The Household, Time Use and Tax Policy

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Abstract

This paper is concerned with modelling household decisions and the welfare effects of tax policy. It seeks to emphasise the importance of a model that incorporates household production and can take account of the evident female labour supply heterogeneity across two-parent families. If, after having children, some proportion of households substitute domestic for market labour supply, the income and consumption variables used as the tax base in most countries may be poorly correlated with living standards. Taxes and welfare programs based on these variables may increase inequality by shifting the overall tax burden to low and middle wage families with both partners in work, away from families with much higher wages and in which only one member works to earn the same joint market income. The paper combines data on time use, income, taxes and benefits to show how they track female labour supply over the life cycle, resulting in much higher tax burdens on two-earner households.

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1 Introduction

There is now an extensive literature that argues against the use of the standard household utility function model for estimating the behavioural responses of multi-person households to changes in policy variables, and for identifying the effects of a reform on individual welfares.[1] One strand of this literature has focused on models that assume each adult member maximises a utility function defined on market consumption and pure leisure. A difficulty with this approach is that the labour supply literature typically estimates models on data sets in which pure leisure is missing, and so the "leisure" variable in empirical work is non-market time. Time use studies show that a substantial proportion of non-market time is spent in household production, and so there is an inconsistency between the theoretical variable and its empirical counterpart.

In previous papers we have emphasised the importance of formulating multi-person models that recognise the allocation of time to domestic production, where the outputs are often close (but not perfect) substitutes for market goods and can be consumed by all family members. In Apps and Rees (1988) we analysed the effects of tax policy using such a model. In a later theoretical paper,[2] we studied the question of the reform of the system for taxing couples, stressing the importance of recognising heterogeneity across households in the allocation of female time to market and domestic work. This theoretical work suggests that at the core of an evaluation of the effects of taxation on the welfare of individuals within and across households, there must be some hypothesis about what determines the variation in female labour supply across households. In more recent papers, we extend this approach to the analysis of the costs of children and the impact of those costs on household decisions over the life cycle, in the presence of an imperfect capital market.[3]

In this paper we bring these ideas together and present empirical evidence to demonstrate the importance of taking account of these factors in modelling household decisions. Specifically, we argue for an approach that takes account of the following observations:

- Time not allocated to market labour supply is used for household pro-

[1] For surveys, see Blundell and MaCurdy (1999) and Vermeulen (2002) .
[2] Apps and Rees (1999).
[3] Apps and Rees (2002, 2004).

duction and not only for pure leisure, defined as time directly used for own consumption.

- There is significant heterogeneity across households in respect of female labour supply and the time spent in household production, after controlling for wage rates and demographic factors.

- Children are costly to parents. This is primarily because it is not possible on existing capital markets for children, or parents on their behalf, to borrow against future earnings to finance their consumption, including that of child care. Instead, parents must share their resources with their children.

The importance for tax policy of these observations lies in their combined effects. Each one taken alone need not limit unduly the relevance of the standard household utility function model estimated on labour supply and consumption data.[4] For example, if we take a sample of two-adult households with no children and in which both partners have a significant workforce attachment, the standard model could well be a reasonable one to use, even though time outside the market is spent on household production as well as leisure. Even with the arrival of children when, as time use data show, there is extensive substitution of domestic for market work, the standard household utility function model could still be a useful approach. This follows from the Sandmo (1990) analysis, which shows that introducing household production alone makes no essential difference to the standard results of optimal tax analysis. The observation that necessitates an alternative approach is the high degree of heterogeneity in the time allocation decisions of the female partner across otherwise seemingly identical households. The Sandmo (1990) model, and that of Boskin and Sheshinski (1983), assumes there is no heterogeneity in the second earner's labour supply across households. As we have shown in the papers cited earlier, once we introduce female labour supply heterogeneity, together with child costs and household production, we require a more general formulation of the household's decision making problem for the purpose of policy analysis.

The importance of household production and heterogeneity for tax policy was certainly well recognised by public finance economists in their discussion, for example, of the issues involved in the differential tax treatment of

[4] As presented, for example, by Blundell and MaCurdy (1999).

single- and two-earner households.[5] But it seems to have been lost sight of in the formalisation of the subject that followed the path-breaking innovations of Mirrlees (1971) and Sheshinski (1972) in the theory of optimal income taxation, and the rediscovery of Ramsey's (1927) work on optimal commodity taxation. Empirical work on tax reform analysis, with its post-1980s focus on micro-simulation modelling using the estimated parameters of utility-consistent demand systems, also ignored the policy implication of these issues, introducing preference heterogeneity to avoid them. More recent work focusing on the intra-household sharing rule in models that assume non-market time is pure leisure is open to even stronger criticism.

If, with the arrival of children, some households, but not others, substitute domestic for market labour supply, observed income and consumption variables used as the tax base in most countries may be poorly correlated with living standards. Taxes and welfare programs based on these variables could well increase inequality by shifting the overall tax burden to low and middle wage families with both partners in work, and away from families with much higher wages and in which only one member needs to work to earn the same joint market income. Furthermore, tax systems based on joint income impose higher effective rates on the incomes of households with a second earner, typically the female partner. If we take the primary earner's labour supply as given, these systems can be seen to increase the outside net-of-tax gender wage differential, to reinforce the effects of discrimination in the labour market. They shift downward the value of the outside option, and therefore the female reservation utility level within the household. The intra-family "sharing rule" cannot sensibly be considered in isolation from outside options, and the role of the tax-benefit system in determining them.

Time use data also show that, with the arrival of children, both parents, but especially the mother, work much longer hours in total (market and domestic) rather than, as may be expected, using the capital market to smooth consumption. Much of that time is spent on home child care, and it declines with the ages of the children. It therefore seems to us to be important to examine household taxation in a life cycle context. The underlying idea is that within each phase of the life cycle, which we define on the presence and ages of children rather than calendar age of the household head, households attempt to choose intertemporally optimal time allocations and consumption of domestic and market goods, in the light of given wage rates (net of taxes)

[5] See, for example, Munnell (1980) and Rosen (1976).

and productivities in household production, as well as interest rates. In an imperfect capital market these decisions are distorted, and so the effects of tax policy on life cycle time use and consumption need to be considered.[6]

Given the importance of household production and female time use heterogeneity, this paper draws attention to the fact that the estimation of the production system of a family decision model encounters a serious difficulty. While time use survey data are available on domestic work and home child care, data on domestic output are typically missing. It is therefore not possible to compute domestic productivities or prices without introducing some essentially arbitrary assumption on domestic output. We hope to show that while the data required to test the assumptions of a given model are not available, it is nevertheless important to recognise that any policy analysis *implicitly* makes some such assumptions, and therefore it is in the interests of clarity and transparency to acknowledge them explicitly and discuss them. We also make clear the way in which the standard household utility function model implicitly constructs data for missing domestic output variables.

The paper is organised as follows. In the next section we outline our modelling approach. The section also discusses the role of taxation in an imperfect capital market and the way in which the welfare effects of the types of systems outlined above depend on assumptions concerning the productivity of domestic work. Section 3 discusses data sources, our definition of life cycle phases and the criteria on which we split the sample into household types to identify some of the tax policy implications of heterogeneity. Section 4 presents empirical evidence on life cycle labour supply and the high degree of heterogeneity in female labour supply and domestic work decisions after the arrival of children. The section goes on to show how market and domestic consumption expenditures tend to track these time use decisions. Section 5 turns to the tax-benefit system. The results show how taxes and family payments also track female labour supply, imposing much higher taxes on those with a second earner. A concluding comment is contained in Section 6.

[6] Del Boca and Lusardi (2002) also emphasise, although in a different context, the effects of credit market constraints on household resource allocation decisions. Their study focuses on the effects on female labour force participation.

