Child-Related Transfers, Means Testing and Welfare*

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Abstract

This paper examines efficiency–equity trade-offs in child-related transfer programs with means-testing. We develop a dynamic general equilibrium life-cycle model featuring single and married households, uninsurable income and longevity risks, and endogenous female labor supply and human capital accumulation. Calibrated to Australia, where child benefits are generous but strictly means-tested, our analysis shows that replacing the current system with a universal scheme increases maternal labor supply, output, and ex-ante welfare, and receives majority support. However, this reform lowers single mothers' net lifetime income and welfare. Alternative reforms that reduce the generosity of the universal benefit or adjust means-testing rules lower fiscal costs and yield more equitable outcomes. In particular, the latter generates modest but broadly shared welfare gains for both parents and non-parents. These findings highlight the importance of balancing efficiency and equity in family policy design.

JEL: E62, H24, H31

Keywords: Child Benefits; Means Testing; Female Labor Supply; Macroeconomic Aggregates; Distributional Impacts; Welfare

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1 Introduction

Advanced economies provide financial support to parents to alleviate the economic burden of raising children. These transfers can take various forms—including lump-sum cash payments, child tax credits, and childcare subsidies—and are collectively referred to as child-related transfers or child benefits. However, the generosity and distribution of such transfers have long been a subject of debate in macroeconomics and public finance, especially concerning how to achieve a balance between efficiency and equity. In practice, child-related transfer policies vary significantly across countries, with some offering universal benefits to all families with children while others using means testing to target support toward lower-income households.

Means testing, while achieving redistributive goals at a lower fiscal cost, can create high effective marginal tax rates as benefits are withdrawn with rising income. As a result, married mothers, who are often secondary earners, may face significant disincentives to work. Guner et al. (2020) examine this trade-off in the U.S., where child-related transfers are relatively small and primarily delivered through tax-based programs such as the Child Tax Credit (CTC) and the Earned Income Tax Credit (EITC). They find that means testing leads to greater welfare gains (or smaller losses) compared to universal schemes. More recently, Hannusch (2022) show differences in child benefit design shape maternal labor supply in the US and European countries. However, Hannusch (2022) does not assess welfare implications, leaving the normative evaluation of alternative child-related transfer policies outside the U.S. setting largely unexplored. This paper seeks to fill that gap by examining the efficiency–equity trade-offs inherent in Australia's distinctive design of child-related transfer programs.

Unlike the U.S. and most European countries, Australia has relatively generous but highly targeted child-related transfer programs.[1] Specifically, Australia allocates approximately 2–2.5% of its GDP annually to family transfers, a more substantial amount than the U.S. and on par with Northern European countries like Denmark. The two main child-related transfer programs, accounting for approximately 70% of all family transfers, are the Family Tax Benefit (FTB) and the Child Care Subsidy (CCS). The FTB provides direct lump-sum cash payments to eligible families, while the CCS subsidizes formal childcare costs, conditional on the secondary earner's employment. These child benefits are relatively generous but subject to complex and strict means-testing rules based on number and age of children, work requirements and joint family income.

We begin by examining the extent to which the Australian design of a means-tested system targets support to families in need and influences the labor supply of married women over the life cycle. Using Australian household data, we document two stylized facts. First, child-related transfers play an important role in supporting low-income families as they can contribute up to 40% of their income. Second, maternal labor supply exhibits a distinct M-shaped pattern over the life cycle, with sharp reductions in work hours during child-rearing years.

We then formulate a simple partial equilibrium model to illustrate how the interaction between household earnings and the stringency of means testing shapes maternal labor market behavior and household welfare. Building on this, we develop a full dynamic general equilibrium life-cycle model of single and married households to quantify the labor supply and aggregate effects of these programs, along with their welfare and distributional effects.

Our quantitative model features endogenous female labor supply and human capital accumulation, allowing for dynamic feedback from career breaks on mothers' future wages. Households vary exogenously by age, marital status, number and age of children, education, and they are exposed to uninsurable income and longevity risks. These features allow the model to capture the self-insurance function of precautionary savings and female

[1] The U.S. relies mainly on tax-based programs—such as the Child Tax Credit (CTC) and the Earned Income Tax Credit (EITC)— to deliver child-related transfers with relatively lower levels of benefits, compared to Australia and European countries. These tax credits are means-tested but often non-refundable, meaning that low-income families with limited tax liabilities may receive little or no support. In contrast, Australia has a long history of operating a comprehensive means-tested child benefit system since the introduction of the New Tax System (Family Assistance) Act in 1999. Similar to Denmark, Australia has an individual-based income tax system and provides generous lump-sum cash payments to families with children. However, a substantial portion of child-related transfers in Denmark is universal, while Australia applies a detailed set of means-testing rules based on demographic characteristics and joint family income.

labor supply, which complement social insurance provided by progressive taxation and means-tested transfers. We discipline the benchmark model using 2012-2018 Australian macroeconomic aggregates and household microdata and conduct policy experiments. We then evaluate a range of counterfactual policy reforms, including structural reforms to implement a universal benefit system or incremental adjustments to the existing means-testing rules. Each counterfactual policy is implemented in a budget-neutral manner, with corresponding adjustments to the progressive income tax schedule to maintain fiscal balance. This budget balancing rule allows us to fully account for the combined effects of benefit payment and tax financing instrument on maternal labor supply and welfare.

Our counterfactual analysis yields the following main findings. First, a baseline universal system, which maintains the current statutory benefit levels, significantly boosts maternal labor supply and welfare for newborn households. By eliminating means testing, the reform removes effective marginal tax rate (EMTR) spikes faced by married mothers, which unleashes their labor supply and human capital potential. Couples, especially those with low education, are the principal beneficiaries. This outcome aligns with Hannusch (2022), who documents how child-related transfer design significantly influences maternal labor supply across advanced economies. However, our welfare results contrast with those of Guner et al. (2020), who—based on the U.S. setting—find that the means testing outperforms universality in welfare terms. One explanation of this divergence lies in the institutional differences in the benchmark model. Compared with the U.S., Australia's child-related transfers combine greater generosity with stricter targeting, which offers stronger income support to mothers but also intensifying equity–efficiency trade-offs. As a result, eliminating distortions from means testing generates efficiency gains that more than offset the associated fiscal costs. This finding highlights that means-tested designs do not yield welfare dominance across alternative policy environments.

Second, universal child-related transfers deliver opposing welfare outcomes. Married households benefit, whereas single mothers suffer welfare losses. The reason is that once children age out of eligibility, single mothers, who lack spousal income (family insurance), must rely solely on their own labor earnings and savings and other sources of government transfers. The higher fiscal costs under the baseline universal system raises the average tax rate by approximately 4 percentage points. Holding other fiscal policies fixed, the combined effects of human capital losses and higher taxes reduce the lifetime disposable income of single mothers by more than the value of the child-related transfers they receive during childbearing years. This result implies that a universal system—such as the Danish design analyzed in Hannusch (2022)—can improve maternal labor supply, but may have unintended distributional consequences when accounting for the adverse effects of tax financing in a dynamic general equilibrium framework.[2]

Third, we explore a broader set of reform options to assess how equity–efficiency trade-offs unfold in our framework. In particular, we identify more equitable universal system designs, including a less generous scheme that halves benefit payments. Under this universal system, the tax burden remains comparable to the current means-tested system, altering the structure of transfers without increasing fiscal costs. The policy reform yields aggregate welfare gains while shielding single mothers from losses, although childless households and low-education married parents still experience small welfare declines. In contrast, an incremental reform within the existing means-tested framework—specifically, reducing the phase-out rates of childcare subsidies—delivers inclusive welfare improvements. By easing the intensity of means testing without changing subsidy rates, this design encourages married mothers across education levels to work more. While the gains are more modest than those under universal systems, the resulting expansion of the tax base, combined with the reform's low financing needs, reduces the average tax rate and improves welfare for both parents and childless households.

Fourth, we show that child-related transfers are socially desirable in our utilitarian framework, even without accounting for potential long-run productivity or demographic dividends. Specifically, while eliminating these transfers leads to the largest macroeconomic gains among all policies considered—maternal labor supply rises

[2] In this study, '*Equity*' is concerned with the ex-ante distribution of welfare gains across demographic groups, prior to the realization of earnings shocks. A reform is considered equitable if, in expectation, no group experiences a welfare loss after demographic type is realized.

by double digits and output increases by nearly 4%—yet welfare for newborn households falls by 0.66%. In this case, higher output does not translate into higher welfare. Losses are also concentrated among vulnerable groups, particularly single mothers, who depend on public transfers to smooth consumption during periods of low earning capacity and high childcare costs. This underscores a central trade-off: abolishing the child-related transfer system removes behavioral distortions and boosts efficiency, but also eliminates its social insurance and redistributive functions, resulting in a highly uneven distribution of welfare outcomes.

Finally, we evaluate the political feasibility of these reforms through lens of a majority voting rule by comparing welfare gains and losses across demographic groups. Universal systems receive strong majority support from married households, despite imposing regressive effects on single mothers—the most disadvantaged group. In contrast, easing childcare subsidy phase-outs is unanimously preferred over the current system, but is politically dominated by universalization when the two options are presented head-to-head. This reflects a broader tension between majority rule and the objective of inclusive welfare design.

In summary, the current means-tested system is redistributive but inefficient. Switching to a universal system improves maternal employment and ex-ante welfare but undermines fiscal sustainability and equity. Incremental reforms strike a better balance, yet lack majority backing. Universal systems can also become politically entrenched, locking in inequitable systems even when more balanced alternatives are available. These findings highlight the complex trade-offs between efficiency and equity in the design of child-related transfer policies. Furthermore, drawing on international evidence, our results also suggest that policy lessons from countries such as the U.S. and Denmark may not be readily applicable across institutional contexts. Ultimately, the success of reform depends not only on policy design, but also on the baseline institutions and the sequencing and framing of the reform—factors that together shape its feasibility, durability, and long-run welfare effects.

Related literature. This paper contributes to the rich literature at the intersection of public finance, labor economics, and macroeconomics. Leveraging Australia's distinctive policy setting, our analysis offers a valuable comparative perspective and serves as a counterpoint to U.S. and EU studies on the design of child-related transfers and their effects on maternal labor supply and household welfare.

We build on a large body of macroeconomic research on fiscal policy, female labor supply, and household welfare. A number of studies explore how tax systems influence women's labor force participation and work hours. For example, Guner et al. (2012a,b) highlight the work disincentive effects of joint taxation on married couples in the U.S. Bick and Fuchs-Schündeln (2018) show that differences in tax policy are a major factor explaining cross-country variation in married men's and women's labor supply. More recent developments extend this work to the design of social insurance and family transfer programs, including social security (e.g., Kaygusuz 2015, Nishiyama 2019, and Borella et al. 2020) and child-related transfers (e.g., Guner et al. (2020) and Hannusch 2022).

Our paper contributes new insights to this latter strand of the literature. Guner et al. (2020) develop a dynamic general equilibrium life-cycle model to evaluate U.S. child-related transfer policies, finding that targeted (means-tested) transfers outperform universal programs in terms of welfare. Hannusch (2022) underscores the role of institutional differences in child-related policy design in explaining cross-country variation in maternal employment. Using a U.S.-based model, the study simulates the adoption of Denmark's universal child benefit system and finds substantial gains in maternal labor supply. Our work complements Hannusch (2022) by incorporating the financing dimension of reform and assessing welfare outcomes, and extends Guner et al. (2020) by providing new evidence from Australia's policy design. Methodologically, we expand the framework in both studies by incorporating uninsurable risks, which elevate the role of private insurance (via savings and labor supply) and social insurance (via progressive taxes and transfers) in shaping household welfare. In addition, we model the statutory structure of child-related transfers, which allows us to evaluate incremental reforms to the existing means-testing rules.

Our focus on means testing also connects this paper to the vast literature on means-tested social insurance (e.g., Feldstein 1987, Hubbard et al. 1995, Neumark and Powers 2000, Tran and Woodland 2014, Braun et al. 2017, and Iskhakov and Keane 2021), which emphasizes the fundamental trade-off between providing insurance and preserving work incentives. These studies generally find that while means testing distorts labor supply and savings decisions, carefully designed systems can enhance welfare by balancing insurance and incentive effects. Consistent with this view, our paper demonstrates that a well-calibrated means-tested child-related transfer system can promote both macroeconomic performance and distributional goals. By contrast, universal systems may raise overall welfare but can lead to unintended distributional consequences that undermine the original policy goal of assisting families in need.

Our work also relates to a longstanding empirical literature showing that female labor supply is highly responsive to tax and transfer policies. Seminal studies such as Eissa and Liebman (1996) find that expansions of the U.S. Earned Income Tax Credit (EITC) significantly increased labor force participation among single mothers, while Eissa and Hoynes (2004) highlight that the EITC's joint income phase-out reduces married women's employment. More broadly, research by Blau and Robins (1988), Averett et al. (1997), Lundberg et al. (1997), Blundell et al. (1998), and Geyer et al. (2015) demonstrates that transfers, wages, and taxation significantly shape women's labor supply and human capital accumulation. Australia-specific evidence from Doiron and Kalb (2005), Breunig et al. (2011), Breunig et al. (2012), Gong and Breunig (2017), and Hérault and Kalb (2022) reaches similar conclusions. We contribute to this literature by developing a structural, micro-founded macroeconomic model that replicates observed behavioral patterns and quantifies the long-run aggregate and distributional impacts of child-related transfer reforms in Australia. In doing so, our work also adds to the growing literature on the macroeconomic effects of fiscal policy in Australia (e.g., Tran and Woodland 2014, Kudrna et al. 2022, Tran and Zakariyya 2022, and Tin and Tran 2023), offering new insights by focusing on the design and reform of child benefit programs.

The political economy of redistribution provides further context for our analysis. Meltzer and Richard (1981) present the canonical model in which redistributive policies reflect the preferences of the median voter. Guner et al. (2020) echo this insight, illustrating that child-related transfers may be rejected under majority voting if the median voter is a net contributor. Korpi and Palme (1998) argue that targeted programs tend to receive weaker political support than universal ones, particularly in countries with encompassing welfare institutions. Our analysis quantitatively demonstrates this mechanism, showing how generous universal schemes can garner majority support even when more equitable and fiscally efficient targeted alternatives are available. Moreover, our results suggest a risk of political lock-in, whereby inequitable universal regimes, once adopted, become resistant to reform.

The paper hereinafter proceeds as follows. Section 2 motivates the quantitative analysis by presenting the Australian institutional background, stylized facts and a simple theoretical model. Section 3 provides the full dynamic general equilibrium model. Section 4 describes the internal and external calibration procedures, and reports the benchmark model's performance. Section 5 presents main results and discussion. Section 6 concludes. The Appendix provides detailed information on the Australian child-related transfer programs, the model solution algorithm, and supplementary results and statistics.

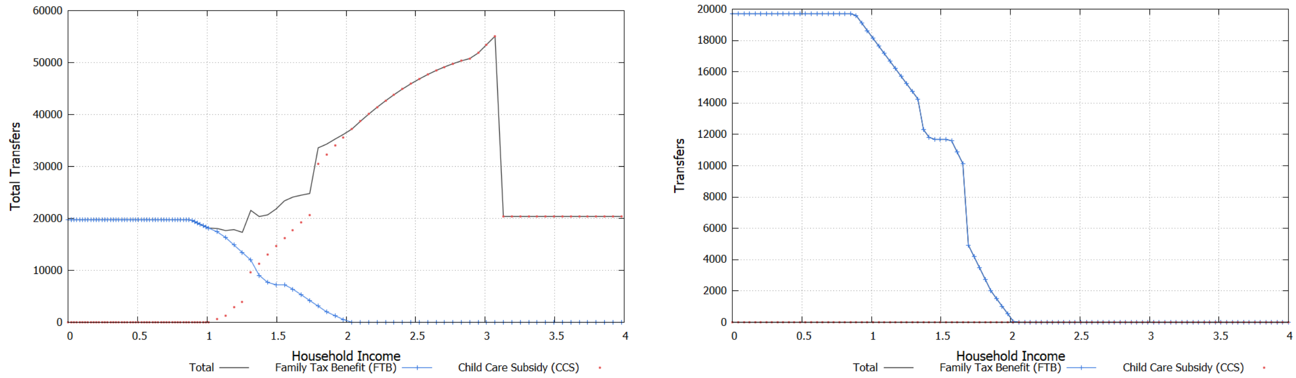
2 Motivation

This section presents institutional context, key empirical patterns, and theoretical insights that motivate the development of our dynamic general equilibrium model.

2.1 The child-related transfer system in Australia

Unlike simpler models that base benefits primarily on household income, Australia's child-related transfer system combines joint income testing with separate income testing for primary and secondary earners. This dual-testing framework reflects the policy goal of targeting support to single parents and single-earner couples.

As a result, households with identical demographic traits and total income may receive different transfer amounts depending on the distribution of earnings within the household. For comparison with the U.S. and Danish systems, as documented in Hannusch (2022), we report benefit schedules for one- and two-earner married households with two children (aged 2 and 4).[3]



((a)) Two-earner

((b)) One-earner

Figure 1: **Child-related transfers for married households with two young children**

Notes:
(*) Panels (a) and (b) display total child-related transfers in 2018 AUD for two-earner and one-earner married households, respectively, each with two children aged 2 and 4. For two-earner households, the primary earner is assumed to earn the mean income of approximately AUD 60,000. For one-earner households, childcare is provided at home by the non-working parent, so these households incur no childcare expenses and are therefore ineligible for the subsidy (CCS). The benefit schedules are derived from the statutory rules detailed in Appendix Section A.1. Childcare subsidies (CCS) are calculated assuming a fixed hourly wage of AUD 28—corresponding to the average wage of 25-year-old married men—and account for the increase in work hours as earnings rise. Appendix Subsection A.4 reports the corresponding benefit schedule in 2004 USD, compared to Hannusch (2022).
(**) For Panel (a), the denser marker spacing along the benefit schedule reflects benefit levels based on changes in primary earner income (with secondary earner income held at zero). The sparser region corresponds to increases in secondary earner income, holding the primary earner's income fixed.

There are three distinctive features of the Australian system. First, the heavy means testing of Australia's child-related transfer system allows for relatively generous support to targeted families. Lump-sum transfers under the FTB alone amount to approximately AUD 20,000 (USD 11,000 in 2004) for both one- and two-earner married households. For two-earner households, the Child Care Subsidy (CCS) can add up to another AUD 35,000 (USD 20,000 in 2004), , assuming their joint income is below the maximum threshold and the secondary earner's hours are less than those of the primary earner. These levels compare favorably with Denmark, where total benefits amount to around USD 10,000—half of which comes from its universal family benefit. This contrast suggests that while Denmark's universal design delivers broad-based support to the average household, Australia's system directs larger benefits to low-income families with dependent children. In the U.S., maximum child-related transfers for low-income two-earner households can reach USD 15,000, mainly through work-contingent programs such as the Earned Income Tax Credit (EITC) and Child Tax Credit (CTC), which phase in with earnings. Like the CCS, these U.S. programs incentivize work, but they are less generous overall.

