. Over twice as many persons and households have disposable income increased by the revisions as have disposable income decreased by the revisions. The mean absolute difference in personal disposable income is approximately $2,000, and the mean absolute difference in household disposable income is approximately $3,500. However, for 50% of persons the difference in calculated personal disposable income is no more than $166, and for 50% of households the difference in calculated household disposable income is no more than $650.

Table 6: Distribution of differences between Release 6.0 and Release 7.0 in estimated disposable income

	Wave 1 (2000-01)	Wave 2 (2001-02)	Wave 3 (2002-03)	Wave 4 (2003-04)	Wave 5 (2004-05)	Wave 6 (2005-06)
Enumerated person file						
Increased (%)	21.4	49.7	52.7	54.1	61.2	59.8
Decreased (%)	30.6	22.1	19.3	18.2	12.1	14.3
Mean absolute difference	2,053	1,966	1,897	1,694	2,056	2,297
Median absolute difference	1	33	67	82	166	149
25th percentile of abs. difference	0	0	0	0	0	0
75th percentile of abs. difference	414	421	299	283	1,004	653
90th percentile of abs. difference	5,532	4,676	4,127	3,673	4,321	4,892
Household file						
Increased (%)	27.6	55.1	56.7	59.2	64.5	63.0
Decreased (%)	39.7	25.7	23.6	21.1	16.5	18.9
Mean absolute difference	3,608	3,339	3,265	2,907	3,558	3,904
Median absolute difference	16	91	139	183	650	381
25th percentile of abs. difference	0	20	31	63	102	126
75th percentile of abs. difference	2,000	1,788	1,448	1,309	2,322	2,160
90th percentile of abs. difference	10,656	9,725	8,294	7,925	8,266	9,958

8. Concluding comments

The revisions to the HILDA tax and benefit model described in this paper should produce more accurate estimates of disposable income, but there is still potential for further refinement of the model. It is our intent that, in addition to updating the relevant parameters annually, further refinements will be made on a continuing basis as resources to undertake the task become available. Some of the potential refinements include:

- Improved tax estimates for retired persons. There is likely to be heterogeneity in tax rates paid by retired persons of similar income levels that is not captured by assuming, as we do, that all retired persons with the same income pay the same amount of tax. Attempting to account for differential treatment of different types of retirement income – the Age Pension, superannuation/private pensions, foreign pensions, other investment income, employment earnings, and so on, is likely to improve disposable income estimates for this group.

- Refined imputations of tax deductions using information on income sources, industry and occupation of employment, other characteristics of employment, and personal, family and household characteristics of tax payers.

- Estimation of additional tax offsets and credits. It may be possible to explicitly estimate other tax offsets or credits drawing on other information in the HILDA data. For example, data on reported medical expenditure may be used to impute the Medical Expenses Tax Offset, and investment income information might provide a basis for estimating dividend imputation. Eligible termination payment credits might also be imputable based on employment history data and reported income.

- Imputation of salary sacrifice amounts by modelling salary sacrifice using external data, such as the Australian Bureau of Statistics Survey of Income and Housing, and applying the parameters to the HILDA data.

9. References

Headey, B. (2003) 'How Best to Impute Taxes and Measure Public Transfers?' *HILDA Project Discussion Paper Series*, No. 2/03, October 2003.

Watson, N. (ed) (2008) *HILDA User Manual – Release 6.0*, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.