2 Life Cycle Modelling Approach

2.1 The Model

The household has a lifetime of $T+1$ periods, with $t = 0, 1, ..., T$ denoting the period. We define the life cycle on the presence and age of children and their parents' later transition from work to retirement. For the purposes of the present study, we distinguish six phases, which form a partition of the set of time periods:

- $\phi_1 = \{0, .., \tau_1\}$: the two-person household has no children;
- $\phi_2 = \{\tau_1 + 1, .., \tau_2\}$: there are children of pre-school age;
- $\phi_3 = \{\tau_2 + 1, .., \tau_3\}$: the children are in primary school or early high school years;
- $\phi_4 = \{\tau_3 + 1, .., \tau_4\}$: the children are at high school or have left school;
- $\phi_5 = \{\tau_4 + 1, .., \tau_5\}$: the children have left home, both adults are of working age;
- $\phi_6 = \{\tau_5 + 1, .., T\}$: the adults are retired, receive a pension and may supply market labour.

Household types are indexed by $h = 1, .., H$, and differ according to the value of the domestic productivity parameter k_h. Within each phase, the household maximises its utility

$$u_{ht} = \sum_{i=1}^{K} \varphi_{iht} u_{it}(x_{iht}, y_{iht}, z_{iht}) \quad h = 1, .., H \;\; t = 0, ..., T \tag{1}$$

where in general x is a vector of consumptions of market goods, y a vector of consumptions of domestic goods and z is consumption of leisure. The distributional weights φ_{iht} sum to one, are taken as fixed throughout, and reflect the hypothesis that the household seeks a Pareto efficient allocation of its resources. The individual utility functions u_{it} are strictly increasing in the consumption goods and leisure and are strictly quasi concave.

In phases 1, 5 and 6 there are no children in the household. The index $i = 1, 2$, always refers to adults. In phases 2, 3, and 4, there are $K - 2 > 0$

children in the household, and their utility functions are therefore included in u_{ht} in these phases. We can think of setting $\varphi_{iht} \equiv 0$ for $i > 2$ in the childless phases. u_{ht} is clearly a simple form of "social welfare function" for the household, where the weights reflect the "household sharing rule".

Each adult $i = 1, 2$ has the time constraint[7]

$$l_{iht} + t_{iht} + z_{iht} = A \quad h = 1, .., H \tag{2}$$

where l denotes a market labour supply, t the supply of labour to domestic production, and A is total available time.

We consider two simple specifications of the household production technology:

P1: there is a single household good, y, for which the production function is

$$\sum_{i=1}^{K} y_{iht} \equiv y_{ht} = f(t_{1ht}, t_{2ht}; k_h) \quad h = 1, .., H \;\; t = 0, ..., T \tag{3}$$

where $f(.)$ is assumed to be linear homogeneous and strictly quasi concave.

The linear homogeneity assumption implies a separation of the production and consumption decisions, which plays a very useful role in the empirical analysis later. We can think of the household as finding an imputed price of the domestic good given by solving the problem

$$\min_{t_{iht}} C_{ht} = \sum_{i=1}^{2} w_{it} t_{iht} \tag{4}$$

$$s.t. \;\; y_{ht} = f(t_{1ht}, t_{2ht}; k_h) \tag{5}$$

yielding the cost function $C_{ht} = c_{ht}(w_{ft}, w_{mt}; k_h) y_{ht}$, with $c_{ht}(.)$ the unit cost function. The price of the domestic good is $p_{ht} = c_{ht}(w_{ft}, w_{mt}; k_h)$.

P2: there are two domestic goods, y_{1ht} and y_{2ht}, produced separately by adult $j = 1, 2$, with production functions given by

$$\sum_{i=1}^{K} y_{ijht} \equiv y_{jht} = k_{jh} t_{jht} \quad h = 1, .., H \;\; t = 0, ..., T \tag{6}$$

[7]For children, $l_{iht} = a_{iht} \equiv 0$, although we realise that children often do household chores, and may well supply labour to the market (especially in developing countries). This is just a useful simplification in the present context.

for $j = 1, 2$. The prices of the household goods in this case are

$$p_{jht} = \frac{w_{jt}}{k_{jh}} \tag{7}$$

The household then solves its within-period consumption optimisation problem in each case:

P1:

$$\max u_{ht} = \sum_{i=1}^{K} \varphi_{iht} u_{it}(x_{iht}, y_{iht}, z_{iht}) \tag{8}$$

$$s.t. \;\; F_{ht} \geq \sum_{i=1}^{K} x_{iht} + \sum_{i=1}^{K} p_{ht} y_{iht} + \sum_{i=1}^{2} w_{it} z_{iht} \tag{9}$$

where F_{ht} is the household's full income available for consumption in period t, which we take as exogenously given for the moment. We also assume for simplicity that there is a single market consumption good, which acts as the numeraire.

P2: We replace the budget constraint in (9) with

$$s.t. \;\; F_{ht} \geq \sum_{i=1}^{K} x_{iht} + \sum_{j=1}^{2} \sum_{i=1}^{K} p_{jht} y_{ijht} + \sum_{i=1}^{2} w_{it} z_{iht} \tag{10}$$

These within-period models have a straightforward implication for the comparison of household welfare levels. If all households face the same wage and interest rates, and if there is no non-wage income or inherited wealth, then all households have the same wealth - the present value of the left hand sides of the budget constraints in (9) and (10) must all be equal. It then follows that households with a lower value of the price of the domestic good in each period, due to higher productivity, will also have higher utility possibilities and must be better off regardless of the specific allocation across the market and consumption goods and leisure and of the specific intertemporal time paths of consumption and saving. Before going on to examine the implications of this for tax policy, we complete the model by specifying the intertemporal choice problem.

As is well known, if the household can be represented as having a sharing rule that specifies how any given household income is divided among the household members, we can regard the value functions of the above

within-period problems as defining indirect utility functions, respectively, $v_{ht}(p_{ht}, w_{1t}, w_{2t}, F_{ht})$ and $v_{ht}(p_{1ht}, p_{2ht}, w_{1t}, w_{2t}, F_{ht})$. The household then chooses its optimal lifetime consumption stream F_{ht} by maximising the present value of its utility stream $v_{ht}(.)$ subject to a wealth constraint, determined by the present value of its full wage income $A\sum_{i=1}^{2} w_{it}$ plus any net transfers from the government (for example child payments, pensions). The precise form of this wealth constraint will depend on the nature of the capital market the household faces. In Apps and Rees (2004) we consider the implications of two alternative formulations: that of a perfect capital market, and that of a capital market in which the interest rate on borrowing increases with the amount borrowed. This latter formulation is consistent with the data we have on household borrowing, and also provides a better explanation of the life cycle choices of the household than that of a perfect capital market. The data on household life cycle choices discussed in Sections 4 below are regarded as being generated by this underlying model.

2.2 Taxes and Benefits

2.2.1 The average household

Taxes and transfers, together with in-kind government benefits, can be used to redistribute income and consumption across the life cycle, as well as across households. The life cycle profiles of these variables for the "average household" presented in later sections suggest that, on the one hand, the tax-benefit system helps to smooth consumption across the mid to later child rearing phases, by public provision of schooling financed by higher taxes on "in-work" households without children. On the other hand, the data also show there is relatively little support for children of pre-school age, particularly in the form of child care and education. This would seem to indicate that any smoothing effect may be unintentional. These issues are discussed in later sections where we present life cycle profiles for the average household.

2.2.2 Heterogeneity

In the remainder of this section, we focus on the tax policy implications of domestic work and female labour supply heterogeneity. We use the within-period production systems, **P1** and **P2**, to explore the effects of different types of tax systems based on market income variables when, in some house-

holds, both partners have a significant workforce attachment while in others, only one partner works in the market and the second specialises in domestic work.