Second, the coverage of Australian transfers is considerably more extensive. Although not universal, the FTB phases out only at around twice the mean income, whereas most U.S. in-work benefits are cut off by the median. Additionally, the CCS kicks in almost as soon as the secondary earner begins employment and, due to the activity test, increases with hours worked despite being means-tested. Benefits then rise at a diminishing rate with income, before declining sharply around three times the mean income, yet remaining

[3] We also provide equivalent figures in 2004 USD in Appendix Subsection A.4. In the Appendix, we also document schedules for single-parent households and two-earner married households with alternative primary-earner incomes, demonstrating how marital status and primary income shape benefit profiles in Australia. As illustrated in Figure 1 and Appendix Figure A.3, the qualitative shape of the benefit schedule remains similar across cases, but benefit tapering begins earlier when the secondary earner's income is higher.

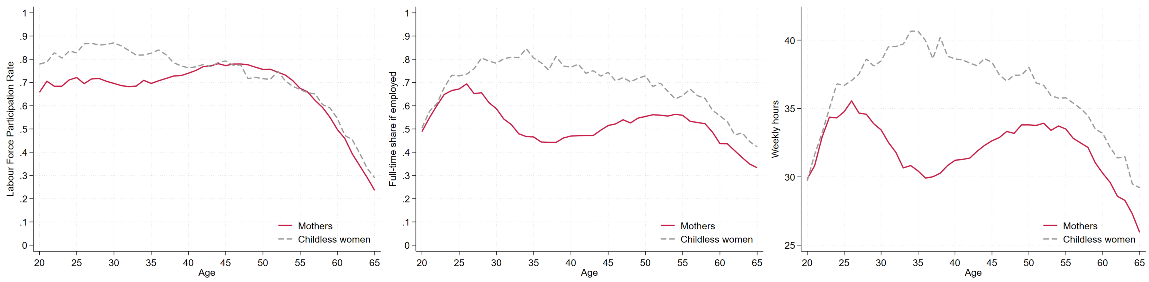
non-negligible.[4] By contrast, U.S. benefits are completely phased out by that point, and Danish subsidies are also fully withdrawn by 1.5 times the mean income, leaving only universal transfers.

Third, Australia's system applies strict and pervasive means testing. Multiple layers of income testing across the FTB and CCS create overlapping phase-out regions, generating complex and nonlinear benefit withdrawal profiles. This structure extends phase-out zones deep into high-income brackets, imposing high and persistent effective marginal tax rates, particularly for secondary earners.

2.2 Stylized empirical facts

Using data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, Restricted Release 20 (2001–2020), we document two stylized facts: (i) the distinct life-cycle pattern of maternal labor supply in Australia, and (ii) the significant effect of means-tested child-related transfers on household income and out-of-pocket childcare costs, particularly among low-income families. All monetary figures are expressed in 2018 AUD unless otherwise specified.

Maternal labor supply over the life cycle The presence of children is associated with a marked divergence in women's labor supply over the life cycle. Mothers consistently exhibit lower labor force participation and work hours than childless women, with the largest gaps occurring during the prime child-rearing years. As shown in Panel (a) of Figure 2, maternal participation rates lag behind those of childless women by 10 to 15 percentage points (pp) throughout their 20s and 30s. The gap is widest in the early 30s and narrows as women enter their 40s, at which point participation profiles begin to converge. In contrast, Appendix Figure B.1 shows that fathers maintain consistently higher labor force participation than childless men across the life cycle.[5]



((a)) Labor force participation ((b)) Full-time rate ((c)) Work hours

Figure 2: **Life-cycle patterns in labour force participation, full-time employment, and hours worked: Mothers vs. Childless women.**

Notes: The age profiles are constructed by stitching together 20-year life-cycle snapshots from selected birth cohorts. The youngest cohort covers ages 20–39 in the data, while the oldest cohort spans ages 75–94.

More striking are the differences in full-time employment and work hours. Panels (b) and (c) of Figure 2 reveal a pronounced M-shaped pattern in both the share of full-time employment and weekly hours worked profiles among employed mothers. Their full-time share declines sharply from 70% in mid-20s to a trough of 45% by mid-30s, before gradually but incompletely recovering in later years. In contrast, nearly 80% of employed childless women work full-time throughout the life cycle. Since maternal labor force participation remains relatively stable over the same period, this pattern mainly reflects a shift from full-time to part-time work rather than an exit from the workforce. This transition is mirrored in the average weekly hours profile. Mothers work fewer than 35 hours per week for much of their working lives, compared with 35–40 hours for childless women. The hours gap peaks around age 35, with mothers working approximately 10 fewer hours per

[4] The CCS phases out fully at approximately six times the mean income (see Appendix Section A.1).

[5] Disincentives to work embedded in the Australian tax and transfer system have been mentioned in government policy review papers (e.g., Treasury 2023 and Treasury 2024). Maternal labor supply in Australia exhibits distinct patterns compared to the United States, Denmark, and many other OECD countries (see Figures 2 and 11 in Hannusch 2022 for comparison).

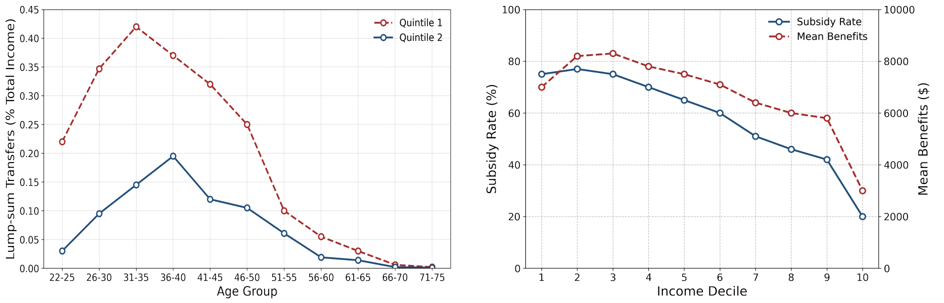
week. These disparities diminish with age, though they never fully close, suggesting lasting impacts for human capital accumulation and earnings.

Child-related transfers Public transfers to families with children have long played a central role in Australia's welfare architecture. Over the past decade, these transfers have accounted for 2–2.5% of GDP annually, a level comparable to that of many European welfare states. Unlike in the U.S., where child-related support is largely administered through the tax system, Australia delivers these benefits primarily via dedicated social assistance programs.

The two flagship programs are the Family Tax Benefit (FTB)—a lump-sum, unconditional transfer not tied to work participation—and the Child Care Subsidy (CCS)—a conditional subsidy that depends on the work hours of the secondary earner. Both are strictly means-tested on joint family income and can be received concurrently. Together, they constitute roughly 70% of total public spending on family transfers (2018-19 budget report) and each serves around one million families, representing over half of all households with children under the age of 16.[6]

Family Tax Benefit (FTB). The FTB consists of two components. FTB part A (FTB-A) is paid per child and is the larger component in both payment size and coverage. Benefits phase out in two steps: first at a lower income threshold for the maximum payment rate, and again at a higher threshold for the base rate. Payment levels also decline with the age of the child and vary by family characteristics such as marital status. Correspondingly, income thresholds differ across household types. FTB part B (FTB-B) provides additional per-family support, particularly for single parents and single-earner couples. Eligibility depends on the income of the primary earner (extensive margin), while the payment amounts are adjusted based on the income of the secondary earner (intensive margin). As with FTB-A, families with younger children receive higher transfers.

Panel (a) of Figure 3 illustrates the share of total household income accounted for by FTB over the life cycle for families in the bottom two income quintiles. Among the lowest quintile, FTB payments comprise 25% to 40% of annual household income during the child-rearing years (late 20s to early 40s). Even in the second quintile, the FTB share reaches up to 20%. These benefits are therefore substantial during key stages of the family life cycle, underscoring their potential impact on both consumption smoothing and labor market incentives.



((a)) Family Tax Benefit ((b)) Child Care Subsidy

Figure 3: **Child-related transfers**

Notes: (*) Panel (a) depicts the age profiles of FTB share of gross household income for the lower two family income quintiles in 2018; (**) Panel (b) uses data from Table 61 in the 2021 report by the AIFS, and shows the effective subsidy rates and mean benefits of the CCS by income decile.

Child Care Subsidy (CCS). The CCS subsidizes the cost of formal childcare for children up to age 13. While it is means-tested on joint family income like the FTB, it also incorporates an activity test, under which

[6]As of June 2018, 1.4 million families received FTB payments, of which 77% received both Parts A and B benefits (AIHW report 2022). In the December quarter of 2018, the CCS covered 974,600 families (Child Care in Australia report 2018). This study excludes the Paid Parental Leave program, which represents a smaller share of family assistance expenditures. Detailed information on all government payments to families in Australia is available from Service Australia. Appendix Section A provides a summary of program rules and eligibility parameters.

the base subsidy rate depends on the secondary earner's work hours. In 2018, households in the lowest income tier could receive a base subsidy of up to 85% of childcare costs if the secondary earner worked at least 48 hours per fortnight. This rate scaled down for shorter work hours. In our model, labor supply is used to determine eligibility under the activity test, though in practice the criteria also include non-work activities such as job training and volunteering.

Figure 3(b) reports the distributional incidence of CCS benefits. Households below the median income receive average subsidy rates of 70-75%, equivalent to roughly AUD $8,000$ in annual support. Notably, the bottom decile receives slightly smaller subsidies than adjacent deciles, reflecting the effect of work-hour eligibility requirements. Nonetheless, the CCS maintains a progressive structure due to means testing, with subsidy rates declining steadily as household income rises.

In summary, child-related transfers are a major source of income for low-income families in Australia, underscoring both their distributional importance and behavioral implications. However, cross-country evidence indicates that Australia's maternal employment gap is not an inherent feature of advanced welfare states. For example, Hannusch (2022) documents near parity in labor supply between mothers and non-mothers in Denmark, attributing this convergence to universal child-related policies that minimize implicit tax burdens on secondary earners. In contrast, Australia's heavy reliance on means testing and large transfers to targeted groups differentiates it from the Danish and U.S. models, and these features may exacerbate labor supply distortions among mothers.

These empirical and institutional contrasts motivate our quantitative analysis. The structural complexity of Australia's system also justifies using full statutory benefit schedules rather than simplified parametric approximations. Our model—building on Guner et al. (2020)—is sufficiently flexible to accommodate these policy rules with only minor simplifications.[7] In subsequent sections, we first present a simple theoretical framework to build intuition, and then develop a structural life-cycle model to quantify how Australia's child-related transfer system influences maternal labor supply, macroeconomic aggregates, and household welfare.

2.3 Intuition from a simple model

This section presents a static model to illustrate an economic mechanism through which means testing, policy interaction, and household income affects female labor supply decisions and welfare.

We consider a partial equilibrium model with a representative household consisting of married couple with dependent children. The household chooses joint consumption c and the wife's labor supply n^f, taking the husband's labor supply n^m as fixed. Labor is awarded at a unit wage rate, and both spouses face a flat income tax rate τ. We model the Family Tax Benefit (FTB) as a means-tested lump-sum transfer based on joint family income $n^m + n^f$. It provides a maximum payout $\bar{tr}$, subject to a joint-income threshold $\bar{y}$ and a phase-out rate ω. The payment schedule is given by: $FTB(n^f) = \max\left\{\min\left\{\bar{tr} - \omega(n^m + n^f - \bar{y}),\ \bar{tr}\right\},\ 0\right\}$. Childcare costs are incurred only when the wife works and are partially subsidized by the Child Care Subsidy (CCS). For simplicity, we abstract from the CCS means test and assume a linear subsidy on the wife's labor earnings: $CCS(n^f) = sn^f$, where $s \in [0,1]$ is the subsidy rate.

Let $u(c, 1-n^f)$ denote a well-behaved utility function over consumption and female leisure, satisfying standard regularity properties: $u' > 0$, $u'' < 0$, $\lim_{x\to 0} u'(x) = \infty$, $\lim_{x\to\infty} u'(x) = 0$, for $x \in \{c, 1-n^f\}$. The household's problem is: $\max_{c,n^f} u(c, 1-n^f)$ subject to $c = (1-\tau)(n^m + n^f) + CCS(n^f) + FTB(n^f)$.

Means testing introduces piecewise non-linearities in the budget constraint, affecting the marginal incentives to work. As illustrated in Figure 4, there are three regions: **(1) Full-Benefit Region**—When family income is less than or equal the threshold ($n^m + n^f \le \bar{y}$), the household receives the full benefit $\left(FTB(n^f) = \bar{tr}\right)$. The effective marginal tax rate on female labor earnings is the tax rate net of the childcare subsidy: $EMTR_1 = \tau - s$; **(2) Phase-Out Region**—When family income is greater than the threshold ($n^m + n^f > \bar{y}$) and lies in the phase-out region, they receive a partial benefit $\left(0 < FTB(n^f) < \bar{tr}\right)$. The household loses ω dollars of transfer

[7] For example, certain benefits depend on school attendance; we assume in this paper that all children attend school.

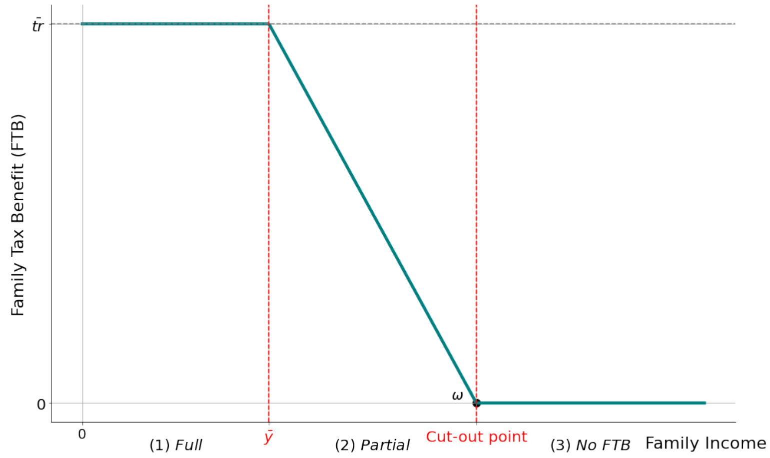


Figure 4: **Example means-tested Family Tax Benefit (FTB) schedule.**
Notes: The slope of the benefit schedule, ω, in the phase-out zone (2), between $\bar{y}$ and the cut-out point, is the taper or phase-out rate.

for every additional dollar earned. This raises the effective marginal tax rate to $EMTR_2 = \tau - s + \omega$; **(3) No-Benefit Region**—When family income equals or exceeds the cut-out point $\left(n^m + n^f \geq \frac{\bar{tr}}{\omega} + \bar{y}\right)$, the household becomes ineligible for the transfer $\left(FTB(n^f) = 0\right)$. The effective marginal tax rate reverts to $EMTR_3 = EMTR_1 = \tau - s$.

There are several notable transmission channels. First, the three regions show how means testing leads to high implicit tax rates that vary non-linearly with family income. For women whose combined household income is near the threshold $\bar{y}$, a marginal increase in labor supply can significantly reduce net transfer receipts, resulting in strong disincentives to work. Second, the interplay between policies plays an important role in shaping work incentives. In particular, overlapping benefit rules can interact in an unintended way. For instance, outside the FTB phase-out region, the female's EMTR is $\tau - s$, reflecting income tax and the childcare subsidy offset. On the contrary, within the phase-out region, the EMTR rises to $\tau - s + \omega$, highlighting how the withdrawal of transfers can partially or fully counteract the intended work incentives of the childcare subsidy, undermining the central objective of the subsidy program.

Third, a married woman's labor supply is influenced not only by statutory policy parameters ($\bar{tr}$, $\bar{y}$, and ω) but also by her partner's income n^m. As long as the household remains eligible for the FTB benefits, the following condition holds: $\bar{tr} - \omega\left(n^m + n^f - \bar{y}\right) > 0$. This can be re-written as $n^f < \frac{\bar{tr}}{\omega} + \bar{y} - n^m$, which defines the effective eligibility range for the wife's labor income. The term $\frac{\bar{tr}}{\omega} + \bar{y}$ represents the statutory cut-out point, but actual eligibility also hinges on n^m. If n^m is sufficiently high, the household is either pushed into the phase-out region—diminishing the wife's incentive to work—or entirely out of eligibility—rendering the FTB irrelevant to her decision. Conversely, if $\bar{y}$ is sufficiently large and n^m is low or absent—as in the case of single mothers—household income may remain below the threshold $\bar{y}$, regardless of her earnings. In this scenario, marginal distortions are absent, though the positive income effect of the transfer may still reduce her labor supply.

To better understand the labor supply and welfare implications, assume the Cobb–Douglas utility function: $u(c, 1 - n^f) = c^\nu (1 - n^f)^{1-\nu}$, where $\nu \in (0, 1)$ denotes the taste for consumption. We obtain a closed-form solution for a household in the phase-out region as follows:

$$n^f = \nu - \underbrace{\frac{1-\nu}{1-EMTR}}_{(a)\text{ wage distortion}} \left[\underbrace{(1-\tau)n^m + FTB(0)}_{(b)\text{ direct IE}} \right], \tag{1}$$

$$\begin{aligned} ln(u) &= \nu ln(\nu) + (1-\nu)ln(1-\nu) - \overbrace{(1-\nu)ln(1-EMTR)}^{(c)\text{SE on leisure}} \\ &+ ln \left[\underbrace{(1-EMTR)}_{\text{(d) IE via wage}} + \underbrace{(1-\tau)n^m + FTB(0)}_{(e)\text{ direct IE}} \right], \end{aligned} \tag{2}$$

where $EMTR = \tau - s + \omega$ captures the effective marginal tax rate faced by the wife, and the term $FTB(0) = \bar{tr} - \omega(n^m - \bar{y})$ denotes the maximum benefit received when the wife does not work.