For simplicity we take just two household types, $h = 1, 2$, and we index the adult members of the household by f and m respectively. Assume that the households face the same wage rates and that individual m in each household has the same market labour supply[8] l_m, while $l_{2f} > l_{1f} \geq 0$. Consider the simplest case, that of a flat tax at rate τ. Then the corresponding difference in tax payments P_h, of the two households is

$$P_2 - P_1 = \tau w_f (l_{2f} - l_{1f}) \tag{11}$$

If, for example, $l_{1f} = 0$, and the female wage is about equal to the male, then the type 2 household pays about twice as much tax as the type 1 household.

Now consider a progressive tax system with two marginal tax rates, τ_1 and τ_2, with $\tau_2 > \tau_1$, and where the higher rate cuts in at an income threshold Y_0 if the tax base is joint household income and Y_{00} if the tax base is individual income. The differences in tax payments under the two tax systems, for various possible relationships between the households' gross market incomes $Y_h = w_m l_m + w_f l_{hf}$ and the tax threshold, are now:

Joint taxation:

$$P_2 - P_1 = \tau_1 w_f (l_{2f} - l_{1f}) \quad Y_1, Y_2 < Y_0 \tag{12}$$

$$P_2 - P_1 = \tau_2 w_f (l_{2f} - l_{1f}) \quad Y_1, Y_2 > Y_0 \tag{13}$$

$$P_2 - P_1 = (\tau_2 - \tau_1) w_m l_m + w_f (\tau_2 l_{2f} - \tau_1 l_{1f}) - (\tau_2 - \tau_1) Y_0 \quad Y_1 < Y_0 < Y_2 \tag{14}$$

These differences are obviously increasing, for given differences in the l_{hf}, as we move through the three cases, and the third shows the significance of the fact that f's earnings may cause an increase in the tax rate on *both* incomes under a joint taxation (income splitting) system. Moreover, the differences are in each case greater the higher are wage and tax rates and the greater the difference in the l_{hf}. In the first two cases, if $l_{1f} = 0$ and male and female wage rates are roughly equal then the type 2 household pays about twice as much tax as type 1, whereas in the third case, in which the wife's earnings

[8] Labour supplies have adjusted to the given tax rates in all cases.

put the type 2 household in the higher tax bracket, it pays significantly more than twice as much.

Individual taxation:

$$P_2 - P_1 = \tau_1 w_f (l_{2f} - l_{1f}) \quad w_f l_{hf} < Y_{00} \quad h = 1, 2 \tag{15}$$

$$P_2 - P_1 = \tau_2 w_f (l_{2f} - l_{1f}) \quad w_f l_{hf} > Y_{00} \quad h = 1, 2 \tag{16}$$

$$P_2 - P_1 = w_f(\tau_2 l_{2f} - \tau_1 l_{1f}) - (\tau_2 - \tau_1) Y_{00} \quad w_f l_{1f} < Y_{00} < w_f l_{2f} \tag{17}$$

Again the differences are increasing as we move through the three cases for given differences in the l_{hf}. Note however that under independent taxation, the effect of a wife's income in increasing the marginal rate on the husband's income is no longer present.

A precise comparison between the two systems depends on the proportions of households in each of the three cases under each system, but clearly, if under each system there is a significant proportion of households in the third case, then a revenue neutral change from joint to independent taxation would involve a major redistribution of income[9] from households with low to households with high values of l_{hf}.

If we accept the stylised fact that female labour supply elasticities are higher than male, then joint taxation is on standard Ramsey grounds inefficient. The question is can this inefficiency be justified for reasons of equity? To answer this question we need to know which household type has the higher household productivity and therefore is better off. That is, is l_{hf} increasing or decreasing as a function of k_h? Empirically, nothing is known about the answer to this question. Theoretically, the answer is ambiguous, the relationship can go either way.[10] If in fact the relationship is inverse, so that households with the higher market income are in fact worse off, then the above differences illustrate what could be called a *Progressivity Paradox*: the more "progressive" the tax system in the sense of the difference between

[9] This ignores of course the induced changes in f-labour supplies, which to the first order can be ignored for a marginal change in tax system but not for a discrete change. For formal analysis see Apps and Rees (1999).

[10] See Apps and Rees (1999) for a formal proof of this. Intuitively, though higher productivity implies that less time is required for a given amount of household production, the implied fall in the price of domestic output increases demand for it and so could lead to a higher demand for f's domestic time overall. The net result depends crucially on the price elasticity of demand for domestic output.

the marginal tax rates $\tau_2 - \tau_1$, the more regressive the welfare distribution. In this case joint taxation is both inefficient and inequitable.

If the households with lower productivity are also those with lower female labour supply, then taxation which redistributes income to them has a positive effect on equity, but the efficiency costs of the marginal tax rate on female labour supply could be so high that overall social welfare would be lower. The aim should be to find less inefficient ways of redistributing income to worse off households, for example by progressive individual taxation.

An attempt to answer this question on the relationship between household productivity and female labour supply by empirical estimation encounters the difficulty that data on domestic outputs are not available. At best we have time use data that provide information on inputs. These can be used to derive estimates of the implicit price of household production, but the assumptions that have to be made to do this are essentially arbitrary and amount to constructing data on domestic outputs. We use very simple versions of models **P1** and **P2** above to illustrate this point.

P1: Assume that the household production function is given by the Cobb-Douglas form

$$y_h = \alpha_h t_{hf}^{k_h} t_{hm}^{1-k_h} \quad h = 1, 2 \tag{18}$$

where the parameters α_h and k_h may vary across households. For a given household they reflect the relative productivities of the household members in domestic production. The price of the household good is in this case

$$p_h = A_h w_f^{k_h} w_m^{1-k_h} \tag{19}$$

where

$$A_h \equiv \alpha_h^{-1} k_h^{-k_h} (1 - k_h)^{-(1-k_h)} \tag{20}$$

Given time use data on the time individuals in the household spend in domestic production, the linear homogeneity assumption allows us to estimate a value of k_h as

$$k_h = \frac{w_f t_{hf}}{w_f t_{hf} + w_m t_{hm}} \tag{21}$$

Typically, k_h will be higher in the household with higher t_{hf} and so lower female labour supply. However the variation of p_h across h cannot be estimated unless α_h is known, but this cannot be estimated with the available data. It is tempting of course to set α_h to 1, which would be achieved simply by omitting it from the specification of the household production function,

in which case the conclusion is[11] that the higher productivity household has lower market labour supply, and the "progressivity paradox" described above holds. This conclusion would however be quite arbitrary, as would be the conclusion that the reverse is true.

P2: The household production functions are of the linear form

$$y_{hj} = k_{hj} t_{hj} \quad h = 1, 2 \tag{22}$$

In this case we do not know k_{hj}, and so it is not possible to compute the price of good j, p_{jh}, $j = f, m$. If we set $k_{hj} = 1$, the price of good j is then given by the net wage, w_j. This is the implicit assumption of empirical applications of the standard labour supply model. It is straightforward to see from this example that the standard household utility function model constructs data for missing domestic output variables, by setting $k_{hj} = 1$, $j = f, m$. The model also omits male and female pure leisures, implying that they are either zero or fixed. Empirical applications of the model using household survey data, containing information only on the allocation of time to the market, are therefore limited to the estimation of an aggregate household demand system - data on all individuals' consumptions of the market and domestic goods are missing. The system is consistent with the theoretical model of the multi-person household outlined above, apart from its specialised assumptions on pure leisure and domestic productivities. The only parameter restrictions are those required for aggregation. The argument that the model is anything more, or less, than this stems from the misinterpretation of non-market time as pure leisure.

To justify basing the taxation of couples on their combined market income requires the arbitrary assumption that α_h is greater than 1 in the first model and that k_{hj} is greater than one in the second. In other words, assuming couples with higher market income have higher welfare necessarily implies an assumption about the value of household production, and, in the absence of the data required to estimate domestic productivity, this assumption is quite arbitrary. Furthermore, as we have seen, even if this were the case, there may be efficiency losses that outweigh any welfare gains from redistribution.

[11] It is sufficient in this example for $\partial p_h / \partial k_h < 0$ that $w_m / w_f < t_f / t_m$.

3 Data

The data for the empirical analysis are drawn from the Australian Bureau of Statistics (ABS) 1997 Time Use Survey (TUS) and the ABS 1998 Household Expenditure Survey (HES).[12] The time use data are collected for ten activity episode classifications comprising labour market activities and nine major categories of non-market activities. We group these into three broad categories: market work, domestic work and leisure. We also split the domestic work category into two subgroups: general domestic work and child care. Market hours are calculated as the sum of time allocations to all subcategories of labour market activities excluding travel to work and job search. Domestic work is computed as the sum of time allocations to the categories "domestic activities"and "purchasing goods and services". Domestic child care is the category "child care/minding". For each episode, information is recorded for a primary and, if relevant, a secondary activity.[13] Both surveys provide information on a common set of demographic, education and occupation variables. In addition, the HES provides estimates of indirect government taxes and benefits as well as detailed data on direct taxes and benefits.

We select matching samples of two-adult households from these datasets excluding only those in which the female partner is aged from 40 to 44 years and there are no children present.[14] The sample drawn from the HES contains 4055 records and that from the TUS, 1938 records. For the purpose of computing household *full consumption*, defined as the sum of expenditure on the market good and the household's implicit expenditure on the domestic good, we combine information on time use in the TUS sample with data on consumption expenditure, individual incomes and earnings in the HES, using split-sample instrumental variables.[15]

[12] The analysis is, in effect, based on a single cross section (all results are presented in 1998 prices) and therefore does not take account of cohort effects. While we recognise that cohort effects can be important, it does not seem to us that they would alter the direction of our key results.

[13] Where primary and secondary activities are reported, the weighting used is 0.6:0.4.

[14] Since we wish to construct life cycle profiles for couples as they pass through each of the defined phases, we omit these households because they are likely to represent couples who have decided not to have children.

[15] For details, see Apps and Rees (2002).

3.1 Phase Definition

The matching TUS and HES samples are split into the six life-cycle phases as follows. Phase 1 comprises couples in which the female partner is aged under 40 years and there are no dependent children present. Phase 2 includes all couples with at least one child under 5 years who is not yet at pre-school. Phase 3 represents couples with at least one child under 10 years at school or pre-school, and phase 4 is defined as couples with older dependent children still living at home. Phase 5 comprises couples selected on the criteria that the female partner is aged 45 years or more, there are no dependent children present and, in the case of couples in which the male partner is 55 or more, at least one partner is not in full or semi-retirement or "out of the workforce." Phase 6 includes all couples in which the male partner is 55 or older, and both partners are in full or semi-retirement or report being unemployed or "out of the workforce". Phases 1 to 6 in the HES sample contain 446, 708, 609, 737, 760 and 795 records, and in the TUS sample, 211, 336, 302, 342, 344, and 403 records, respectively.

3.2 Heterogeneity

To illustrate the empirical importance of heterogeneity, we take matching HES and TUS samples of "in-work" households and, within each phase, split the samples into two groups of equal size according the market hours of the female partner. With missing data on domestic output, this strategy for defining household types implies that female labour supply decisions are, ceteris paribus, systematically related to domestic productivities.

Ideally we would like to distinguish between those households in which female labour supply is zero, or "marginal" in the sense of Heckman (1995), throughout the life cycle, and those in which it is significant and relatively large over the entire life cycle. This categorization requires panel data. Since we have access only to cross-section data, we select "in-work" households in phases 1 to 5 on the criterion that the male partner's "usual hours of work" exceed 25 per week. Under this criterion we obtain a HES sample with 405, 615, 609, 537 and 617 records in phases 1 to 5, respectively, and a TUS sample with 204, 308, 276, 307 and 318 records in the same phases. We partition phases 2 to 5 into two groups of equal size within each phase according to the female partner's "usual hours of work". Households in the first group with zero to marginal hours are labelled type 1 and the remainder working

longer hours as type 2. The two groups are also referred to as "traditional" and "non-traditional", respectively.[16]

4 Life Cycle Profiles

4.1 Time Use

4.1.1 The average household

Table 1 presents weighted TUS data means for male and female time allocations to market and domestic work across the six life cycle phases. Columns 1 to 3 list annual hours of male labour supply, domestic work and total hours allocated to these activities. Corresponding figures for female time allocations are listed in columns 4 to 6. The labour supply profiles are depicted in Figure 1. They illustrate the very dramatic change in female labour supply with the arrival of children in phase 2. Between phases 1 and 2, female market hours fall from around 80 per cent of male hours to less than 25 per cent, and barely rise to more than 50 per cent of male hours at any later phase of the life cycle, even after the children have left home.

Table 1 and Figure 1 about here

Table 2 and Figure 2 present time allocations to domestic work and child care. The profiles reveal an even more dramatic change in the allocation of female time with the transition from phase 1 to phase 2. Comparing Figures 1 and 2, it can be seen that the large fall in the market hours of the female partner is matched by an even larger increase in her hours of work at home. Male domestic hours also rise in phase 2, but to a far lesser extent.

Table 2 and Figure 2 about here

These results broadly support, and offer an explanation for, estimates of wage elasticities indicating that the labour supply of married women is much more responsive to a change in the net wage than that of prime aged males. They also explain the usual empirical estimates of demographic effects. However, the negative association between female labour supply and domestic work suggests that the usual assumption of separability between

[16] It may be argued that the overall lifetime differences between the two types are overstated because households may switch type over the life cycle. For example, married women who work and save more in the early child-rearing phases may become non-workers and save less in later phases. Studies of the persistence of female labor supply indicate strongly that this is not the case (e.g., Shaw, 1994).

consumption and non-market time in life cycle models is strongly rejected by the data.

These time use data reveal strongly U-shaped life cycle profiles of leisure, which would seem to be inconsistent with consumption smoothing in a perfect capital market. Figure 3 depicts the profiles of male and female leisures, calculated on the basis of a time constraint of 14 hours per day. They are, of course, the reverse image of total hours of work and show the large fall in female leisure with the arrival of children in phase 2. There is also a decline, but to a lesser extent, in male leisure. In subsequent phases the leisure hours of both partners gradually increase.

Figure 3 about here

4.1.2 Heterogeneity

Time use data reveal the high degree of heterogeneity in female labour supply and domestic work after the arrival of children. Table 3 presents data means for male and female labour supplies and hours of domestic work across phases 2 to 5, with separate results for household types 1 and 2. The final column of the table reports the average number of children per household in each phase. The labour supply profiles are plotted in Figure 4. They show diagrammatically the strong tendency of households to split into the two types defined on female hours. There is relatively little variation in average male hours between household types in each phase.

Table 3 and Figure 4 about here

The labour supply and domestic hours profiles indicate strong substitution of domestic for market work in phases 2 and 3 by the female partner in the traditional household. In the non-traditional household there is much less substitution, and the female partner works longer hours in total. Her male partner also works longer than his counterpart in the traditional household because he spends more time on child care in phases 2 and 3. Since the data indicate that type 2 households work considerably longer hours than type 1, this suggests that neither market nor domestic work can be assumed to be separable from leisure in the within-period demand system of a life cycle model.