According to Equations 1 and 2, child-related transfers exert opposing effects on female labor supply and welfare. First, the direct income effect (IE) associated with $FTB(0)$ reduces female labor supply n^f, as seen in term (b), but increases welfare, as shown by term (e). Second, the effects operating through wage distortions are more nuanced. Term (a) in Equation (1) shows that a high phase-out rate ω, which increases the $EMTR$, adversely impacts labor supply and earnings. However, its welfare effect, as shown by terms (c) and (d) in Equation (2), is ambiguous. On one hand, an increase in ω lowers wage rate and causes the household to substitute away from consumption towards leisure. As a result, for $0 < EMTR < 1$, term (c) shows that a high $EMTR$ contributes positively to welfare, with its effect weighted by the household's taste for leisure $(1-\nu)$. On the other hand, a high $EMTR$, by reducing income, diminishes consumption and leisure. This welfare deteriorating effect is represented by term (d). Finally, The tax financing instrument τ is part of the $EMTR$ and enters directly into the household budget constraint as a negative income effect. A higher tax rate can offset the intended positive welfare effects of child benefits by increasing wage distortions and reducing net earnings.

Overall, the welfare effect is theoretically ambiguous, highlighting the need for quantitative analysis. Moreover, the simple model above abstracts from dynamic life-cycle effects as well as from heterogeneity in childcare costs, child benefits, and tax burdens across demographic groups. In the next section, we develop a dynamic general equilibrium model to address these issues and conduct a quantitative assessment.

3 A dynamic general equilibrium model

Our quantitative model is a dynamic general equilibrium model of a small open economy, featuring a continuum of overlapping generations of heterogeneous life-cycle households, a representative firm with constant returns to scale (CRS) technology, and a government committed to balancing its budget each period via income taxation.

In the spirit of Guner et al. (2020), the model incorporates rich household heterogeneity across wealth, education, marital status, age and number of children, child-related costs, and female human capital. Households make joint decisions over consumption, savings, and labor supply. Male labor supply is inelastic, while female labor supply is endogenous along both the participation margin and the discrete hours margin (part-time vs. full-time), and contributes to future earnings through human capital accumulation.

We also extend the framework of Guner et al. (2020) by incorporating uninsurable longevity risk and idiosyncratic earnings shocks. These features allow the model to capture the self-insurance function of precautionary savings and female labor supply, which complement social insurance provided by progressive taxation and means-tested transfers.

3.1 Demographics

Time is discrete, and each model period corresponds to one calendar year. Every period t, a new cohort of households aged $j = 1$ (equivalent to age 21 in real terms) enters the economy as workers. All individuals retire at age $J_R = 45$. The initial total population of households at time $t = 0$ is normalized to one and grows at a constant rate n. The mortality rate is time-invariant and depends on age and gender. An individual of gender $i \in \{m, f\}$ born at time t survives to age $j + 1$ with conditional survival probability $\psi_{j+1,i}$. The maximum attainable age is $J = 80$, after which $\psi_{J+1,i} = 0$.

Family structure. At entry, each household is exogenously assigned one of three family types: married couple with children ($\lambda = 0$), single childless man ($\lambda = 1$), or single mother ($\lambda = 2$). Married households comprise a husband and wife of identical age j and education θ. The model assumes no endogenous transitions between marital states. That is, households do not make marriage, divorce, or remarriage decision. Instead, transitions across family types are purely mortality-driven. A married household becomes a single household only upon the death of a spouse, and single households remain single until death. The mortality-contingent transition probability between family types ($\pi_{\lambda_{j+1}|\lambda_j}$) is given by:

$\pi_{\lambda_{j+1}\vert\lambda_j}$	$\lambda_{j+1} = 0$	$\lambda_{j+1} = 1$	$\lambda_{j+1} = 2$
$\lambda_j = 0$	$\psi_{j+1,m}\psi_{j+1,f}$	$\psi_{j+1,m}(1 - \psi_{j+1,f})$	$(1 - \psi_{j+1,m})\psi_{j+1,f}$
$\lambda_j = 1$	0	$\psi_{j+1,m}$	0
$\lambda_j = 2$	0	0	$\psi_{j+1,f}$

Table 1: **Transition probabilities of family structure**

Children. For parent households ($\lambda = \{0, 2\}$), we abstract from fertility decisions. Instead, all women follow an exogenous fertility schedule. Each household has two children ($\bar{nc} = 2$), with identical spacing between births. However, the timing of childbearing ($b_{k,\theta}$) differs across education types: women with low education (θ_L) have children earlier than those with high education (θ_H). For a mother of education type θ, the k-th child is born at age $j = b_{k,\theta}$, and remains dependent for 18 years until age $j = b_{k,\theta} + 17$. After reaching adulthood, children leave home permanently, ending the parent-child link. The number of children for a household of age j and education θ is therefore deterministic and given by: $nc_{j,\theta} = \sum_{k=1}^{\bar{nc}} \mathbf{I}\{b_{k,\theta} \leq j \leq b_{k,\theta} + 17\}$, where $\mathbf{I}\{x\}$ is an indicator function with a logical argument x.

Childcare costs (pecuniary and non-pecuniary) and quality for a child aged j_c are exogenous, deterministic, and uniform across households. Informal care options (e.g., grandparenting or neighbor help) are not available.

This setup implies that households know in advance the number and timing of children based on information about their own age j and education level θ. Thus, children are treated purely as anticipated costs. They do not contribute to the household's utility.[8] Instead, their impact is captured through consumption needs and time constraints on parents. Children do not alter the demographic structure, nor do they generate a demographic dividend. That is, they do not grow into workers within the model horizon, and investment in their upbringing does not contribute to future productivity.

3.2 Preferences

Household preferences are represented by a time-separable expected utility function:

$$\sum_{j=1}^{J} \beta^{j-1} \left(\prod_{s=1}^{j-1} \pi_{\lambda_{s+1}|\lambda_s} \right) u(c_j, l_j^m, l_j^f, \theta, \lambda_j) \tag{3}$$

where β is the time discount factor, c_j is joint consumption, l_j^m and l_j^f denote leisure time for men and women, respectively. The survival-adjusted continuation probability $\prod_{s=1}^{j-1} \pi_{\lambda_{s+1}|\lambda_s}$ captures both longevity risk and transitions in family type due to mortality.

[8] Since fertility is exogenous, including children directly in the utility function is not necessary.

Suppressing the age subscript j to ease notation, the periodic household utility function for each family type λ can be written as follows:

$$u(c,l^m,l^f,\theta,\lambda)=\begin{cases}\dfrac{\left[\left(\frac{c}{\iota_{0,\theta}}\right)^{\nu}(l^m)^{1-\nu}\right]^{1-\frac{1}{\gamma}}+\left[\left(\frac{c}{\iota_{0,\theta}}\right)^{\nu}(l^f)^{1-\nu}\right]^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}} & \text{if } \lambda=0 \text{ (married)}\\ \dfrac{\left[(c)^{\nu}(l^m)^{1-\nu}\right]^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}} & \text{if } \lambda=1 \text{ (single male)}\\ \dfrac{\left[\left(\frac{c}{\iota_{2,\theta}}\right)^{\nu}(l^f)^{1-\nu}\right]^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}} & \text{if } \lambda=2 \text{ (single female)}\end{cases} \tag{4}$$

Here, $\nu\in(0,1)$ is the taste for consumption relative to leisure, $\gamma>0$ is the elasticity of intertemporal substitution (EIS), and $\iota_{\lambda,\theta}=\sqrt{\mathbf{1}_{\{\lambda\neq1\}}+\mathbf{1}_{\{\lambda\neq2\}}+nc_{\theta}}$ is a consumption equivalence scale that adjusts for household size and composition. While we abstract from modeling children in household utility, as in quantity–quality fertility frameworks, child welfare is partially captured through the equivalence scale $\iota_{\lambda,\theta}$, which adjusts per capita consumption and reflects parental concern for intra-household resource allocation.[9]

Consumption equivalence scale. Children increase household size, thereby reducing per capita consumption. We capture this effect using a square-root consumption equivalence scale, defined as $\iota_{\lambda,\theta}=\sqrt{\mathbf{I}\{\lambda\neq1\}+\mathbf{I}\{\lambda\neq2\}+nc_{\theta}}$. The inner expression $\mathbf{I}\{\lambda\neq1\}+\mathbf{I}\{\lambda\neq2\}+nc_{\theta}$ calculates the household size, counting two adults for married households and one for singles, plus children. This helps account for household composition and economies of scale: while larger households require more resources, the increase is not linear due to shared consumption (e.g., housing, utilities, durables). For instance, a family of four (two parents and two children) faces greater consumption needs than a childless couple, but not twice as much.[10]

3.3 Endowments

Married and single men. Male labor supply is exogenous and inelastic throughout the working life. All men work full-time until retirement, earning labor income $y^m_{j,\lambda}=wn^m_{j,\lambda}e^m_{j,\lambda}$, where w denotes the market wage and $n^m_{j,\lambda}=1-l^m_{j,\lambda}$ is fixed male labor supply (normalized average work hours). $e^m_{j,\lambda}{=}\bar{e}_j\left(\theta,h^m_{j,\lambda}\right)\cdot\epsilon^m_j$ represents earning ability, which is composed of a deterministic component $\bar{e}_j(.)$ and a stochastic shock ϵ^m_j. The deterministic part is a non-linear function of education θ and male human capital $h^m_{j,\lambda}$, and is specified as $\bar{e}_j\,(.)=e^{\theta}h^m_{j,\lambda}$. The idiosyncratic shock ϵ^m_j follows a first-order auto-regressive process:

$$\overbrace{\ln\left(\epsilon^m_j\right)}^{=\eta^m_j}=\rho\cdot\overbrace{\ln\left(\epsilon^m_{j-1}\right)}^{=\eta^m_{j-1}}+\upsilon^m_j \tag{5}$$

with persistence parameter $\rho\in(0,1)$ and white-noise disturbance $\upsilon^m_j\sim N\left(0,\sigma^2_{\upsilon}\right)$.

Married and single mothers. Maternal labor supply is endogenously determined within the household and modeled along discrete margins. At each age j, the household chooses among three maternal employment states: staying at home ($\ell=0$), working part-time ($\ell=1$), or working full-time ($\ell=2$). If a woman participates

[9] Early theoretical frameworks by Becker 1960 and Becker and Tomes 1976 introduced the trade-off between child quantity and quality, laying the foundation for subsequent studies such as De La Croix and Doepke 2003, Daruich and Kozlowski 2020, and Zhou 2021. These works show how family transfers can affect fertility, long-term growth, inequality, and intergenerational mobility, highlighting trade-offs between demographic targets, human capital outcomes, and welfare. We adopt a complementary perspective, focusing instead on the economic consequences of family policy for maternal labor supply and welfare outcomes across different household types.

[10] The consumption equivalence scale can be translated into the income adjustment required to equalize per capita consumption between parent and non-parent households. For instance, under the square-root scale $\iota_{\lambda,\theta}$, a dollar to a childless couple is equivalent to x dollars for a couple with nc_{θ} children if $\dfrac{1}{\sqrt{2}}=\dfrac{x}{\sqrt{2+nc_{\theta}}}$. Solving this yields $x\approx\$1.2$ for couples with one child and $x\approx\$1.4$ for those with two children. While the square-root scale is adopted here primarily for tractability, these resulting equivalence values align closely with empirical estimates for Australia reported in the Department of Social Services (DSS) report, and with findings for New Zealand by Chatterjee and Michelini (1998).

in the labor force, she commits to an exogenous work hours schedule $n^f_{j,\lambda,\ell}$, which depends on age, family type, and employment type.

She also faces several additional costs. If she works, she (i) *pays formal childcare expenses per child, denoted* κ_j; (ii) *forfeits a portion or all of her means-tested transfers, conditional on family income*; and (iii) *incurs a fixed time cost* χ *that varies by employment type.* Specifically, at age j, her labor choice (ℓ) and family type (λ) affect her available leisure time $l^f_{j,\lambda,\ell}$ in the following manner:

$$l^f_{j,\lambda,\ell} = \begin{cases} 1 & \text{if } \ell = 0 \text{ (not working)} \\ 0 < 1 - n^f_{j,\lambda,1} - \chi_p < 1 & \text{if } \ell = 1 \text{ (working part-time)} \\ 0 < 1 - n^f_{j,\lambda,2} - \chi_f < 1 & \text{if } \ell = 2 \text{ (working full-time)} \end{cases} \tag{6}$$

where χ_p and χ_f are fixed time costs associated with part-time and full-time work, respectively.[11] This fixed cost helps capture any unexplained variation in life-cycle labor supply patterns not accounted for by preferences, child penalties, or other model elements.

A working mother also receives several benefits as she: (i) *earns income* $y^f_{j,\lambda} = wn^f_{j,\lambda,\ell}e^f_{j,\lambda}$; (ii) *accumulates human capital* $h^f_{j+1,\lambda}$; and (iii) *may become eligible for a childcare subsidy of* sr_j, conditional on meeting the CCS eligibility criteria outlined in Subsection 3.5.2. Female earning ability is $e^f_{j,h} = \bar{e}_j\left(\theta, h^f_{j,\lambda,\ell}\right) \times \epsilon^f_j$. The deterministic component $\bar{e}_j(.) = e^{\theta} h^f_{j,\lambda,\ell}$ is determined by her education θ and current human capital $h^f_{j,\lambda,\ell}$. The stochastic component ϵ^f_j is governed by the same auto-regressive process as her male counterpart: $\eta^f_j \equiv \ln\left(\epsilon^f_j\right) = \rho \times \ln\left(\epsilon^f_{j-1}\right) + \upsilon^f_j$, with persistence parameter $\rho \in (0,1)$ and white-noise disturbance $\upsilon^f_j \sim N\left(0, \sigma^2_\upsilon\right)$.

Female human capital accumulation. Unlike men, however, her human capital evolves endogenously according to the following law of motion:

$$log(h^f_{j,\lambda,\ell}) = log(h^f_{j-1,\lambda,\ell}) + (\xi_{1,\lambda,\ell} - \xi_{2,\lambda,\ell} \cdot (j-1))\, \mathbf{I}\{\ell_{j-1} > 0\} - \delta_l \cdot \mathbf{I}\{\ell_{j-1} = 0\} \tag{7}$$

where the human capital gain from working is determined by the coefficient $\xi_{1,\lambda,\ell} - \xi_{2,\lambda,\ell} \cdot (j-1)$, which declines with age, while δ_ℓ captures the rate of human capital depreciation when not working.[12]

3.4 Technology

A representative firm operates with a labor-augmenting production technology A_t, which grows at a constant rate g. Output Y_t is produced using capital K_t and effective labor $A_t L_t$ via a constant-returns-to-scale Cobb-Douglas production function $Y_t = K_t^\alpha (A_t L_t)^{1-\alpha}$. The firm rents capital and hires labor in perfectly competitive factor markets. It takes the wage rate w_t and the capital rental rate q_t as given. The firm pays a capital income tax τ^k_t and chooses inputs to maximize its after-tax profits. Suppressing time subscripts for simplicity, the firm's problem is:

$$\max_{K,L} \quad (1-\tau^k)(Y - wAL) - qK \tag{8}$$

The first-order conditions for profit maximization imply:

$$q = (1-\tau^k)\alpha \frac{Y}{K}, \tag{9}$$

$$w = (1-\alpha)\frac{Y}{AL}. \tag{10}$$

[11] We interpret the fixed time cost as a penalty on the mother's leisure, motivated by evidence that working mothers disproportionately bear childcare responsibilities and domestic chores. See, for instance, the ABS report on barriers and incentives to labor force participation.

[12] We model human capital accumulation as a learning-by-doing process, where continued labor market participation improves future productivity. This differs from on-the-job training models, which require an agent to allocate her work time between production and training. A significant challenge with this setup involves identifying returns to productive time in the data, as these are not directly observable.

3.5 Fiscal policy

The model features three components of fiscal policy: a progressive income tax schedule, two major means-tested child-related transfer programs (the FTB and the CCS), and a means-tested public pension scheme for retirees (the Age Pension). All other government expenditures not modeled explicitly are captured by exogenous general spending, denoted G_t.

3.5.1 Tax system

The government collects revenue from three main sources: personal income taxes, corporate income taxes, and consumption taxes.

Personal income tax. The government levies taxes on individual labor income via a progressive tax schedule.[13] This allows the model to account for the interplay between income taxation and means-tested transfers. For instance, in lower tax brackets, the marginal disincentive effects of transfer phase-outs (such as those stemming from the FTB) may be relatively mild, while in higher tax brackets, the overlap between transfer withdrawal and rising tax liabilities can amplify work disincentives by increasing effective marginal tax rates (EMTRs).

Let $y^i_{j,\lambda}$ denote the labor income for individual $i \in \{m, f\}$ of family type λ and age j. We adopt a parametric tax function based on Feldstein (1969), Benabou (2000), and Heathcote et al. (2017) to approximate Australia's progressive income tax schedule. Suppressing λ and i superscripts for notational ease, the individual tax payment at age j is given by:

$$tax_j(y_j) = \max\left\{0, y_j - \zeta y_j^{1-\tau}\right\} \tag{11}$$

where ζ is a scaling factor and $\tau \in [0, 1)$ governs the degree of progressivity. When $\tau = 0$, the function becomes $tax_j = (1-\zeta)y_j$, implying a linear tax with constant average and marginal tax rates. As τ increases, the system becomes more progressive, with high-income earners facing disproportionately higher tax rates. In the limit as $\tau \to 1$, the marginal tax rate approaches 100%, and all earnings are taxed away. We impose a non-negative constraint, to rule out all government transfers in the form of negative income taxes.

Company income and consumption taxes. The government collects revenue from corporate income and consumption taxes. The firm pays a proportional tax on capital income, τ^k_t, based on its rental payments to capital. Households also face a flat consumption tax τ^c_t, applied to their consumption expenditure. Both taxes contribute to general revenue and support the financing of transfers, pensions, and other government spending.

3.5.2 Transfer system

The government operates the following transfer programs: (i) means-tested child-related transfers, and (ii) a means-tested public pension for retirees. The child-related transfers include the Family Tax Benefit (FTB Parts A and B) and the Child Care Subsidy (CCS). The full statutory rules of these programs are encoded in the model, and we present simplified formulations below to illustrate their key mechanisms. Full policy details and parameter values are provided in Appendix Section A.