4.2 Consumption

4.2.1 The average household

Table 4 lists data means for net income (private income net of direct taxes and direct benefits) and market consumption expenditure in columns 1 and 2. The life cycle profiles of these variables across phases 1 to 5 reflect the substitution of domestic for market work by the female partner after the arrival of children. This substitution explains the strong tendency of household consumption to track net income - the much discussed puzzle of the excess sensitivity of consumption to income.[17]

Table 4 about here

Column 3 of the table lists estimates of average household expenditure on domestic work and child care, using the opportunity cost of time allocated to these activities.[18] Column 4 presents the life cycle profile of household *net* full consumption expenditure, computed as the sum of market and domestic expenditures in columns 2 and 3, and indirect government benefits (listed later in Table 6). It is important to include the latter in a measure of full consumption because the data available in the HES indicate they are large and vary quite dramatically across the life cycle.[19]

The final column of the table reports an estimate of *adult* net full consumption expenditure, obtained by subtracting the total costs of the children from household net full consumption in column 4. The total costs of the children are computed as the sum of market and domestic consumption expenditures. Data are available for computing two components of these costs, the parents' time spent on child care and government spending on child care and education.[20] The children's shares of the remaining items, market consumption, other indirect government benefits and non-child care household production, are computed for an "equivalence scale" that sets the cost of a child to 0.4 that of an adult, a scale used, for example, in the Blundell et al. (1994) life cycle study. The results we obtain for total costs are: $57403,

[17] For further comment on this issue, see Apps and Rees (2004).

[18] We instrument for the gross wage and marginal tax rate, to compute the net wage as the opportunity cost of domestic work and child care time.

[19] Net household income includes all government direct (cash) benefits but not indirect benefits through, for example, the eduation and health systems.

[20] Our estimates for the cost of the parents' time are $34229, $25218 and $6698 pa for phases 2 to 4, respectively. The data means for indirect government child care and education benefits are $4669, $11509 and $11731 for the same phases.

$57793 and $37778 pa. for phases 2 to 4, respectively.[21]

The U-shaped profile of the adults' full consumption matches their leisure profiles, providing further evidence of an imperfect capital market. The profiles suggests that parents cut back on both consumption and leisure, instead of borrowing more, in order to support their children in the early child rearing phases.[22]

4.2.2 Heterogeneity

There is very considerable heterogeneity in market/domestic consumption choices, as we would expect, since net income tracks female labour supply. Table 5 presents data means for net income, market and domestic consumption expenditures and household and adult full consumption expenditures, for each household type across phases 2 to 5. Type 2 households have higher net incomes and higher levels of market consumption spending in each phase. However, they have lower levels of domestic consumption expenditure. Overall, household net full consumption expenditures tend to be higher for the type 1 household, while adult net full consumption expenditures are almost the same for the two types, across the five phases.

Table 5 about here

Since type 1 households allocate considerably more time to leisure, and both have similar wage rates and demographic characteristics, the higher levels of their full consumption could be seen as a puzzle. As we will now show, the explanation for this is the tax-benefit system.

5 Taxes and Benefits

5.1 The average household

Table 6 presents weighted TUS sample means for household private income, direct taxes and benefits, and indirect taxes and benefits, in columns 1 to 5,

[21] The results are in line with our estimates of a "sharing rule" in Apps and Rees (2002) based on an individualistic model and time use survey data.

[22] Evidence of an imperfect capital market is also provided by data on saving and borrowing and on housing available in the HES. Many households are found to be in the position of having to borrow short term to finance long term contractual saving in the form of house purchase and superannuation schemes. For further analysis, see Apps and Rees (2004).

respectively. The final column reports data means for *net* tax, computed as all taxes minus all benefits. Figure 5 depicts the profiles of private income, market consumption expenditure (including indirect benefits) and net tax.

Table 6 and figure 5 about here

The net tax profile shows that the overall effect of the tax-benefit system is to redistribute household income and consumption quite significantly across the life cycle. In the phases in which children are present, net tax is either negative or close to zero. Couples in phase 1 face, on average, the highest level of taxation, net of benefits, followed by those in phase 5.

An interesting feature of the results is that the profile of net tax in figure 5 tends to match that of household saving (obtained by subtracting market consumption expenditure from net income in table 5). Both are at their highest points in phases 1 and 5, the phases in which there are no children present. This result would seem to suggest that the tax-benefit system decouples private income and consumption to a greater degree than the household's saving decision. The tax-benefit system might therefore appear to be designed to improve consumption smoothing for the household in an imperfect capital market.

However, the low level of indirect government benefits for child care and education in phase 2 does not support this. From column 5 of Table 6 it can be seen that, across the phases in which children are present, government spending on indirect benefits is at its lowest in phase 2. This is due primarily to a much lower level of spending on child care and education. Families with children at school or in tertiary education receive by far the largest support - in the order of $8000 pa per family. This contrasts with an average spending of only $1,093 per family on child care and education in the preschool phase.[23]

Given this low level of support, it is not surprising to find that parents allocate a very large share of their resources to child care in phase 2. Faced with high borrowing rates and a lack of access to good quality, affordable child care,[24] the household's optimal choice is, first, to reallocate the mother's time

[23]Note that the data means for indirect government benefits include medical costs. In phase 2 these include costs for the birth of a child. Furthermore, $4052 of the average spending in phase 2 represents education benefits for school aged children who are also present in the household.

[24]To appreciate the inefficiencies and consequent high cost of market child care, one need only consider the impact that government financial support, central planning and regulation has had on primary school care and education, and what would happen to

from market to household work, since she generally faces a lower wage rate, and secondly, for both parents, but especially the mother, to work longer hours in total, and so reduce leisure, in phase 2.

In later years, the cost of children to parents is substantially reduced by public funding of education and the child care it provides. In other words, when the child reaches school age the public education system takes over many of the child-minding activities that the household itself has to undertake for pre-school children. This allows the female partner to expand her market labor supply in phase 3 while simultaneously reducing total hours of work. The effect is accentuated in phase 4. Household income, labour supply and market consumption expenditure all peak in phase 4, with teenaged children living at home. Thus, the profile of leisure, together with that of adult full consumption, is, we argue, to a significant extent an outcome of an imperfect capital market and variations in the public funding of the costs of children. Once the children have reached school age, access to public education and the child care it provides allows parents to maintain family consumption without cutting back excessively on leisure and consumption.

5.2 Heterogeneity

The tax-benefit system impacts very differently on the two household types, at given wage rates, non-labour incomes, and demographics. Two earner household pays far more in tax.

Table 7 presents a breakdown of the tax-benefit treatment of the two types. Column 1 reports data means for household private income, and column 2, for female earnings. Columns 3 to 6 list the data means for direct taxes, direct benefits, indirect taxes and indirect benefits, respectively. The final column gives net tax, computed as the sum of all taxes net of all benefits, for each type. Figure 6 plots the net tax of each household type. The results show the extent to which non-traditional households are taxed more heavily than traditional households. In phase 2, for example, traditional households receive, on average, a transfer of $922 pa whereas non-traditional households pay, in effect, $7188 pa in tax. The tax differential is over $8000 pa. Similar results hold for subsequent phases.

Table 7 and Figure 6 about here.

female labour supply and school attendance if that sector had been treated in the same way as child care.

There are several factors that produce this outcome. First, the traditional household (type 1), by switching to untaxed domestic production as a substitute for market work, avoids direct taxes on a second market income. The household also retains a much greater share of family benefits because these are tested on joint income and on the income of the second earner. As a consequence, traditional households with only one partner in work pay much lower direct taxes net of direct benefits. Take, for example, phase 2, in which only the male partner is in work in the traditional household. The household pays only $7176 in direct taxes net of benefits. In contrast, the non-traditional household (type 2) pays $13262 even though it has an additional income of only $20813 pa and the female partner is working an average of 1171 hours pa. Second, by switching to the domestic production of market substitutes, the type 1 household also avoids consumption taxes. This widens the gap between the tax liabilities of the two household types.[25]

While the Australian income tax is based on individual incomes, it has been combined with a system of income tested family benefits to produce a distributional outcome similar to that of joint taxation across much of the distribution of household income. Households with the same combined income pay around the same amount in tax, net of direct benefits, irrespective of whether it takes one member in full-time work to earn that income, or two members. Moreover, because the withdrawal of benefits occurs across the middle of the distribution of household income, the effective marginal rate schedule has an inverted U shape rather than the usual progressive form.[26]

Table 8 shows that the overall tax and family benefit system approximates equal taxation of couples with the same joint income, across much of the distribution of joint income. The table presents data means for tax liabilities, calculated as the sum of direct and indirect taxes, less direct benefits, within each quartile of a ranking by household private income. The data means are for a sample of "in-work" households, excluding those reporting negative incomes. The upper section of the table presents results for type 1 households

[25]The highly unequal distribution of the tax burden between traditional and non-traditional households in Australia is an ongoing trend that reflects a continuing shift towards a less progressive tax-transfer system, as in other OECD countries. In effect, lower rates at the top of the distribution of income have been funded by raising taxes on working married women. It is important to see the issue in this context, and not in terms of a conflict between non-traditional and traditional households.

[26]The same result would be obtained by introducing an earned income tax credit program, as in the US.

and the lower section, for type 2 households.

Table 8 about here

The amount of tax paid is recorded in the first row of each section. The second row gives the income of the primary earner and the next three rows, male and female annual market hours and the number of dependent children per household. Although, within each phase, type 2 households work much longer hours for lower wages, as indicated by the gap between primary incomes, the two household types pay much the same amounts in tax across a wide band of the distribution. In phase 2 they pay close to identical amounts. In phase 3 the type 1 household pays only $2403 more in tax even though its primary income is around 40 per cent higher than that of the type 2 household. In quartile 1, type 2 households pay over $2600 more due to withdrawal of family payments, and towards the upper end of the distribution they pay less because the progressive marginal rates on individual incomes start to take effect as primary incomes approach $100,000. Note that there is relatively little variation in the average number of children per household across types within each quartile.

The final row of each section of the table shows the percentage distribution of household types within a quartile. The point to note is that type 1 households tend to be concentrated in the lower quartiles. This is because a ranking based on household income places two earner couples working long hours for low wages in the same percentile as single earner couples with much higher primary earner wages. This effect is accentuated if there is little wage dispersion around the median, as in this in-work sample.

The longstanding argument for equal taxation of households with the same combined income under a system of joint taxation assumes household income is a reliable measure of welfare. As we discussed in section 2.2 earlier, in the absence of the necessary data and measurements this implies an arbitrary assumption about the value of household production and the relationship between domestic productivity and female labour supply.The assumption implies that the productivity of domestic labour is zero and, as well, that additional leisure does not contribute to household welfare. Thus a parent who switches to domestic work and home child care contributes nothing to real family consumption and is the beneficiary of an altruistic equal share in the income of the partner in work.

To gain further insight into the rate structure of a system of this kind, which characterises many OECD countries, it is useful to examine the distribution of taxes across a ranking by primary income, as in Table 9. The

table presents data means for type 1 households in the upper section and for type 2 in the lower section. The table includes means for male and female market hours and the average number of children per household. The first row shows the tax liability (direct and indirect, net of direct benefits) of type 1 households in each quartile of primary income. The second row reports the result as an average rate of tax (ATR) with respect to household private income (shown in the third row).

Since the two household types have similar wage rates and demographic characteristics, the upper section can be interpreted to provide results indicating the distributional impact the tax system would have if all household were of type 1. Under this condition, the conclusion could be drawn that the combined direct and indirect tax system, together with family payments, is highly progressive, with average rates rising from 6.8 per cent in the bottom quartile to almost 37 per cent in the top quartile. However, from the results for non-traditional households in the lower section of the table, it can be seen that this progressivity with respect to primary incomes is combined with high ATRs on the lower incomes of second earners.

Table 9 about here

The average additional tax paid by type 2 households in each quartile can be obtained by subtracting type 1's tax from that of type 2. Expressing the result as an average rate of type 2's additional private income gives the ATRs shown in shown in row 3. In quartile 1, the ATR is over 45 per cent and in quartile 2, almost 40 per cent. There are two key points to note. These results reflect the fact that the ATR on the second earner's income is much higher than on the first, and ATRs on second incomes tend to be regressive across the distribution. Again, in terms of equity, this outcome can be justified only if the type 1 household has a sufficiently low domestic producitivity.

The last row of Table 9 reports the percentage of households of each type within each quartile. Note that the two types of households are spread much more evenly across the distribution of primary income. This is because households with similar wage rates, and similar full consumption expenditures, tend to appear in the same percentile.

6 Conclusions

Several OECD countries, Germany and the US for example, continue to tax incomes of couples jointly. An increasing number are shifting towards welfare systems involving the withdrawal of benefits as a function of joint income, as with the earned income tax credit scheme in the UK and the family tax-benefit system in Australia. This has the effect of extending the element of joint taxation in purportedly independent taxation systems. The US combines both.

This paper has looked at the profile of tax burdens (net of benefits) of households over the life cycle, and across households with varying female labour supply. We have confirmed that there is a strong element of redistribution, away from two-earner and toward single-earner households with similar household income. While the inefficiency of this is relatively undisputed, its equity effects are also very much open to question. These latter depend very much on the value of household production, and on the correlation between domestic productivity and female labour supply, about which much more needs to be known. Major progress at the conceptual level, also, would follow from a change in modelling approach, away from those in which these issues are simply assumed away, towards one that makes them explicit and indeed central to the analysis.

We have also shown that tax-benefit policy tends to reinforce the effects of imperfect capital markets and the low availability and high cost of good quality child care, in making life difficult for couples with young children, particularly those where the wife continues to work in the market. This is also likely to make the terms of the trade-off between fertility and female labour supply particularly severe, and should be a subject of serious concern to policy makers trying to deal with the problem of sustainability of social security programmes in a period of ageing populations.

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TABLE 1 Hours of market and domestic work pa*

Life cycle phase	Male hours			Female hours		
	Market 1	Domestic 2	Total 3	Market 4	Domestic 5	Total 6
1	2286	614	2900	1789	1012	2801
2	2241	1532	3774	551	3590	4142
3	2305	1421	3727	745	2913	3658
4	2232	989	3222	1099	1927	3027
5	2123	848	2972	1035	1675	2710
6	87	1415	1503	27	1782	1808
All	1784	1167	2952	811	2169	2980

*Weighted TUS data means

Figure 1: Hours of market work (pa)