Family Tax Benefit Part A (FTB-A). The FTB-A provides per-child payments that depend on joint family income, as well as the number and age of dependent children. Benefits are phased out in two stages as income rises: first from the maximum to a base rate, and then from the base rate to zero. Key policy parameters that determine the levels, kinks, and slopes of the FTB-A schedule are: (i) maximum and base payment rates per child, tr^{A1}_j and tr^{A2}_j; (ii) joint income thresholds for maximum and base payments, $\bar{y}^{tr}_{max}$

[13] Australia uses an individual-based tax filing system, treating each person (not the household) as the unit of taxation. The model abstracts from personal capital income taxes and franking credits under Australia's dividend imputation system. We assume that the representative firm pays corporate capital income taxes and distribute fully franked dividends to households, thus exempting them from capital earnings tax. For further details on dividend imputation and franking credits, see the Parliamentary Budget Office (PBO) 2024 report.

and $\bar{y}^{tr}_{base}$; and (iii) phase-out rates for the respective thresholds, ω_{A1} and ω_{A2}. The total FTB-A benefit per child for a household aged j is given by:

$$tr^{A}_{j}(y_{j,\lambda}) = \begin{cases} tr^{\mathrm{A1}}_{j} & \text{if } y_{j,\lambda} \leq \bar{y}^{tr}_{max} \\ \max\left\{tr^{\mathrm{A2}}_{j},\ tr^{\mathrm{A1}}_{j} - \omega_{A1}\left(y_{j,\lambda} - \bar{y}^{tr}_{max}\right)\right\} & \text{if } \bar{y}^{tr}_{max} < y_{j,\lambda} \leq \bar{y}^{tr}_{base} \\ \max\left\{0,\ tr^{\mathrm{A2}}_{j} - \omega_{A2}\left(y_{j,\lambda} - \bar{y}^{tr}_{base}\right)\right\} & \text{if } y_{j,\lambda} > \bar{y}^{tr}_{base}, \end{cases} \tag{12}$$

where $y_{j,\lambda} = \mathbf{I}\{\lambda \neq 2\} \cdot y^{m}_{j,\lambda} + \mathbf{I}\{\lambda \neq 1 \wedge \ell > 0\} \cdot y^{f}_{j,\lambda} + ra_j$ denotes the combined family income used for means testing.

Family Tax Benefit Part B (FTB-B). The FTB-B provides additional support to single parents and single-earner partnered families with dependent children and limited means. Unlike the FTB-A, the FTB-B is paid per household and is subject to dual income tests, one applied to the primary earner and one to the secondary earner. Key policy parameters that determine the levels, kinks, and slopes of the FTB-B schedule are: (i) maximum benefit levels for households with children below age 5 and between ages 5-18, tr^{B1}_{j} and tr^{B2}_{j}, respectively; (ii) joint income thresholds for primary and secondary earners, $\bar{y}^{tr}_{pe}$ and $\bar{y}^{tr}_{se}$; and (iii) a phase-out rate based on the secondary earner's income, ω_B. Let $y_{pe} = \max(y^{m}_{j,\lambda},\ y^{f}_{j,\lambda})$ and $y_{se} = \min(y^{m}_{j,\lambda},\ y^{f}_{j,\lambda})$ denote the incomes of the primary and secondary earners, respectively. The total FTB-B benefit for a household aged j is:

$$tr^{B}_{j}(y^{m}_{j,\lambda}, y^{f}_{j,\lambda}) = \begin{cases} \Upsilon_1 \cdot tr^{\mathrm{B1}}_{j} + \Upsilon_2 \cdot tr^{\mathrm{B2}}_{j} & \text{if } y_{pe} \leq \bar{y}^{tr}_{pe} \text{and } y_{se} \leq \bar{y}^{tr}_{se} \\ \\ \Upsilon_1 \cdot \max\left\{0,\ tr^{\mathrm{B1}}_{j} - \omega_B(y_{se} - \bar{y}^{tr}_{se})\right\} & \text{if } y_{pe} \leq \bar{y}^{tr}_{pe} \text{and } y_{se} > \bar{y}^{tr}_{se}, \\ + \Upsilon_2 \cdot \max\left\{0,\ tr^{\mathrm{B2}}_{j} - \omega_B(y_{se} - \bar{y}^{tr}_{se})\right\} & \end{cases} \tag{13}$$

where $nc_{[a,b],j}$ represents the number of dependent children in age range $[a, b]$ for a household aged j, $\Upsilon_1 = \mathbf{I}\{nc_{[0,4],j} \geq 1\}$ is an indicator for presence of at least one child aged 0-4, and $\Upsilon_2 = \mathbf{I}\{nc_{[0,4],j} = 0 \wedge nc_{[5,18],j} \geq 1\}$ is an indicator for at least one child aged 5-18 and none under 5.

Child care subsidy (CCS). The CCS supports the cost of formal childcare for families with children aged 13 or younger. Like the FTB, the CCS is means-tested based on joint family income and varies by the age and number of children. However, a key difference is that CCS eligibility is also conditional on work activity.[14] Key parameters determining eligibility and per-child subsidy rates include (i) base subsidy rates, $\{sr_1, sr_2, sr_3, sr_4\}$; (ii) joint income thresholds, $\{\bar{y}^{sr}_1, \bar{y}^{sr}_2, \bar{y}^{sr}_3, \bar{y}^{sr}_4, \bar{y}^{sr}_5\}$; (iii) fortnightly work hour thresholds, $\{0, 8, 16, 48\}$; and (iv) phase-out rates, $\{\omega^1_c, \omega^3_c\}$. The effective subsidy rate per child for a household aged j is given by:

$$sr_j(y_{j,\lambda}, n^{m}_{j,\lambda}, n^{f}_{j,\lambda,\ell}) = \Psi(.) \times \begin{cases} sr_1 & \text{if } y_{j,\lambda} \leq \bar{y}^{sr}_1 \\ \max\left\{sr_2,\ sr_1 - \omega^1_c\right\} & \text{if } \bar{y}^{sr}_1 < y_{j,\lambda} < \bar{y}^{sr}_2 \\ sr_2 & \text{if } \bar{y}^{sr}_2 \leq y_{j,\lambda} < \bar{y}^{sr}_3 \\ \max\left\{sr_3,\ sr_2 - \omega^3_c\right\} & \text{if } \bar{y}^{sr}_3 \leq y_{j,\lambda} < \bar{y}^{sr}_4 \\ sr_3 & \text{if } \bar{y}^{sr}_4 \leq y_{j,\lambda} < \bar{y}^{sr}_5 \\ sr_4 & \text{if } y_{j,\lambda} \geq \bar{y}^{sr}_5, \end{cases} \tag{14}$$

where the adjustment factor $\Psi(.)$ accounts for the activity test, which scales the base subsidy rate according to the fortnightly hours worked by the parent with the lowest labor supply $n^{min}_{j} = min\{n^{m}_{j,\lambda}, n^{f}_{j,\lambda,\ell}\}$. Formally,

[14] In practice, the Australian CCS defines "recognized activity" more broadly, encompassing paid work (including self-employment), unpaid work in a family business, volunteering, study or training, and job search. We focus on labor supply as a proxy for work requirements.

$\Psi(.)$ is defined as:

$$\begin{aligned}\Psi(y_{j,\lambda}, n^m_{j,\lambda}, n^f_{j,\lambda,\ell}) &= 0.24 \cdot \mathbf{I}\{y_{j,\lambda} \leq \$70,015 \wedge n^{min}_j \leq 8\} \\ &+0.36 \cdot \mathbf{I}\{8 < n^{min}_j \leq 16\} + 0.72 \cdot \mathbf{I}\{16 < n^{min}_j \leq 48\} + \mathbf{I} \cdot \{n^{min}_j > 48\}\end{aligned}$$

This rule ensures that higher work intensity results in greater subsidy eligibility. Importantly, the joint income test and activity test interact: working longer hours increases the effective subsidy rate via $\Psi(.)$, but also raises income, potentially triggering phase-outs.

Age Pension. The Age Pension is a means-tested, non-contributory public pension that plays a central role in Australia's welfare system. It is the largest income support program, amounting to approximately 3% of GDP and covering the majority of retirees. Eligibility begins at the retirement age $j = J_R$, and pension benefits are determined by both an assets test and an income test, with the final benefit equal to the minimum of the two. Partnered households are assessed jointly and receive a full couple-rate pension, while single households receive two-thirds of the couple amount.

Given its scale, behavioral responses to child-related transfers, such as reduced private savings, may affect later-life reliance on the Age Pension and generate non-negligible fiscal and welfare spillovers. Therefore, although this paper focuses on child-related transfers, we model the Age Pension explicitly to capture these potential aggregate and distributional interactions.

Let $\mathcal{P}^a(a_j)$ be the pension benefit based on the assets test:

$$\mathcal{P}^a(a_j) = \begin{cases} p^{\max} & \text{if } a_j \leq \bar{a}^P_1 \\ \max\{0,\ p^{\max} - \omega_a(a_j - \bar{a}_1)\} & \text{if } a_j > \bar{a}^P_1 \end{cases} \tag{15}$$

where p^{max} is the maximum pension payment, $\bar{a}^P_1$ is the asset threshold, and ω_a is the corresponding phase-out rate. Similarly, let $\mathcal{P}^y(y_{j,\lambda})$ be the benefit according to the income test:

$$\mathcal{P}^y(y_{j,\lambda}) = \begin{cases} p^{\max} & \text{if } y_{j,\lambda} \leq \bar{y}^p_1 \\ \max\{0,\ p^{\max} - \omega_y(y_{j,\lambda} - \bar{y}^p_1)\} & \text{if } y_{j,\lambda} > \bar{y}^p_1 \end{cases} \tag{16}$$

where $\bar{y}^p_1$ is the income threshold and ω_y is the income-test phase-out rate. The pension benefit received by a household aged j is determined by:

$$pen_j(a_j, y_{j,\lambda}) = \begin{cases} \min\{\mathcal{P}^a(a_j), \mathcal{P}^y(y_{j,\lambda})\} & \text{if } j \geq J_R \text{ and } \lambda = 0 \\ \frac{2}{3}\min\{\mathcal{P}^a(a_j), \mathcal{P}^y(y_{j,\lambda})\} & \text{if } j \geq J_R \text{ and } \lambda = 1,2 \\ 0 & \text{otherwise} \end{cases} \tag{17}$$

3.5.3 Government budget

At each time t, the government's total revenue consists of consumption taxes (T^C_t), company profit taxes (T^K_t), and personal income taxes (T^I_t). To meet its financing needs, the government can also issue new debt, represented by the net change in government bonds $(B_{t+1}-B_t)$. Public expenditures consist of four components: general government purchases (G_t), child-related transfers (Tr_t), the Age Pension $(\mathcal{P}_t)$, and interest payments on outstanding public debt (r_tB_t). The government's intertemporal budget constraint is given by:

$$T^C_t + T^K_t + T^I_t + (B_{t+1} - B_t) = G_t + Tr_t + \mathcal{P}_t + r_tB_t \tag{18}$$

In every period t, the government adjusts the income tax schedule to balance its budget. Specifically, we assume the government holds the tax progressivity τ constant and uses the tax scaling factor ζ as the endogenous policy lever to ensure public budget balance across policy experiments. Changes in ζ affects the overall tax size. For instance, a decrease in ζ raises the overall tax burden by shifting the tax schedule upward and narrowing the zero-tax bracket.

3.6 Market structure

The benchmark model is set in a small open steady-state economy in which all markets clear simultaneously. The representative firm produces the final good, which is sold in a perfectly competitive market at a relative price normalized to one. This good serves as the consumption good, the investment good, and the model's numeraire.

Capital is perfectly mobile internationally, so the domestic interest rate is pinned down by the exogenous world interest rate r_w, under a no-arbitrage condition. As a result, domestic capital demand is perfectly elastic, and the rental rate of capital is fixed at $q = r_w + \delta$, where δ is the capital depreciation rate. Since production follows a CRS Cobb-Douglas technology, this results in a fixed steady-state capital-labor ratio. Consequently, the real wage remains constant over time, and the labor demand curve is perfectly elastic. Given that male labor supply is exogenous, the equilibrium quantity of labor is therefore endogenously determined by maternal labor supply decisions. The fixed capital-labor ratio then implies that the firm's demand for capital—and hence output—adjusts proportionally with changes in maternal labor supply. The current model abstracts from labor market frictions, such as search costs, matching inefficiencies, wage rigidity, or switching costs between part-time and full-time work.

The asset market is incomplete. Households cannot insure against risks using state-contingent assets. Instead, they self-insure by saving in a one-period risk-free bond, subject to a no-borrowing constraint. That is, households cannot borrow against future income, and asset holdings must be non-negative at all times.

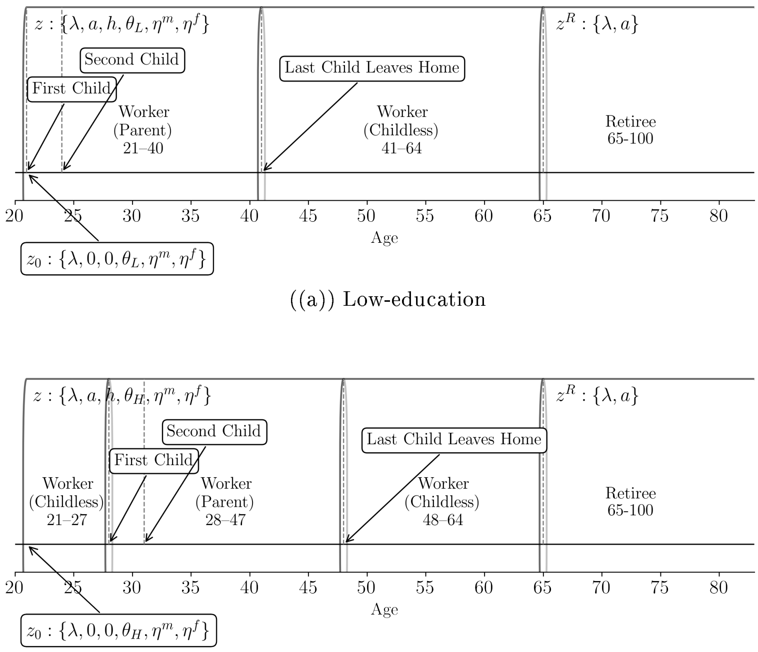
Risks and private insurance. Uninsurable earnings and longevity risks, together with child-related costs, play a central role in shaping female labor supply and household savings behavior. Both serve as self-insurance mechanisms that complement the public safety net. Single mothers, lacking access to spousal income (i.e., family insurance), rely more heavily on work and savings, especially as their children age out of transfer eligibility. Their incentives to remain employed are reinforced by the risks of future income shocks, human capital depreciation, and outliving their savings. In contrast, married mothers face weaker work incentives. Spousal income provides a buffer against shocks and raises joint income, increasing the likelihood that the household enters the phase-out range of means-tested transfers. This reduces the marginal return to employment for married mothers by lowering childcare subsidies and accelerating the withdrawal of FTB benefits. These dynamics, driven by heterogeneity in household structure, are explored in detail in Section 5.

3.7 The household problem

Households are heterogeneous along several dimensions, including: age $j \in \{1, 2, \ldots, J\}$, family type $\lambda \in \Lambda$ where $\Lambda = \{0, 1, 2\}$, permanent education level $\theta \in \Theta$ where $\Theta = \{\theta_L, \theta_H\}$, female human capital $h^f_{j,\lambda,\ell} \in H$ where $H = [h_{min}, h_{max}] \subset \mathcal{R}^+$, asset holdings $a_j \in A$ where $A = [a_{min}, a_{max}] \subset \mathcal{R}^+$, and idiosyncratic productivity shocks to male and female earnings, η^m_j and $\eta^f_j \in S$ where $S \subset \mathcal{R}$. Every household maximizes expected lifetime utility 3 by choosing consumption, savings, and female labor supply, subject to constraints imposed by labor and capital income, child-related costs, taxes, transfers, and borrowing limits. They form rational expectations over future income paths, survival probabilities, productivity shocks, and policy environments.

Working-age married parents ($\lambda = 0$) **and single mothers** ($\lambda = 2$)**.** Define $Z = \Lambda \times A \times H \times \Theta \times S \times S$ as the state space for working-age households ($j < J_R$). Let the individual household state vector at age j be $z_j = \left\{\lambda_j, a_j, h^f_{j,\lambda,\ell}, \theta, \eta^m_j, \eta^f_j\right\} \in Z$. The life-cycle profiles of parent households are summarized in Figure 5.

Given the current state z_j, a working-age parent household chooses a triple (c_j, ℓ_j, a_{j+1}) from the choice set $\mathcal{C} \equiv \{(c_j, \ell_j, a_{j+1}) \in \mathcal{R}^{++} \times \{0, 1, 2\} \times \mathcal{R}^+\}$, where c_j is joint consumption, ℓ_j denotes the female employment status (non-participation, part-time, or full-time), and a_{j+1} is next-period's joint asset holdings. Suppressing



((b)) High-education

Figure 5: **Life cycle of parent households.**

Notes: This figure displays the life cycle of parent households. Panel (a) shows the profile for low-education parents, and Panel (b) depicts that for high-education parents. Beyond differences in education, a salient distinction lies in the timing of childbirth, with high-education parents experiencing delayed fertility relative to their low-education counterparts.

the age subscript j to simplify notation, the household's problem can be expressed as the following dynamic programming formulation:

$$V(z) \quad = \quad \max_{c,\ell,a_+} \left\{ u(c, l^m, l^f, \theta, \lambda) + \beta \sum_{\Lambda} \int_{S^2} V(z_+)\, d\Pi(\lambda_+, \eta^m_+, \eta^f_+ | \lambda, \eta^m, \eta^f) \right\} \tag{19}$$

s.t.

$$\begin{aligned}
(1+\tau^c)c + (a_+ - a) + \mathbf{I}\{\ell > 0\} \cdot n^f_{\lambda,\ell} \cdot CE_\theta(y_\lambda, n^m_\lambda, n^f_{\lambda,\ell}) &= y_\lambda + FTB_\theta(y^m_\lambda, y^f_\lambda) - T_\lambda(y^m_\lambda, y^f_\lambda) + beq \\
l^f &= 1 - n^f_{\lambda,\ell} - (\mathbf{I}\{\ell = 1\} \cdot \chi_p + \mathbf{I}\{\ell = 2\} \cdot \chi_f) \\
l^m &= 1 - n^m_\lambda \ \text{ if } \ \lambda = 0 \\
c &> 0 \\
a_+ &\geq 0
\end{aligned}$$

where $y_\lambda = \mathbf{I}\{\lambda \neq 2\} \cdot y^m_\lambda + \mathbf{I}\{\ell > 0\} \cdot y^f_\lambda + ra$ is the total household market income; $n^f_{\lambda,\ell}$ is the female work hours under choice ℓ; $CE_\theta(.) = w\,(1 - sr(.)) \sum_{i=1}^{nc_\theta} \kappa_i$ is the childcare expense per hour worked net of subsidies; $sr(.)$ is the CCS function and κ_i is the hourly childcare cost (as a share of market wages) for the i^{th} child; $FTB_\theta(.) = nc_\theta \cdot tr^A(.) + tr^B(.)$ is the FTB transfer function, comprising $tr^A(.)$ from (12) and $tr^B(.)$ from (13); $T_\lambda(.) = \mathbf{I}\{\lambda \neq 2\} \cdot tax^m(.) + tax^f(.)$ is the total income tax function, with $tax^i(.)$ for $i \in \{m, f\}$ following the progressive tax schedule (11); and τ^c is the consumption tax rate. Households are born with no assets ($a_1 = 0$). Bequest motives are not operative. beq is a uniform lump-sum accidental bequest, redistributed from deceased households in the same period, as described in Equation (C.2) of Appendix Subsection (C.1.3).