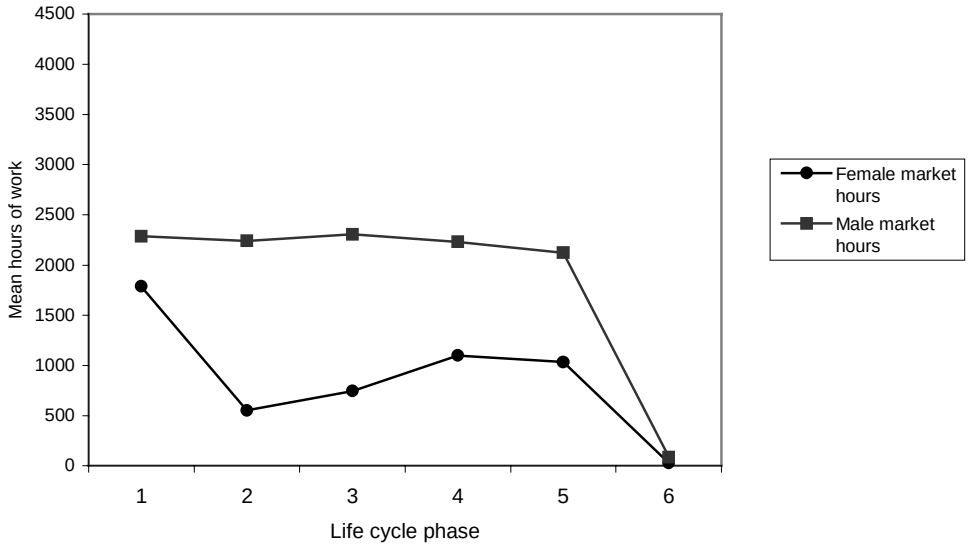

TABLE 2 Domestic work and child care hours (pa)*

Life cycle phase	Male hours Domestic 1	Male hours Child care 2	Female hours Domestic 3	Female hours Child care 4	# kids
2	656	876	1337	2253	2.01
3	732	689	1466	1447	2.16
4	791	198	1561	366	1.62

*weighted data means

Figure 2: Domestic work and child care hours (pa)

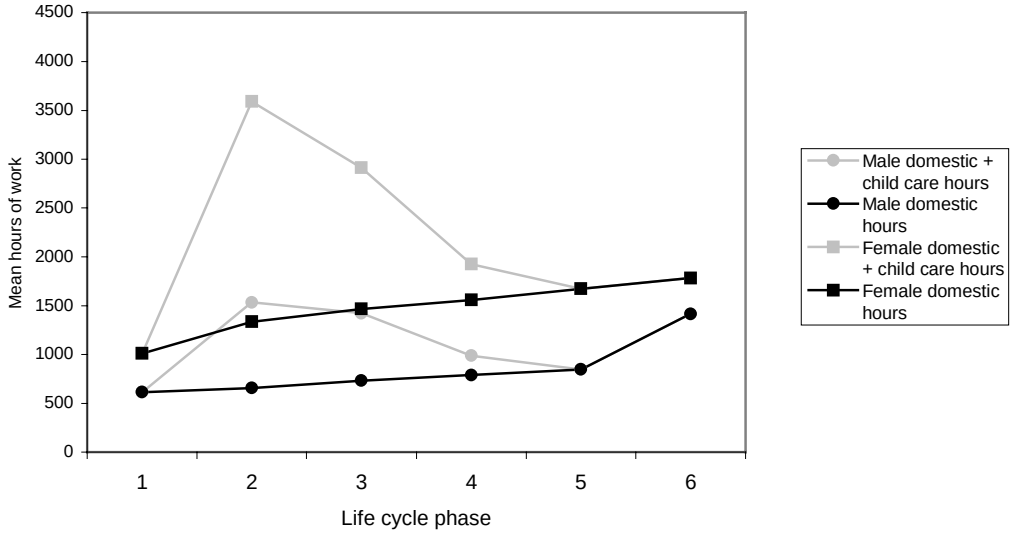

Figure 3: Leisure hours (pa)

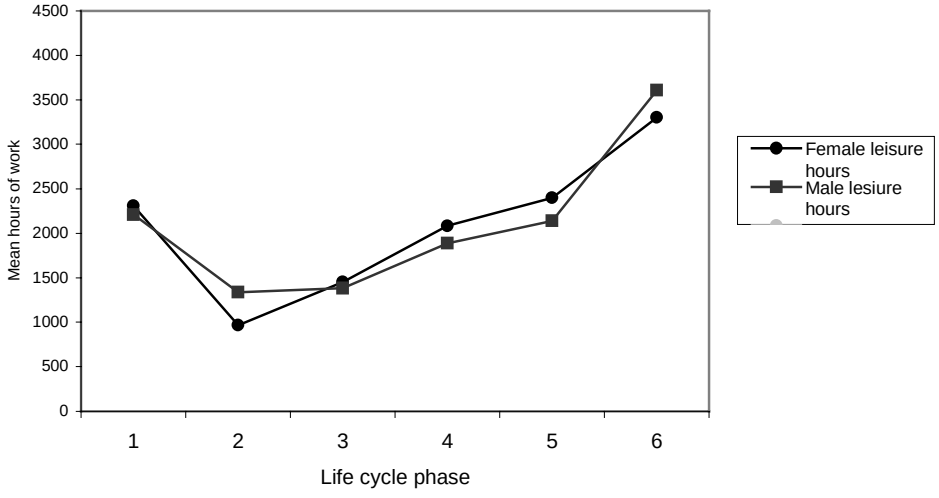

TABLE 3 Market and domestic work, by household type (pa)

HH type	Life cycle phase	Male hours: Market 1	Male hours: Domestic 2	Male hours: Total 3	Female hours: Market 4	Female hours: Domestic 5	Female hours: Total 6	# kids 7
1&2	1	2314	554	2868	1811	1014	2285	-
	2	2419	1420	3839	0	4023	4023	2.07
1	3	2629	1246	3875	22	3340	3362	2.21
	4	2318	1002	3321	501	2255	2756	1.63
	5	2137	771	2908	143	2043	2186	-
	2	2468	1551	4019	1171	3140	4311	1.82
2	3	2455	1460	3914	1466	2543	4009	2.15
	4	2636	889	3525	1959	1937	3594	1.62
	5	2459	871	3300	1962	1356	3318	-
1&2	6	87	1415	1503	27	1782	1808	-

*weighted data means

Figure 4: Labour supply by household type (hours pa)

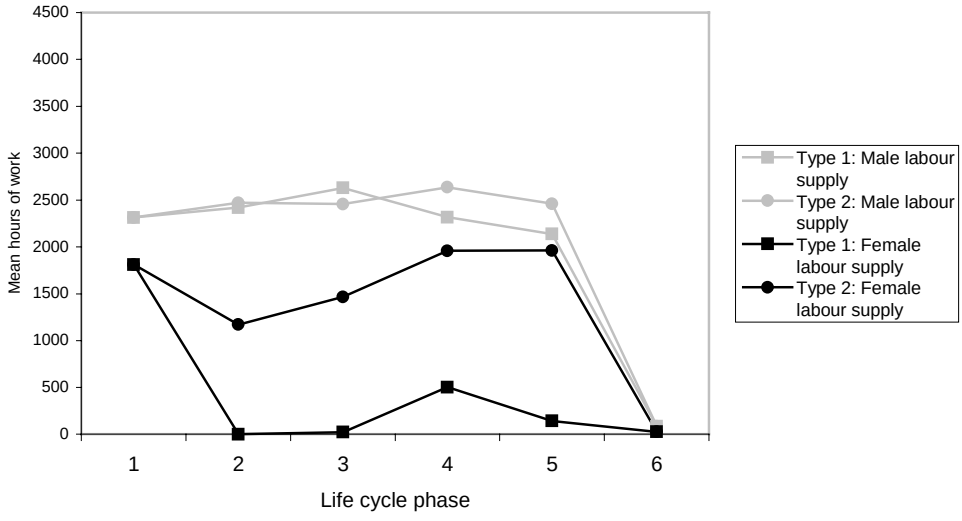

TABLE 4 Consumption expenditures ($pa, 1998)

Life cycle phase	Net income 1	Market consumption 2	Domestic cons expend 3	Household net* full cons expend 4	Adult net* full cons expend 5
1	50619	42707	16769	59475	59475
2	40693	49981	54965	104956	47553
3	46268	57910	49666	107588	49795
4	53837	66507	32417	98925	61147
5	50242	45820	23448	69268	69268
6	22209	35400	29450	64851	64851
All	42732	49286	34192	83479	59599