Working-age single childless male households ($\lambda = 1$)**.** Single male households follow an exogenous labor supply path over the life cycle and do not make work decisions. At every age j, they choose a consumption-savings pair (c, a_+) from the choice set $\mathcal{C} \equiv \{(c, a_+) \in \mathcal{R}^{++} \times \mathcal{R}^{+}\}$ to maximize expected lifetime utility, subject to the budget constraint (21). Formally, a single male household problem reduces to a consumption-savings problem:

$$\begin{aligned} V(z) &= \max_{c,a_+} \left\{ u(c, l^m, \theta) + \beta \sum_{\Lambda} \int_{S^2} V(z_+)\, d\Pi(\lambda_+, \eta_+^m \mid \lambda, \eta^m) \right\} \qquad (20) \\ \text{s.t.} \end{aligned}$$

$$\begin{aligned} (1+\tau^c)c + (a_+ - a) &= y_\lambda - T_\lambda(y_\lambda^m) + beq \qquad (21) \\ l^m &= 1 - n_\lambda^m \\ c &> 0 \\ a_+ &\geq 0 \end{aligned}$$

where $y_\lambda = wn_\lambda^m h_\lambda^m e^{\theta+\epsilon^m} + ra$ is market income, and $T_\lambda(.) = tax^m(.)$ is the progressive tax function defined in Equation (11).

Retirees. Retirement at age J_R is mandatory. Upon retirement, the education level and idiosyncratic earnings shocks become absorbing states. In addition, since retirees no longer have dependent children, they are not eligible for the child-related transfers. Pension payouts are not conditional on earnings history but do depend on family type λ. Eligible single households receive two-thirds of the maximum pension payment that a partnered household would receive. The state vector of a retired household at age $J_R \leq j \leq J$ simplifies to $z^R = \{\lambda, a\} \in \{0, 1, 2\} \times \mathcal{R}^+$, and their choice set becomes $\mathcal{C}^R \equiv \{(c, a_+) \in \mathcal{R}^{++} \times \mathcal{R}^+\}$. Suppressing the age j subscript, the retired household's dynamic programming problem reduces to:

$$\begin{aligned} V(z^R) &= \max_{c,a_+} \left\{ u(c, \lambda) + \beta \sum_{\Lambda} V(z_+^R)\, d\Pi(\lambda_+ | \lambda) \right\} \qquad (22) \\ \text{s.t.} \end{aligned}$$

$$\begin{aligned} (1+\tau^c)c + (a_+ - a) &= ra + pen(a, y_\lambda) \\ c &> 0 \\ a_+ \geq 0 \quad &\text{and} \quad a_{J+1} = 0 \end{aligned}$$

where $pen(.)$ is the Age Pension function described in Equation (17).

3.8 Equilibrium

The *stationary distribution of households* (C.1.1), *aggregation* (C.1.2), the *definition of competitive equilibrium* (C.1.3), and the *numerical solution algorithm* (C.2) are provided in Appendix Section C.

4 Calibration

We calibrate the benchmark model to a steady-state economy along a balanced growth path, where aggregate variables such as consumption, investment, and capital grow at the constant rate of labor-augmenting technological progress g, while the time endowment is fixed. The model target key features of the Australian economy between 2012 and 2018, a period of relative macroeconomic stability, with steady trends in household consumption and asset accumulation. This window also allows us to incorporate the statutory rules of child-related transfer programs as of 2018, after major changes had been implemented.

Externally calibrated parameters in Table 2 are estimates and statistics drawn from the HILDA survey, the Australian Bureau of Statistics (ABS), the World Bank, and prior Australia-focused studies. The remaining micro and macro parameters are internally calibrated to match key model moments to their empirical counterparts. These are reported in Table 3. We evaluate the model fit by comparing its simulated outcomes to a range of non-targeted life-cycle and aggregate moments. Overall, results shown in Table 4 and Figures (8)-(9) demonstrate that the benchmark model does reasonably well in replicating salient features of the Australian economy. We discuss the benchmark performance in Subsection 4.6. Further details on calibration—including data estimates for consumption and wealth, as well as the implied gender wage gap—are provided in Appendix Section D.

Parameter	Value	Target
Demographics		
Maximum lifespan	$J = 80$	Age 21-100
Mandatory retirement age	$J_R = 45$	Age Pension age 65
Population growth rate	$n = 1.6\%$	ABS 2012-2018
Survival probabilities	ψ_m, ψ_f	Australian Life Tables (ABS 2010-2019)
Measure of newborns by λ type	$\{\pi(\lambda_0), \pi(\lambda_1), \pi(\lambda_2)\} = \{0.70, 0.14, 0.16\}$	HILDA 2012-2018
Technology		
Labor aug. tech. growth	$g = 1.3\%$	Average per work hour growth rate (World Bank 2012-2018)
Output share of capital	$\alpha = 0.4$	Treasury 2019
Real interest rate	$r = 4\%$	World Bank 2012-2019
Households		
Relative risk aversion	$\sigma = 1/\gamma = 3$	Standard values 2.5-3.5
Male and female labor supply	n_λ^m, n_λ^f	Age-profiles of average labor hours for employees (HILDA)
Male human capital profile	h_λ^m	Age-profile of wages for men (HILDA)*
Education		
Education level	$\{\theta_L, \theta_H\} = \{0.745, 1.342\}$	College-HS wage ratio of 1.8**
Measure of households by θ	$\{\pi(\theta_L), \pi(\theta_H)\} = \{0.7, 0.3\}$	College-HS ratio (ABS 2018)
Fiscal policy		
Income tax progressivity	$\tau = 0.2$	Tran and Zakariyya 2021
Consumption tax	$\tau^c = 8\%$	$\tau_c \times \dfrac{C_0}{Y_0} = 4.5\%$
Company profit tax	$\tau^k = 10.625\%$	$\tau^k \left(\dfrac{Y - WL}{Y}\right) = 4.5\%$
Government debt to GDP	$\dfrac{B}{Y} = 20\%$	Average (CEIC 2012-2018)
Government general purchase	$\dfrac{G}{Y} = 14\%$	Net of FTB, CCS and Age Pension (WDI and AIHW)
FTB, CCS and Pension parameters		HILDA tax-benefit model

Table 2: Externally calibrated parameters

Notes: (*) The age-profiles of median hourly wages for married and single men are obtained by regressing log(wage) on quadratic age terms and four dummies (gender, marital status, employment type, and time). We then normalize all hourly wage estimates by the average hourly wage of male aged 21. (**) Our estimates based on HILDA suggests a wage premium for married men in the range of 1.7-1.8 over the 18 years period 2001-2018.

Parameter	Value	Target
Households		
Discount factor	$\beta = 0.99$	Saving ratio 5%-8% (ABS 2013-2018)
Taste for consumption	$\nu = 0.375$	LFP rate 68-72% of working-age mothers (HILDA 2012-2018)
Fixed time cost of work	$\{\chi_f, \chi_p\} = \{0.1125, 0.0525\}$	Age profile of full-time employment share for mothers
Female human capital		
Depreciation rate	$\delta_h = 0.074$	Male-female wage gap at age 50*
Accumulation rate for:		
Married mother working full-time	$(\xi_{1,\lambda=0,\ell=1}, \xi_{2,\lambda=0,\ell=1}) = (0.0450, 0.00175)$	Married father's age-profile of full-time wages
Married mother working part-time	$(\xi_{1,\lambda=0,\ell=2}, \xi_{2,\lambda=0,\ell=2}) = (0.0350, 0.00135)$	Married father's age-profile of part-time wages
Single mother working full-time	$(\xi_{1,\lambda=2,\ell=1}, \xi_{2,\lambda=2,\ell=1}) = (0.0206, 0.00088)$	Single father's age-profile of full-time wages
Single mother working part-time	$(\xi_{1,\lambda=2,\ell=2}, \xi_{2,\lambda=2,\ell=2}) = (0.0179, 0.00060)$	Single father's age-profile of part-time wages**
Technology		
Capital depreciation rate	$\delta = 0.07172$	$\frac{K}{Y} = 3.2$ (ABS 2012-2018)
Transitory shocks		
Persistence parameter	$\rho = 0.98$	Literature
Variance of shocks	$\sigma_v^2 = 0.0145$	Gini coefficient of male earnings at age 21, $GINI_{j=1,m} = 0.35$
Fiscal policy		
Maximum pension payment	$pen^{max} = 30\% \times Y$	Pension share of GDP, $\frac{\mathcal{P}_t}{Y_t} = 3.2\%$ (ABS 2012-2018)

Table 3: Internally calibrated parameters

Notes: (*) We chose age 50 to allow sufficient time for δ_h to take effect on female labor supply decisions. (**) We calibrate the female human capital accumulation and depreciation rates for a type $\{\lambda, \ell\}$ woman such that her age-profile of wages matches that of her male counterpart if she chooses to work without time off.

4.1 Demographics

Households enter the economy at age 21 ($j = 1$) as workers, retire at age 65 ($j = J_R$ =45), and can live up to a maximum age of 100 ($j = J = 80$). Married households consist of spouses who are the same age. Time-invariant conditional survival probabilities for males and females ($\psi_{j,m}$ and $\psi_{j,f}$) are calculated from the 2001-2019 Australian Life Tables published by the ABS. The growth rate of newborn households is set to $n = 1.6\%$, consistent with the average annual population growth in Australia between 2012 and 2018 (AIHW, 2023).

The distribution of newborn households by family type $\pi(\lambda)$ is estimated using HILDA survey data for working-age adults (ages 21 to 64). Married households comprise 70% of the new entrants ($\pi(\lambda_0) = 0.70$). Of the remaining 30% single households, 53% are female, implying shares of $\pi(\lambda_1) = 0.14$ for single men and $\pi(\lambda_2) = 0.16$ for single mothers.

4.2 Preferences

The subjective discount factor is set to $\beta = 0.99$ so that the model's implied household savings rate falls within the empirically observed range of 5-8%, based on ABS data (2012-2018). The elasticity of intertemporal substitution (EIS), the inverse of the relative risk aversion parameter σ, is set at $\gamma = 1/3$, a value within the standard range commonly used in the literature.[15] The taste for consumption relative to leisure, $\nu = 0.375$, is chosen so that the average female labor force participation in the model falls within the 68-72% range observed in the data. Fixed time costs of work are set to $\chi_f = 0.1125$ for full-time and $\chi_p = 0.0525$ for part-time work. These values allow the model to reproduce the empirical life-cycle profile of full-time maternal employment, as shown in Figure 8.

4.3 Endowments

Labor productivity shock. Every adult household member is subject to idiosyncratic earnings shocks η^i for $i \in \{m, f\}$. These shocks follow an identical AR(1) process with persistence parameter ρ and innovation variance σ_υ^2. We set $\rho = 0.98$, within the bound of common values in the literature, and calibrate σ_υ to achieve a Gini coefficient of 0.35 for the effective wage distribution of 21-year-old men in the model. This configuration yields a Gini coefficient of 0.38 (non-target) for the broader working-age male population.[16]

We discretize the AR(1) shock process using the Rouwenhorst method. This yields 5 shock grid points {0.29813, 0.54601 1, 1.83146, 3.35424}, with the following Markov transition matrix:

$$\begin{bmatrix} 0.9606 & 0.0388 & 0.0006 & 0 & 0 \\ 0.0097 & 0.9609 & 0.0291 & 0.0003 & 0 \\ 0.0001 & 0.0194 & 0.9610 & 0.0194 & 0.0001 \\ 0 & 0.0003 & 0.0291 & 0.9609 & 0.0097 \\ 0 & 0 & 0.0006 & 0.0388 & 0.9606 \end{bmatrix}$$

Education. We model two exogenous, permanent education types—low (θ_L) and high (θ_H)—realized at birth. These correspond to individuals with at most a high school diploma and those with a university degree or equivalent, respectively. We set $\theta_L = 0.745$ and $\theta_H = 1.342$ to match a college wage premium of 1.8 in the benchmark economy. Based on ABS (2018) statistics, the shares of low- and high-education households are $\pi(\theta_L) = 0.7$ and $\pi(\theta_H) = 0.3$, respectively. We also assume assortative mating. In addition to spouses being

[15] This implies a growth-adjusted time discount factor $\tilde{\beta} = \beta(1+g)^{\nu\left(1-\frac{1}{\gamma}\right)} = 0.9807$ for the balanced-growth-path steady state economy.

[16] σ_υ is calibrated based on the empirical male earnings distribution rather than the wage distribution because our male labor supply profiles are exogenously fixed at average hours. As the model lacks endogenous variation in male work hours, the transitory shock process η^m is used to capture both wage shocks and variation in hours.

of the same age, they are matched by education. This simplifies calibration and facilitates the identification of human capital parameters, as discussed below.

Labor supply. Men are assumed to work full-time with exogenously given age profiles of labor hours. Women choose from three discrete labor supply options: non-participation ($\ell = 0$), part-time work ($\ell = 1$), or full-time work ($\ell = 2$). Once a choice is made, hours worked follow deterministic age profiles by employment status and family type. These gender- and family-type-specific work hour profiles (n^m_λ and $n^f_{\lambda,\ell}$) are estimated from HILDA survey data (2001-2018) and shown in Figure 6. Productivity is set to zero from retirement age ($j \geq J_R$) onward, making retirement mandatory.[17]

Human capital. The exogenous life-cycle profiles of male human capital $\left\{h^m_{j,\lambda}\right\}_{j=1}^{J_R-1}$ are proxied using estimated age profiles of hourly wages for single and married men from the HILDA survey. In contrast, female human capital profile $\left\{h^f_{j,\lambda,\ell}\right\}_{j=1}^{J_R-1}$ evolves endogenously over the life cycle as a function of their labor supply decisions. The female human capital gain parameters $\{\xi_{1,\lambda,\ell}, \xi_{2,\lambda,\ell}\}$ are calibrated by family type (λ) and employment status (ℓ) to ensure that, if a woman works continuously from age 21 to retirement, her human capital trajectory would resemble that of a man with matching marital and labor market characteristics (an implication of the assortative mating assumption). Specifically, we estimate these parameters by applying the law of motion (7), omitting the depreciation term associated with not working, to the male wage growth:

$$log(\hat{w}^m_{j,\lambda,\ell}) - log(\hat{w}^m_{j-1,\lambda,\ell}) = \hat{\xi}_{1,\lambda,\ell} + \hat{\xi}_{2,\lambda,\ell} \cdot (j-1)$$

Here, $\hat{w}^m_{j,\lambda,\ell}$ denotes the estimated average male wage at age j for a given family type and employment status. To improve the robustness of these estimates, especially for demographic groups with sparse observations (e.g., single fathers), we trim extreme values and omit noisy data near retirement age when fitting the wage profiles.[18]

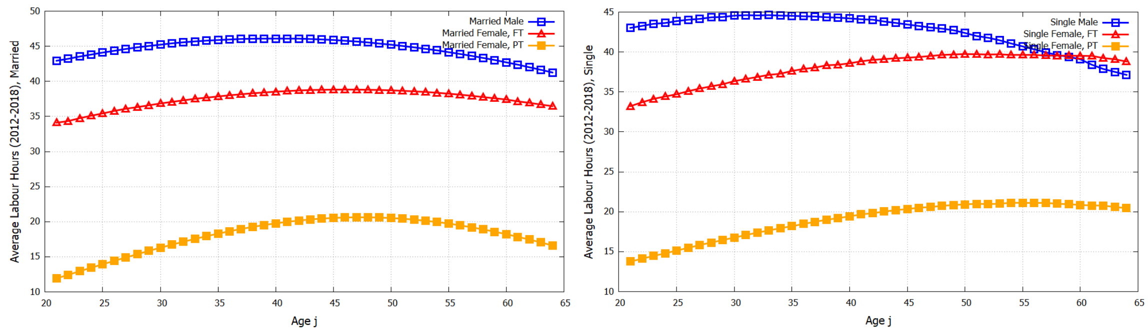


Figure 6: **Exogenous labor supply over the life cycle. Left:** Age profiles of average work hours for married parents if employed. **Right:** Age profiles of average labor hours for single men and single mothers if employed.
Notes: The two y-axes are different. The former ranges from 10 to 50 hours and the latter ranges from 10 to 45 hours.

Children. We assume that all married households and single women have children, while single men are childless. This is empirically justified by the observation that women account for 87% of lone parents in our HILDA sample. To maintain computational feasibility, we further assume that all parents have exactly two children over their lifetime. This is supported by data from households aged 50 and above in the HILDA survey, which reflects completed fertility histories: 12% of parents have one child, 42% have two, 28% have three, and the remainder have four or more. Our assumption reflects the most common family structure and yields an average number of children close to the empirical mean.[19]

[17] Empirical evidence suggests that male labor supply is largely inelastic. Doiron and Kalb (2004) find that increases in childcare costs have negligible effects on male labor supply in Australia. Our own estimates using HILDA similarly show little variation in male hours parental or marital status.

[18] Ideally, human capital accumulation parameters would also vary by education, in addition to marital and labor force status. However, this would require additional data moments that are difficult to estimate reliably due to sample size limitations for certain demographics, such as young married individuals and old single households, in the HILDA survey.

[19] Since married and single female households comprise 86% of the model population, the average number of children per

Heterogeneity in fertility timing is linked to household education θ. Drawing on statistics from the the 2017 longitudinal study of Australian children (LSAC), we observe that early motherhood is more prevalent among low-education women. Specifically, 67.7% of first-time mothers aged 15-19 have a year 11 or lower education level, while this proportion drops to just 10% among those aged 25-37. Conversely, nearly half of the first-time mothers in the latter age group hold a bachelor's degree or higher, with the proportion increasing with maternal age. We reflect these patterns in the model by assigning the birth of the first child to low-education (θ_L) households at age 21 (i.e., $j = 1$, the youngest model age) and to high-education (θ_H) households at age 28. In both cases, the second child arrives exactly 3 years later, at age 24 for θ_L and age 31 for θ_H. This spacing aligns with the average child interval observed in in Australia (AIHW, 2023).

Childcare costs. We abstract from informal childcare arrangements such as grandparenting or neighbor assistance. Formal childcare services are assumed to be of uniform quality and price across households, abstracting from regional variations and differences in service types. That is, we assume these services operate in a perfectly competitive market. Using a conservative estimate of $12.50 per hour, childcare costs amount to 52% of the average hourly wage of a 21-year-old male from HILDA survey. Accordingly, the childcare cost in the model is set as $\kappa = 0.52 \cdot w$.

We assume that childcare costs decline once children reach school age (6 years old). In particular, working mothers pay the full hourly cost of formal care for children aged 0-5 years and one-third of that cost for school-aged children. This reflects the provision of free public schooling and the lower intensity of formal care at older ages. In other words, additional care needs—such as out-of-school hours (OOSH) programs and extracurricular activities—are assumed to be approximately one-third of pre-school childcare expenditure.[20]

4.4 Technology

The capital share in output is set to $\alpha = 0.4$. Given α, along with the company tax rate $\tau^k = 10.625\%$ (see Table 2) and a target capital-to-output ratio of $K/Y = 3.2$ (see Table 4), we use the firm's first-order condition (9) to back out the capital depreciation rate δ. This yields $\delta = 0.07172$ in the initial steady-state equilibrium.

Labor-augmenting technology A is normalized to 1 in the benchmark economy. Based on an average annual growth rate of real GDP per hour worked of 1.3% in Australia, we set the rate of labor-augmenting technological progress to $g = 0.013$.

4.5 Fiscal policy

Taxes. We adopt a progressivity parameter $\tau = 0.2$, in line with Tran and Zakariyya (2021). The scale parameter ζ, which governs the size of the tax schedule for a given τ, is endogenously determined to balance the government budget. The consumption tax rate is set at $\tau^c = 8\%$, which targets a consumption tax-to-GDP ratio $\frac{\tau^c C}{Y} = 4.5\%$, where the consumption share of GDP is $\frac{C}{Y} = 56.3\%$ (ABS 2012-2018). The company income tax rate is calibrated to match a company tax revenue share of GDP $\tau^k \left(\frac{Y - WL}{Y}\right) = 4.25\%$. Provided that the labor income share $\frac{WL}{Y} = 1 - \alpha = 0.6$, this implies a company tax rate of $\tau^k = 10.625\%$.

Family Tax Benefit and Child Care Subsidy. We adopt the 2018 statutory policy settings for the Family Tax Benefit (Parts A and B) and the Child Care Subsidy programs, including base and maximum payment rates, income thresholds, and phase-out rates. The rules for benefit calculation are detailed in Appendix A.

household is $0.86 \times 2 = 1.72$. This aligns closely with Australia's average total fertility rate of approximately 1.8 children per woman during 2012-2018

[20] OOSH services typically operate before school (6:30am–9am), after school (3pm–6pm), and during school holidays (7am–7pm). The decline in childcare costs for school-aged children also reflects lower average usage: only 40% of children aged 6-8 participate in any form of childcare, and this rate falls to 20% by age 12. We use information on hourly childcare fees from DSS (2005) and assume that the cost ratio between pre-school and school-aged children has remained stable since then. For further details on childcare costs and usage patterns, see the AIFS (2015) and DSS (2005) reports.

Age Pension. The Age Pension's income and assets test thresholds, along with their respective phase-out rates, are based on 2018 policy parameters. The maximum pension benefit, p^{max}, is internally calibrated to equal 30% of average income. This targets a total Age Pension expenditure of 3.2% of GDP in the benchmark steady state.

General government expenditure and debt. General government expenditure G includes all public spending not explicitly modeled through the two child-related transfer programs (FTB and CCS) or the Age Pension program. In the benchmark, G is set to14% of GDP, derived as the residual from total government spending of 18.5% of GDP after subtracting the combined expenditure on FTB, CCS, and the Age Pension (estimated at 4.5% of GDP). Public debt B is set at 20% of GDP, consistent with the the average pre-pandemic debt-to-GDP ratio.

4.6 The benchmark economy

We assess the benchmark model's performance by comparing model-generated moments with their corresponding empirical moments.

4.6.1 Aggregate macro variables

We begin by examining key targeted and non-targeted macroeconomic indicators. Table 4 shows that the benchmark model performs reasonably well in matching aggregate empirical moments observed in the Australian economy. To further assess the model's validity, we next evaluate its ability to reproduce key life-cycle profiles in the following subsection.

Moments	Model	Data	Source
Targeted			
Capital, K/Y	3.2	3-3.3	ABS (2012-2018)
Savings, S/Y	4.7%	5-8%	ABS (2013-2018)
Mothers' labor participation, LFP	72.57%	68-72%	HILDA (2012-2018)*
Consumption tax, T^C/Y	4.23%	4.50%	APH Budget Review
Corporate profit tax, T^K/Y	4.25%	4.25%	APH Budget Review
Age Pension, P/Y	3.65%	3.20%	ABS (2012-2018)
Gini coefficient (male aged 21)	0.35	0.35	HILDA (2012-2018)
Non-targeted			
Consumption, C/Y	52.80%	54-58%	ABS (2012-2018)
Investment, I/Y	32.29%	24-28%	ABS (2013-2018)
Mothers' full-time share	50.32%	50%	HILDA (2012-2018)
Scale parameter, ζ	0.7417	0.7237	Tran and Zakariyya (2021)
Income tax, T^I/Y	14.93%	11%	APH Budget Review
Tax revenue to output	28.36%	25%	ABS(2012-2018)
Child-related transfers (FTB + CCS)	1.7%	1.45%	ABS (2012-2018)

Table 4: **Key macroeconomic variables: Model vs. Data moments**

Notes: (*) Multiple sources agree on these ranges of participation rates for mothers. (**) We set 0.35 *as the target for the Gini coefficient of wage distribution at birth* ($j = 1$)*. This results in the Gini coefficient for the male wage distribution over the entire working age of* 0.3766.

4.6.2 Life-cycle profiles

Age-dependent moments offer a more stringent validation test. Below, we compare model-generated life-cycle profiles to data for female labor force participation, full-time employment, consumption, and wealth (asset holdings). With the exception of full-time employment, these moments are not targeted. Thus, the average model household must endogenously reproduce observed behaviors across different stages of the life cycle.

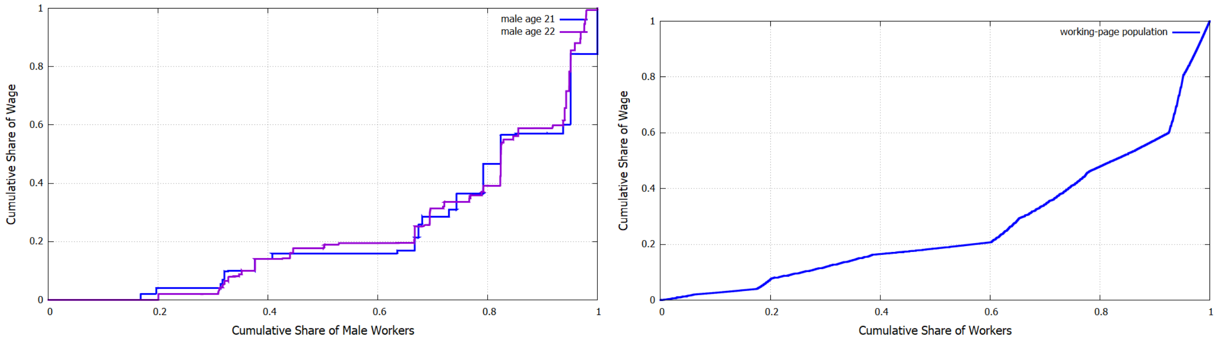


Figure 7: **Lorenz curves of wage distributions. Left:** Lorenz curves of the distributions of married male wages at age 21 and 22 (Gini = 0.35). **Right:** Lorenz curve of the wage distribution of working-age male population (Gini = 0.38).

These comparisons are therefore informative for assessing the model's ability to capture life-cycle dynamics and, by extension, the plausibility of the policy impacts we study.

Female labor force participation and full-time employment share. Figure 8 plots the life-cycle profiles of female labor force participation (a non-targeted moment) and full-time employment share (a targeted moment), comparing model predictions to HILDA data. The model performs reasonably well in matching both empirical profiles up to approximately age 55. Beyond this point, however, it increasingly overpredicts maternal labor force participation, with the gap widening with age. This discrepancy can be attributed to several simplifying assumptions made for tractability: (i) exogenous work hour choices; (ii) absence of health shocks or health-related costs; (iii) mandatory retirement; and (iv) exogenous fertility.

First, agents in the model cannot adjust work hours and do not experience age-related health deterioration that tend to reduce labor supply at older ages. Second, the assumption of exogenous fertility, under which all mothers have children early in adulthood, implies that older women are modeled without dependent children or associated policy distortions. As a result, they encounter fewer barriers to continued workforce participation. In reality, some older women take on childcare responsibilities—whether due to late fertility or custodial roles—and are subject to policy-induced disincentives, which may reduce labor supply. Finally, the mandatory retirement constraint, combined with uninsurable longevity risk, incentivizes higher labor supply among older women in the pre-retirement years as households accumulate precautionary savings. Together, these assumptions contribute to the model's understatement of late-career labor market exit among women.

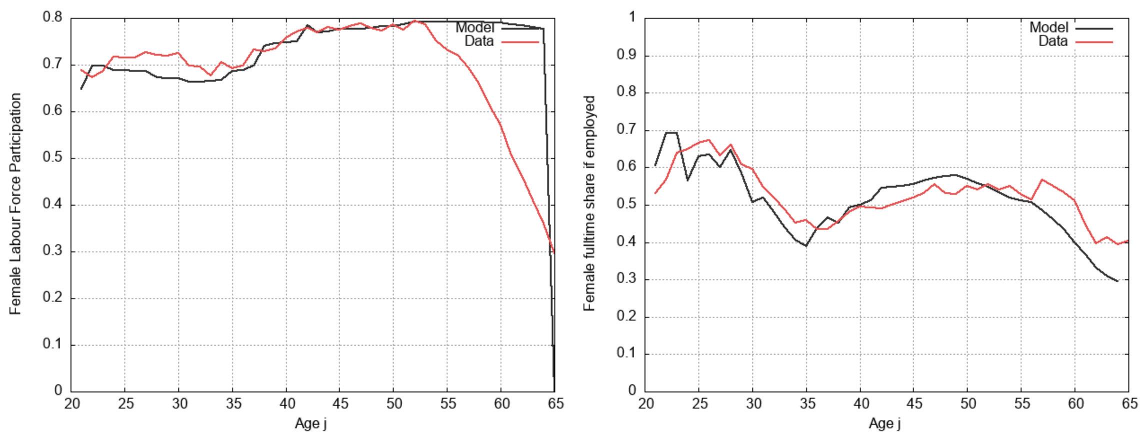


Figure 8: **Model vs Data: Life-cycle profiles of labor supply of mothers. Left:** Labor force participation. **Right:** Full-time share of employment.

To further assess the credibility of the model, we next examine the life-cycle profiles of two key non-targeted moments, wealth and consumption, by comparing model-generated outcomes to estimates from the HILDA survey (Appendix Figure D.2).

Wealth. Figure 9 indicates that the model captures key qualitative features of empirical wealth dynamics over the life cycle. Both the model and the data exhibit a hump-shaped asset profile. Wealth accumulates throughout the working years, peaks around retirement, and decumulates during the post-retirement phase. The model is thus capable of accounting for the increasing wealth effect over the working age.[21]

However, some notable deviations remain. First, the model produces a narrower asset profile with a sharper peak compared to the data. This reflects, in part, the assumption that all households enter the economy with zero wealth. In reality, some young households begin with positive wealth (e.g., through intergenerational transfers) and can adjust fertility based on their economic circumstances. These factors allow for smoother consumption and less abrupt responses to income shocks or child-rearing costs.

Second, the high consumption needs due to children suppress savings in early adulthood. As a result, model households accumulate wealth more slowly during the child-rearing years, before accelerating savings thereafter, particularly from age 40 onward. This acceleration continues into late working years, eventually overshooting observed wealth levels in the data. The absence of post-retirement labor income due to mandatory retirement constraint amplifies the role of savings as a self-insurance mechanism, thus driving the aggressive wealth accumulation observed prior to retirement. Third, the lack of bequest motives and the imposition of a zero terminal asset condition lead to faster decumulation of assets after retirement relative to the data. Finally, the interaction between wealth and labor supply is particularly noteworthy. The pronounced decline in wealth during the child-rearing years, followed by a rapid recovery, reinforces persistent female labor force participation in the model. In particular, model mothers remain in the workforce during later stages of the life cycle partly to rebuild savings depleted earlier in life by child-rearing costs.

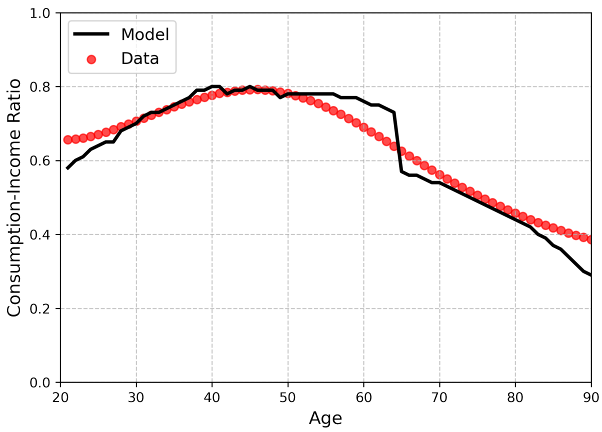


Figure 9: **Model vs Data: Life cycle profiles of wealth and consumption.**

Notes: (*) The estimated wealth profile represents household net worth (assets minus debts) expressed relative to the average annual income of working-age population, based on HILDA household survey data. Assets include financial assets (bank accounts, superannuation) and non-financial assets (property assets, business assets, collectibles). Debts consist of credit card balances, HECS debt, property debt, other personal debt, and overdue household bills. Further details on asset and debt classifications are available in HILDA User Manual - Release 20 (p. 74). (**) The estimated consumption profile is also expressed relative to the average annual income of the working-age population, based on HILDA household survey data. Consumption is derived from annualized household expenditures across multiple categories, including food and beverages, transportation, clothing and footwear, communication and utilities, healthcare, leisure and recreation, household expenses (e.g., repairs, renovations, furniture, appliances), and education and technology. Further details on expenditure classifications are available in the HILDA User Manual - Release 20 (p. 85).

Consumption. Although not targeted, the model-implied life-cycle consumption profile closely tracks the data. It replicates the overall trajectory: a gradual rise that plateaus around age 45, followed by a decline in

[21] To improve comparability, the empirical asset profile from HILDA is rebased relative to its level at age 21, adjusting for the fact that households in the data do not begin with zero wealth.

later life. Additionally, for the first 30 years of economic life, the model and data align closely, with only minor deviations.

The most notable divergence occurs around retirement. The mandatory retirement assumption results in higher pre-retirement income and wealth accumulation relative to the data. Upon retirement, the sudden loss of labor income—only partially replaced by capital income and pension—triggers a negative income effect that leads to a sharp drop in consumption. There are also some discrepancies at very old ages (around 90), likely due to the model's omission of health expenditures and late-life medical shocks.[22] Nonetheless, the observed deviations in pre-retirement labor and savings behavior, driven by the embedded structural constraints, enable model households to self-insure and thus maintain a relatively smooth consumption path that closely matches observed levels in the data.

Summary. Overall, the model captures key empirical patterns in female labor supply, wealth accumulation, and consumption. Still, some discrepancies remain, particularly in the later working years and post-retirement, due to simplifying assumptions. While these assumptions facilitate numerical solution, they constrain the model's ability to replicate certain behavioral margins. In our case, agents are compelled to work and save more intensively before retirement to sustain a consumption trajectory consistent with the empirical profile. Relaxing these assumptions—such as introducing flexible retirement timing, health shocks, or endogenous fertility—may improve the model's empirical fit, especially around retirement and in old age.

5 Quantitative analysis

We use the calibrated model to evaluate the impact of Australia's child-related transfer system on maternal labor supply and welfare. The analysis is organized into three groups of counterfactual policy experiments, presented across subsections that follow.

In Subsection 5.1, we examine whether replacing the current means-tested structure with universal child-related transfers—at varying levels of generosity—can improve maternal labor supply and overall welfare. Subsection 5.2 then turns to more modest, incremental adjustments within the existing means-tested system and compare their implications to those of universal reforms. Finally, in Subsection 5.3, we extend the analysis to a more radical scenario, going beyond the policy design to consider the broader role of public child support. We ask: Do child-related transfers discourage maternal employment? And if so, is there a case for abolishing these programs altogether? These experiments help illuminate the behavioral responses to child-related transfers, as well as their macroeconomic and distributional implications.

We report welfare outcomes from two complementary perspectives. First, we compute ex-ante welfare, measured as the expected utility of newborn households behind the veil of ignorance. This represents the viewpoint of a utilitarian social planner. However, aggregate gains under this metric may be driven by concentrated benefits for a minority while obscuring diffused losses across the broader population. As such, they may not reflect the preferences of a democratic society. To address this, we also assess ex-post welfare changes, evaluated after households have realized their permanent demographic types. This provides a distributional lens to examine the heterogeneity of policy impacts and offers insight into the political feasibility of each reform under a simple majority voting rule.

5.1 Universal child-related transfers

This subsection presents two sets of experiments in which we eliminate all means-testing rules, making child-related transfers universally available to all eligible households with children. Demographic and other non-income eligibility criteria—such as conditions related to the number and age of dependent children, as described in Appendix Section A—are retained.

[22]The kink at retirement also reflects the discontinuous increase in leisure. As leisure jumps to unity, its marginal utility declines abruptly, temporarily disrupting the balance with the marginal utility of consumption. The net effect on consumption depends on how this interacts with the negative income shock from retirement.

The main distinction across these universal systems lies in the generosity of the transfers. In the first reform, referred to as the *baseline universal child-related transfer system,* we preserve the baseline statutory lump-sum payment levels for the Family Tax Benefit (FTB) and the subsidy rates for the Child Care Subsidy (CCS). In the second reform, we maintain the universal system but vary the payment rates to assess whether greater or lesser generosity improves upon the baseline results.

5.1.1 Baseline universal benefit payment

We begin by quantifying the effects on maternal employment and welfare of replacing the current means-tested system with a *baseline universal child-related transfer* scheme, first discussing heterogeneous responses across household types to provide foundation for interpreting the aggregate implications.