* Includes indirect government benefits

TABLE 5 Consumption expenditure by household type ($pa,1998)

HH type	Life cycle phase	Net income 1	Market cons expenditure 2	Domestic cons expend 3	H'hold net* full cons 4	Adults net* full cons expend 5
1&2	1	52457	44380	15642	59035	59035
	2	38196	41166	56630	105907	46659
1	3	44607	43536	52878	108365	50229
	4	51667	54420	32290	98229	59445
	5	46742	43609	24412	67956	67956
	2	52102	46857	46955	99878	46665
2	3	53685	50198	39411	100653	45339
	4	66517	61294	24318	95309	59380
	5	59203	50359	16481	65691	65691

* Includes indirect government benefits

TABLE 6 Household income, taxes and benefits ($pa, 1998)

Life cycle phase	Household private income 1	Direct taxes 2	Direct benefits 3	Indirect taxes 4	Indirect benefits 5	Overall net tax 6
1	65940	15948	626	4756	4099	15976
2	47220	11325	4798	4750	12899	-1621
3	54902	13020	4386	8634	17503	-3572
4	65756	15586	3667	5962	17528	354
5	63102	14363	1503	5629	5428	13062
6	13708	1924	10425	3388	10823	-15937
All	49425	11371	4677	4913	11515	91

Figure 5: Private income, net market consumption expendiutre and net tax ($pa, 1998)

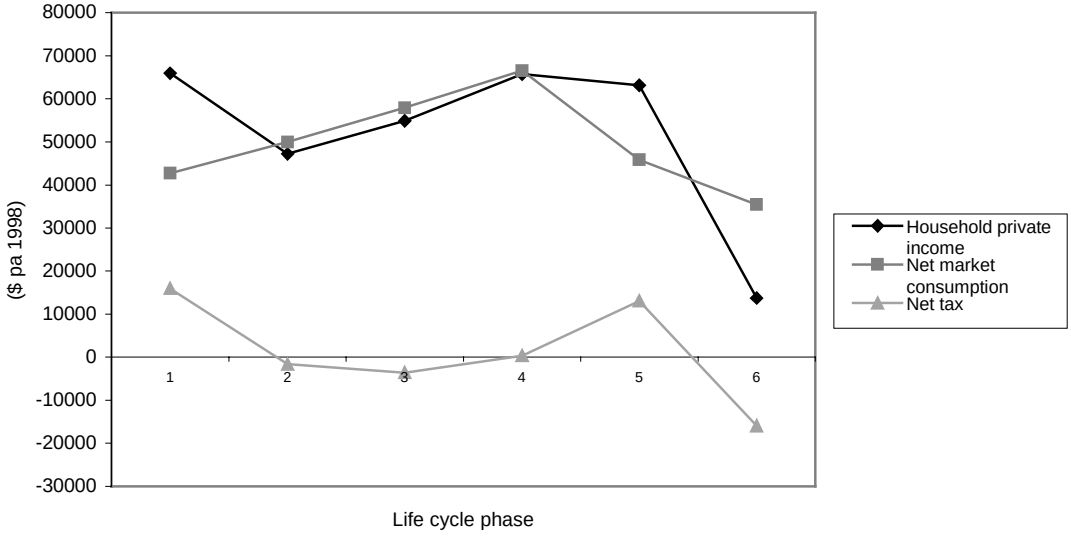

TABLE 7 Taxes and benefits by household type ($pa,1998)

HH type	Life cycle phase	H'hold priv. income 1	Female earnings 2	Direct taxes 3	Direct benefits 4	Indirect taxes 5	Indirect benefits 6	Overall net tax 7
1&2	1	68978	28279	16795	275	4894	3908	17505
	2	45372	489	11516	4340	4702	12800	-922
1	3	53502	5123	12956	4060	5111	17059	-3054
	4	64949	9710	15512	2229	5906	17425	1765
	5	59242	5814	13621	1120	5426	5361	12566
	2	66185	22300	14740	1478	5346	11412	7188
2	3	67893	25953	16010	1802	5824	16866	3166
	4	86277	30418	20969	1209	6742	16440	10061
	5	76568	27740	17852	487	6077	4932	18513

Figure 6: Net tax by household type ($pa, 1998)

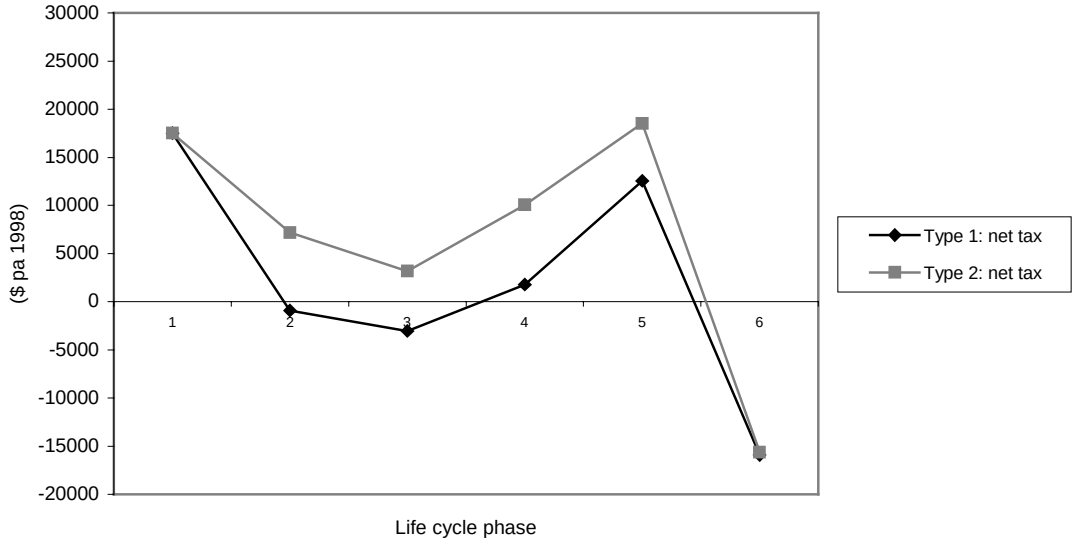

TABLE 8 Household private income ranking by household type ($pa, 1998)

Quartile	1	2	3	4
HPI	29785	48776	66549	111316
Type 1				
Tax	3125	12655	20737	42646
Primary income	28253	43698	58093	101635
Male hrs	2246	2444	2429	2791
Fem hrs	95	231	370	324
# kids	2.04	1.90	1.91	1.99
% of type 1	**88.44**	**56.49**	**25.74**	**25.52**
Type 2				
Tax	5801	12589	18334	39171
Primary income	23904	33742	42658	74556
Male hours	2490	2323	2373	2540
Female hours	1274	1486	1681	1944
# kids	1.91	1.89	1.88	1.75
% of type 2	**15.56**	**43.51**	**74.26**	**74.48**

TABLE 9 Primary private income ranking by household type ($pa, 1998)

Quartile	1	2	3	4
Prim inc	25183	37783	49027	86266
Type 1				
Tax	1863	9130	15353	34473
ATR	**6.77**	**21.06**	**28.69**	**36.80**
Hpi	27535	42203	53512	93685
Male hours	2229	2358	2439	2664
Female hours	189	199	236	230
# kids	2.02	1.98	1.88	1.98
% of type 1	**58.50**	**50.18**	**38.53**	**51.20**
Type 2				
Tax	9720	16260	22154	43522
Hpi	44729	60097	75189	118410
ATR on add hpi	**45.70**	**39.85**	**31.37**	**36.60**
Male hrs	2365	2346	2376	2632
Fem hrs	1580	1678	1689	1815
#kids	1.95	1.81	1.84	1.74
% of type 2	**41.50**	**49.82**	**61.47**	**48.80**