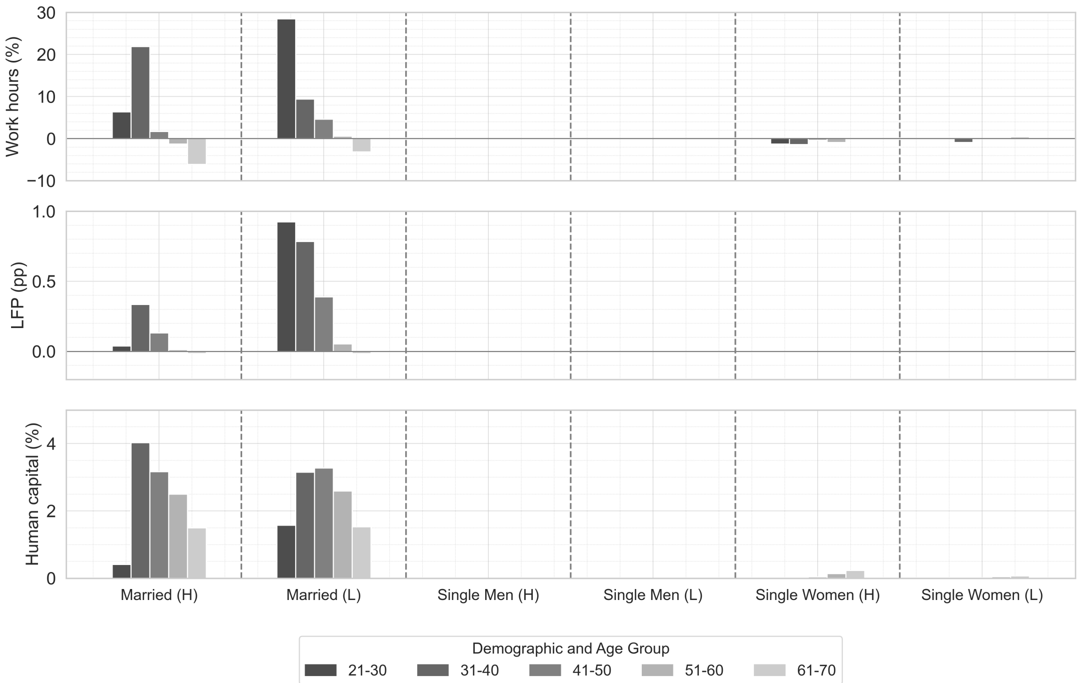


Figure 10: **Changes in female work hours (top), labor force participation (middle), and human capital (bottom) due to universal child benefits.**

Notes: This figure is based on Table E.1 in the Appendix. We report LFP as percentage point (pp) changes, and work hours and human capital as percentage changes (%) relative to their respective values in the benchmark economy.

Heterogeneous maternal employment responses. To better understand the drivers of aggregate maternal labor supply changes, we examine employment responses by family type and education level. Figure 10 illustrates these heterogeneous effects.

Under the universal regime, all mothers receive the maximum lump-sum transfer (FTB) regardless of family income, and all working mothers qualify for the full childcare subsidy (CCS). As discussed in Section 2.3, family-income-based means testing introduces benefit clawbacks that offset earnings gains as secondary earners increase their labor supply. By removing these phase-outs, the reform eliminates implicit taxes that disproportionately affects secondary earners, especially married women.

Indeed, our quantitative results suggest the new universal regime leads to marked increases in labor supply among married mothers, particularly between ages 20 and 40. This period corresponds to the child-rearing years, during which the benchmark means-tested child-related transfers are active and most distortionary. Removing these work disincentives therefore encourages earlier and stronger labor market engagement. The timing is crucial: it coincides with the phase of life when human capital potential is highest (see Equation 7), resulting in compounding gains in long-run productivity and earnings.

This response is especially pronounced among low-education married mothers. Since this group earns lower wages, they face steeper effective marginal tax rates under means testing and are more responsive to the removal of such penalties. However, because of their low productivity and taxable earnings under a progressive tax schedule, their contribution to aggregate output and fiscal revenue remains limited.

In contrast, single mothers exhibit highly inelastic labor supply responses. Their participation changes only marginally, with a small reduction in hours worked. Three key mechanisms help explain this limited responsiveness relative to married mothers.

First, single mothers are already largely insulated from the disincentive effects of means testing. Without a partner, they generally have lower household incomes and thus already qualify for maximum benefits under the benchmark regime. Therefore, the removal income-based phase-outs provides little additional incentive to work. Second, lacking access to spousal income, single mothers rely more heavily on their own labor earnings to smooth consumption and insure against income and longevity risks. Since child-related transfers expire once their children age out of eligibility, continued labor market attachment becomes essential for their long-term financial security. Third, their muted response may also reflect limited adjustment margins in the model. Labor supply is restricted to discrete choices, so intensive-margin adjustments within each employment type (e.g., varying hours within part-time or full-time work) are not captured. While some single mothers shift from full-time to part-time work, additional within-category flexibility could yield further responses. Nonetheless, this modeling limitation is unlikely to overturn the central finding, that labor supply responses to universal transfers are stronger among married mothers than among single mothers.

	Universal child-related transfers		
	[1] Baseline	[2] 1.5×Baseline	[3] 0.5×Baseline
CCS size, %	+129.45	+207.27	−15.45
FTB size, %	+281.40	+430.23	+132.56
Tax scale (λ)	−3.90	−4.80	−0.09
Average tax rate, *pp*	+4.20	+6.13	+0.15
Fe. Lab. For. Part. (LFP), *pp*	+2.64	+3.91	+1.06
Fe. Full time (FT), *pp*	+4.39	+6.29	+0.23
Hour, %	+6.67	+9.57	+1.18
Human cap. (H), %	+2.09	+3.09	+0.40
Savings (S), %	+10.84	+16.43	+9.62
Consumption (C), %	+0.04	+0.08	−0.03
Output (Y), %	+0.11	+0.11	+0.16
Welfare (EV), %	+0.85	+1.50	+0.27

Table 5: **Aggregate and welfare effects of universal child-related transfers with different payment rates.**
Notes: Results are reported as percentage changes relative to the levels in the baseline economy. The middle column shows the aggregate changes associated with the baseline universal scheme.

Aggregate maternal employment effects. The heterogeneous responses discussed above translate into notable gains at the aggregate level. As depicted in Column 1 of Table 5, maternal labor force participation rises by 2.64 pp, accompanied by a 4.39 pp increase in full-time employment share and a 6.67% improvement in average work hours among employed mothers. These labor supply improvements, driven primarily by behavioral changes among married mothers, also lead to a 2.1% gain in female human capital and a modest 0.11% rise in total output.

Importantly, these aggregate outcomes reflect the net effect of competing forces: the elimination of labor supply distortions created by the joint income means testing, the extension of support to previously ineligible high-income families, and the higher taxes required to finance the reform. On balance, the results indicate that the work incentives induced by removing means testing dominate. In other words, the inefficiencies stemming from the strict means-testing rules are large enough that a universal child-related transfer scheme—despite broader benefit coverage and increased tax burden—can still improve maternal employment and aggregate output.

Taken together, our findings support the empirical observations from Section 2, suggesting that the M-shaped life-cycle profile of maternal labor supply in Australia is, at least in part, a consequence of the current child-related policy design, particularly through its distortionary effects on married mothers. These same mechanisms may also help explain gender gaps in earnings, especially those arising from differences in work hours and the cumulative impact of labor market experience on human capital. By contrast, they offer limited explanatory power for the labor supply behavior of single mothers, whose employment decisions remain largely unaffected by the reform.

	Couples (H)	Couples (L)	Single M (H)	Single M (L)	Single W (H)	Single W (L)
Welfare (%)	+1.36	+1.34	−1.47	−1.20	−0.69	−0.51

Table 6: **Welfare changes by demographic due to universal child benefits** (H: High education, L: Low education, M: Men, W: Women).
Notes: Results are reported as percentage changes relative to the levels in the benchmark economy.

Heterogeneous welfare outcomes. While the universal reform boosts macroeconomic performance, it produces sharply divergent welfare effects across demographic groups. These distributional patterns reflect the heterogeneous responses in labor supply, consumption, and wealth accumulation, with the most pronounced differences observed between married and single households.

Married households emerge as clear winners, experiencing average welfare gains of approximately 1.3%, as reported in Table 6. In addition to receiving transfers, increased labor supply during the peak child-rearing years strengthens their capacity for self-insurance, enabling greater savings and facilitating higher and smoother consumption over the life cycle. These dynamics are illustrated in Figure 11. Within this group, the largest improvement is among younger married households, who typically earn lower incomes due to limited human capital early in life and are more likely to be credit-constrained, thereby having higher marginal utilities of consumption compared to older households. Consequently, the transfer-induced increases in consumption during this stage are especially valuable. Moreover, enhanced financial stability allows married women to reduce labor supply intensity and reallocate time toward leisure in later years. These adjustments contribute to more efficient intertemporal allocations of labor and consumption, which help explain the sizeable welfare gains observed for this group.

In contrast, single mothers—the intended beneficiaries of child-related transfers—are disadvantaged under the baseline universal system. The key mechanism behind this outcome is the adverse effect of the tax financing. Providing all families with baseline-level benefits entails a substantial expansion in government spending. Compared to the benchmark, FTB and CCS expenditures rise by 281.4% and 129.5%, respectively. To maintain fiscal balance, the progressive income tax schedule is uniformly shifted upward by adjusting the scale parameter ζ, resulting in a 4.2 pp increase in the average tax rate (Table 5). This broad-based increase raises tax burdens across the income distribution, including for low-income workers.

As a result, because single mothers' labor supply remain largely unchanged under the universal system, they bear the full weight of the higher tax liabilities without corresponding gains in earnings. Furthermore, lacking access to spousal income, credit markets, or alternative insurance mechanisms, they are less equipped to buffer this tax-induced contraction in disposable income. As depicted in Figure 11, these households experience persistent consumption losses throughout the working-age period, which translate into welfare declines of 0.51% for low-education and 0.69% for high-education single mothers. Single childless men are similarly worse off. This group receives no transfers under either regime but face the same increase in tax obligations under the universal system. In net terms, the reform is a redistribution of welfare from single to married households.

Aggregate welfare effects. We now turn to the aggregate welfare outcomes. As reported in Table 5, aggregate welfare—measured as ex-ante lifetime utility—increases by 0.85%. That such welfare gains emerge despite the considerable fiscal cost of a universal system suggests that the efficiency losses embedded in Australia's tightly targeted regime are substantial. The long-recognized trade-off between fiscal targeting and work incentives manifests here in quantitatively meaningful terms. By eliminating benefit phase-outs tied to joint income, the universal reform reduces distortions that dampen maternal labor supply and human capital accumulation. Behavioral changes among married mothers, in particular, drive much of the observed efficiency and welfare improvements. However, this result reflects the benefits concentrated in married households that out-

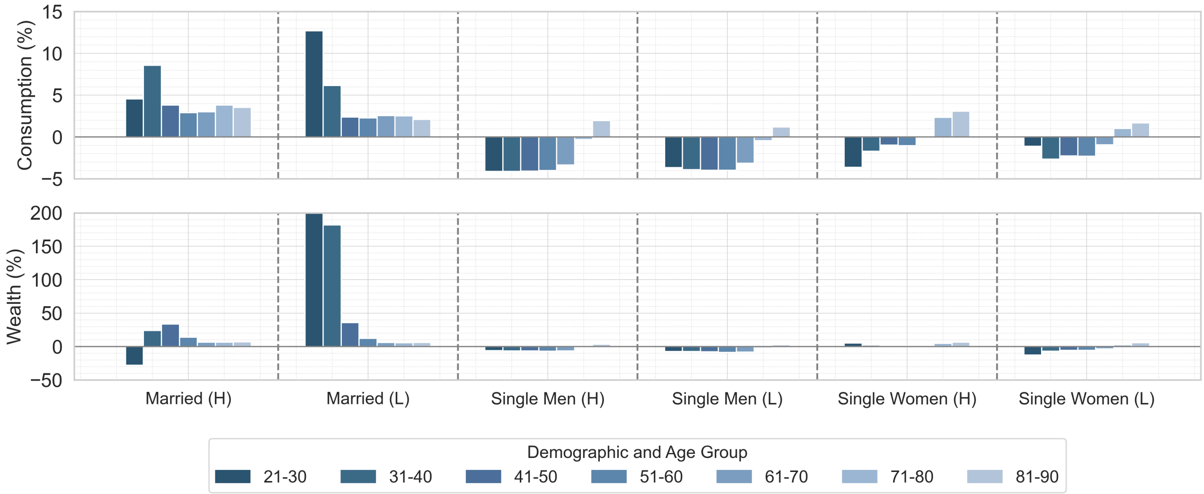


Figure 11: **Changes in consumption (top) and wealth (bottom) due to universal child-related transfers.**
Notes: This figure is based on Table E.2 in the Appendix. Results are reported as percentage changes relative to the levels in the benchmark economy.

weigh losses borne by single households. In particular, low-education single mothers—who derive substantial support under the current means-tested system—are made worse off by the shift toward broad-based universality. The reform is therefore regressive for the most vulnerable group the existing system was intended to support.

Majority support. Despite its adverse distributional effects, the reform would likely pass under a simple majority vote. Married households, who benefit substantially from the universal system, constitute 70% of the population. Assuming voters are not inequality-averse, the welfare gains accruing to this majority group would be sufficient to secure political support for the baseline universal reform.[23]

5.1.2 Alternative universal benefit payment levels

The preceding analysis highlights a key limitation of the baseline universal system: while it increases maternal labor supply and aggregate welfare, it disproportionately harms single mothers due to the excessive fiscal expansion. Without means testing, one potential remedy is to control the generosity of transfers to better balance efficiency and equity.

To evaluate this, we simulate two alternative universal policy scenarios: (i) a reduced universal system, which halves the baseline benefit level; and (ii) an expanded universal system, which increases benefits by 50% relative to the baseline. Columns 2 and 3 of Table 5 summarize the aggregate outcomes, while Figures 12, 13, and 14 present the heterogeneous impacts on welfare, labor supply, and consumption across household types.

Expanded universal system: higher aggregate gains, deeper inequity Under the more generous policy, the average tax rate rises by 6.13 pp, almost 2 points above the baseline universal scenario (see Column 2 of Table 5). Despite this heavier fiscal burden, aggregate outcomes continue to improve: maternal labor force participation increases by 3.91 pp, full-time employment by 6.29 pp, and female human capital by 3.09%. These employment gains are driven by the more generous universal childcare subsidies. Aggregate output also goes up slightly by 0.11%, while ex-ante welfare improves by 1.5%, the largest across all policy experiments we consider.

As with the baseline universal regime, married households—particularly those with low education—reap the greatest benefits. Figures 13 and 14 show significant increases in their early-life labor supply, which, combined with larger transfers, lead to higher lifetime consumption and more leisure in later years. Compared to the

[23]Since the reform also increases the average (ex-ante) welfare, the majority vote outcome aligns with a utilitarian social planner's choice.

baseline, welfare gains grow accordingly from +1.4% to +1.6% for high-education couples, and double for low-education couples, from +1.3% to +2.6%.

However, the expanded generosity further exacerbates the disadvantages faced by single mothers. As in the baseline case, their labor supply remains largely unresponsive. Although they indeed receive larger transfers, these are outweighed by the substantially higher taxes. With limited access to alternative income sources or insurance mechanisms, the resulting decline in disposable income translates into steeper lifetime consumption losses (Figure 14). Consequently, welfare declines worsen to −0.9% for low-education and −1.3% for high-education single mothers.

In short, more generous universal child-related transfers amplify both the macroeconomic gains and the regressive distributional effects. In the absence of means testing, those most in need of support end up shouldering a disproportionate share of the financing burden relative to their limited earnings capacity.

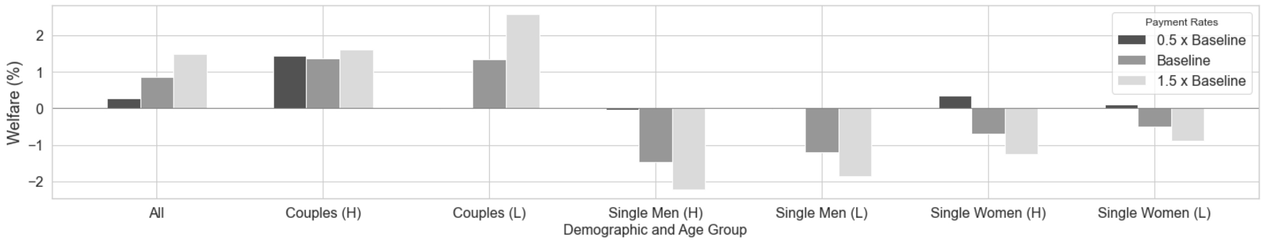


Figure 12: **Changes in welfare by demographic across different universal payment rates.**
Notes: Welfare declines slightly by 0.02% *for low-education couples when the payment rates are* 0.5× *baseline rates. The figure is based on Table E.4 in the Appendix. Results are reported as percentage changes relative to the benchmark economy.*

Reduced universal system: smaller aggregate gains, improved equity

In contrast to the baseline and expanded universal regimes, reducing the generosity of transfers (by halving payments) delivers smaller macroeconomic and welfare gains but produces a markedly more equitable distribution of outcomes. Crucially, this reform eliminates the distortions associated with means testing without introducing significant new tax distortions that would otherwise erode efficiency gains. In effect, it alters the policy design while maintaining a roughly constant fiscal cost. As shown in Column 3 of Table 5, the average tax rate increases by just 0.15 pp, marginally above the benchmark level.

This reduced universal scheme yields modest welfare improvements for both low-education (+0.1%) and high-education (+0.4%) single mothers. These households gain from improved disposable income and higher consumption over the life cycle (Figure 14), which outweigh the losses from lower benefit generosity.

Notably, this reform avoids the regressive tilt and comes close to achieving an inclusive welfare improvement, incurring only minimal equity costs. While single men continue to experience welfare losses, reflecting their role in financing a system from which they receive no direct benefit, these losses are substantially smaller than those in prior scenarios (Figure 12). Among the intended beneficiaries, low-education married households also incur a slight welfare decline of 0.02%. As illustrated in the top panel of Figure 14, their consumption rises by 3–4% throughout much of the life cycle, owing to strong maternal labor supply responses. However, these sustained gains, which even exceed those observed under more generous universal schemes, are insufficient to compensate for their early-life consumption shortfalls. This suggests that the welfare losses are concentrated in the initial stages of life, when marginal utility is highest due to a combination of low joint earnings (reflecting both low education and assortative mating), high dependency ratios from early childbearing, and limited access to credit.

This result highlights the importance of the timing of public transfers. When benefit reductions coincide with periods of acute needs—such as early parenthood among low-income families—the resulting welfare losses may not be fully offset by future increases in earnings or transfers. Early-life supports during these vulnerable

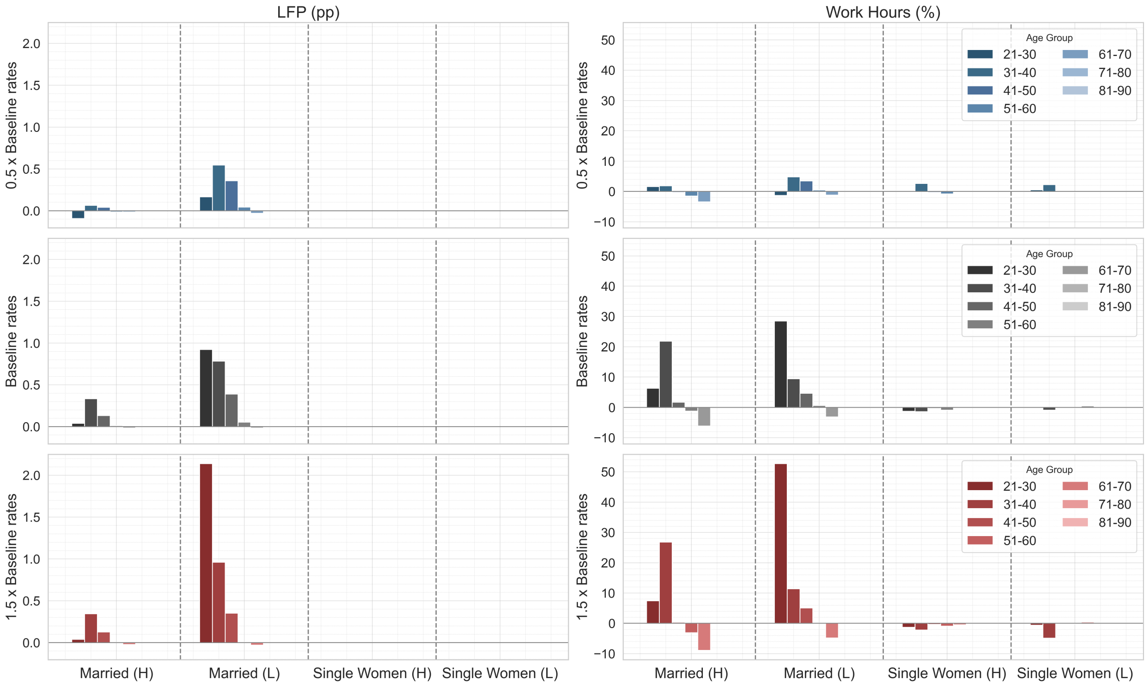


Figure 13: **Changes in female labor force participation (left) and work hours (right) across different universal payment rates: Top**: 0.5×Baseline, **Middle**: Baseline, **Bottom**: 1.5×baseline.
Notes: Figures are based on Table E.3 in the Appendix. LFP and work hours are reported as percentage point (pp) and percentage (%) changes relative to their respective values in the benchmark economy.

child-rearing stages enable more effective consumption smoothing and improve household welfare.[24]

Majority support. Under a majority voting rule, the political feasibility of universal child-related transfers depends on the generosity of benefits, which shapes their differential welfare impacts across household types. Specifically, married couples favor more generous universal programs, while single households prefer more modest alternatives. Compared to the baseline universal system, bigger transfers further enlarge welfare gains for married households—up to 2.6% for low-education couples—while deepening losses for single mothers (−1.3%) and single men (−1.9%). Because the gains are concentrated among demographically dominant groups, the expanded universal regime would still pass a majority vote, despite its more regressive distributional outcomes. Conversely, scaling down the payment to 50% of the baseline level improves both aggregate welfare (+0.27%) and equity. Single mothers now register modest welfare gains (0.1% to 0.4%) due to a more favorable trade-off between transfers received and taxes paid. However, despite these improvements in distributional fairness, the reform lacks majority backing. The pivotal voting bloc, married households, continues to prefer the more generous alternatives that offer them higher welfare. As a result, a majority coalition can block the fiscally conservative proposal.

Taking stock. Our findings contrast with those of Guner et al. (2020) in the U.S. context, where means-tested child-related transfers were shown to deliver greater welfare gains than universal alternatives. This divergence reflects fundamental institutional differences. Compared to the U.S., Australia's child-related transfers—primarily delivered as lump-sum payments and childcare subsidies—are more generous and subject to stricter, more pervasive means-testing based on joint family income. In such a setting, the labor supply distortions and associated efficiency losses are magnified. This contrast underscores that policy reform outcomes are context-dependent and shaped by a country's existing institutional architecture.

Our analysis also emphasizes the critical role of transfer generosity in shaping both efficiency and inclusion,

[24] Cross-regime comparisons in Figure 14 support this conclusion. Low-education couples exhibit smaller late-life consumption increases under more generous universal systems, due to heavier tax burdens. Yet their welfare gains are larger, indicating that: (i) welfare outcomes are primarily driven by early-life consumption; (ii) marginal utility is highest in early adulthood due to concave utility; and (iii) early transfer cuts are not fully offset by future earnings.

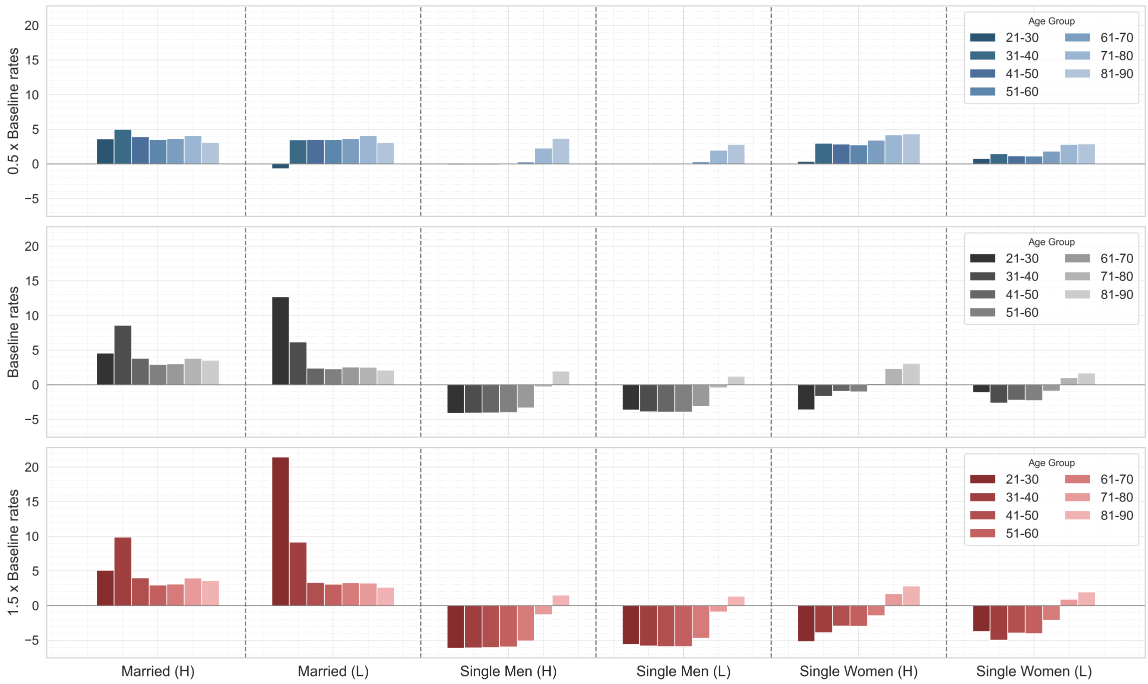


Figure 14: **Changes in consumption across different universal payment rates. Top**: 0.5×Baseline, **Middle**: Baseline, **Bottom**: 1.5×baseline.
Notes: The figure is based on Table E.4 in the Appendix. Results are reported as percentage changes relative to the benchmark economy.

though not always in ways anticipated in public discourse. A more generous universal system delivers larger aggregate gains in labor supply, output, and welfare. However, its unintended distributional consequences undermine the redistributive goals of child-related policies by shifting the fiscal burden onto vulnerable households. In contrast, a scaled-down universal scheme limits tax-induced distortions and achieves more inclusive gains. These results show that without a careful balance between benefit generosity and fiscal incidence, even well-intentioned reforms may become regressive.

5.2 Incremental reforms to the means-tested system

The preceding subsection demonstrates that universal child-related transfers can be designed to improve efficiency and ex-ante welfare while supporting vulnerable parent groups. However, childless households—particularly single men—continue to experience welfare losses, as they remain net contributors. A key constraint lies in the fiscal burden required to finance a universal system. While Australia's current means-tested approach addresses this by targeting transfers to low-income families, it also introduces sharp work disincentives that ultimately reduce overall efficiency.

Motivated by these trade-offs, we next examine whether incremental adjustments to the existing means-tested policy parameters can enhance welfare without incurring the fiscal and distributional costs of a universal system. In principle, such reforms can succeed if they broaden the tax base (e.g., by increasing labor supply) sufficiently to offset the financing costs of transfers. The complexity of Australia's means-testing rules—encompassing payment levels, income thresholds, phase-out (taper) rates, and work and demographic criteria—create a rich policy space. To keep the analysis tractable while drawing out key insights, we narrow our scope to a set of plausible reforms. These include variations to payment levels and phase-out rates for each of the two child-related transfer programs (FTB and CCS). Table 7 summarizes the macroeconomic and ex-ante welfare effects across these scenarios.

Among the reforms considered, two stand out for their positive ex-ante welfare effects: increasing FTB payments and relaxing the CCS phase-out rates, which yield welfare increases of 0.28% and 0.37%, respectively.

However, their macroeconomic outcomes diverge. While relaxing the CCS taper boosts maternal labor supply and output, expanding FTB payments generates declines on both fronts. Given its superior performance across efficiency and welfare dimensions, we focus the remainder of the analysis on the aggregate and distributional consequences of the CCS phase-out reform.

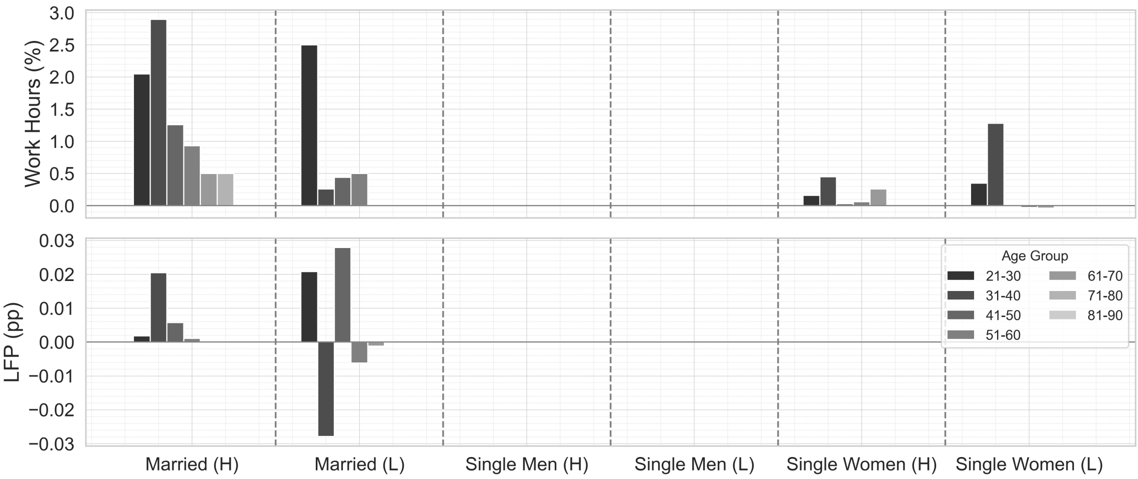


Figure 15: **Changes in work hours (top) and labor force participation (bottom) due to relaxing the CCS phase-out rates.**

Notes: LFP and Work hours are reported as percentage point (pp) and percentage (%) changes relative to their respective values in the benchmark economy.

Heterogeneous maternal employment responses. Labor supply responses vary across family types and education levels. Relaxing the CCS phase-out rate extends childcare subsidy eligibility further up the income distribution. This broader coverage softens the EMTRs faced by secondary earners, which arise from the interaction between means testing and progressive income taxation. As a result, both low- and high-education mothers benefit from this reform.

As illustrated in Figure 15, low-education married mothers respond strongly, especially in their early working years (ages 20–30), when childcare expenses are high and credit constraints most binding. Expanded subsidy support during this critical stage encourages them to work more, especially in full-time roles. Later in life, some decline in labor supply is observed, suggesting a reversion to more leisure as financial constraints ease due to earlier savings. High-education married mothers exhibit even stronger labor supply responses during their prime working years. In the benchmark economy, this group faced steep EMTRs due to higher productivity and earnings, which placed them in upper tax brackets. By extending subsidy coverage further up the income distribution, the reform alleviates these disincentives, leading to substantial increases in work hours. Among single mothers, while participation margins remain inelastic, we observe a shift from part-time to full-time employment in early adulthood as reflected by their increased work hours. This behavioral change was absent under the baseline and expanded universal reforms, where competing forces—such as higher taxes and universally available lump-sum transfers from the FTB—diluted the work incentives created by childcare subsidies. Still, single mothers exhibit minimal responses in participation, indicating structural constraints beyond subsidy design.

Importantly, the reform avoids the crowding-out effects seen under the universal regime. In that setting, older high-education mothers—whose children had aged out of eligibility for child-related transfers—faced sharply increased tax burdens. This led to premature workforce exits despite their high accumulated human capital. In contrast, the more targeted and fiscally restrained design of the CCS taper reform preserves work incentives for this productive group, sustaining their labor market attachment (see Figure 13).

Aggregate maternal employment effects. The heterogeneous labor supply responses translate into measurable improvements in macroeconomic indicators. As shown in Table 7, maternal labor force participation

Incremental reforms to the means-tested system								
	FTB payment rates		CCS subsidy rates		FTB phase-out rates		CCS phase-out rates	
	$0.5 \times tr$	$1.5 \times tr$	$0.5 \times sr$	$1.5 \times sr$	$0.5 \times \omega^F$	$1.5 \times \omega^F$	$0.5 \times \omega^C$	$1.5 \times \omega^C$
Tax rate, *pp*	−0.36	+0.19	−1.37	−0.69	+2.08	+3.34	−0.97	+1.28
Tax scale (λ)	+0.26	−0.94	+1.62	+0.48.	−0.14	−1.54	+0.01	+0.01
Fe. LFP, *pp*	+1.13	−2.87	−5.65	+1.00	+1.69	−2.94	+0.17	−2.66
Fe. Hour, %	+3.28	−5.05	−10.89	+3.67	+1.13	−5.47	+1.00	−5.32
Fe. H. Cap, %	+0.92	−2.22	−4.95	+0.93	+0.76	−2.21	+0.22	−2.49
Savings. (S), %	−0.48	−2.41	−0.32	−1.45	−4.62	−6.93	+1.52	−3.44
Cons. (C), %	−0.17	−1.09	−2.41	+1.03	+1.36	−1.55	+0.46	−2.06
Output (Y), %	+0.88	−1.08	−1.52	+2.20	+0.81	−1.67	**+0.89**	−1.42
Welfare (EV), %	−0.82	+0.28	−0.41	−0.02	−0.44	−1.41	**+0.37**	−0.61

Table 7: **Aggregate effects of incremental reforms to selected means-testing parameters.**
Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy. Let tr denote the FTB payment rates, sr denote the CCS subsidy rates, ω^F denote the FTB phase-out rates, and ω^C denote the CCS phase-out rate (a reciprocal of the taper unit which is the amount of income increment by which the subsidy rate falls by 1pp*). ϕ_p is a scaling factor for a particular policy parameter. For example, $\phi_p \times tr^{FTB}$ when $\phi_p = 1.5$ means that the FTB payment rates are increased* 1.5 *times.*

increases by 0.17 pp, while work hours rise by 1%. While these changes appear modest, they generate sizeable macroeconomic effects: aggregate consumption rises by 0.46%, and output increases by 0.89%. Notably, these gains exceed those achieved under the universal reform scenarios (see Section 5.1), even though the latter produce larger total rise in labor supply. The key insight here is that who responds matters as much as how much overall labor supply increases.

Crucially, the largest labor supply gains come from high-education married mothers, a demographically smaller but economically significant group due to their high productivity. By strengthening work incentives for this group, without imposing offsetting tax burdens that would crowd out their labor supply during prime working years, the policy generates efficiency gains that exceed what might be expected based on aggregate labor supply metrics alone.

Heterogeneous welfare outcomes. Welfare gains under the CCS taper reform are modest but notably inclusive in their distribution, as summarized in Table 8. This stands in sharp contrast to the universal reform scenarios, where some households, including single mothers, bore substantial costs.

This distinction is central. Under universal schemes, aggregate welfare gains were achieved at a high fiscal cost and primarily driven by concentrated improvements among married households, while redistributing resources away from more vulnerable groups. In contrast, the CCS taper reform maintains a low fiscal cost and promotes maternal labor supply across education levels. This broadens the tax base, further mitigating fiscal pressure. The enhanced revenue flows via income and consumption taxes, as well as reduced reliance on the FTB, more than offset the additional public spending on the CCS.[25] Overall, the reform enables a 0.97 pp reduction in the average tax rate, in stark contrast to the 4.2 pp increase required under the baseline universal policy. In this way, the redistributive goal is attained in a fiscally sustainable manner, spreading modest yet widespread benefits across the population. These patterns are reflected in the life-cycle profiles of consumption changes in Figure 16.

Married households enjoy the largest welfare improvements, ranging from 0.38% to 0.44% Increased labor supply significantly enhances their consumption over the life cycle, particularly among young couples. Single mothers also benefit, albeit to a lesser extent. While their participation response is limited, this group still gains from the expanded subsidy coverage and reduced tax burdens, which support higher consumption and improve financial resilience.

Perhaps most striking are the welfare outcomes recorded for single childless men. Under universal reforms, this group suffered welfare losses due to increased taxation. Here, however, they benefit indirectly from the general equilibrium effect of reduced average tax rates, which improve disposable income and consumption. Thus, the reform's fiscal sustainability ensures that enhanced support and work incentives for mothers do not necessitate offsetting tax burdens elsewhere. Instead, the policy's fiscal surplus allows even childless households to share in the gains.

Aggregate welfare effects. The broad-based welfare increases under this new regime translates into a meaningful aggregate improvement. As reported in Table 7, ex-ante welfare for newborn households rises by

[25] Under this reform, CCS expenditures expand by 11.12%, whereas FTB outlays fall by 2.32%.

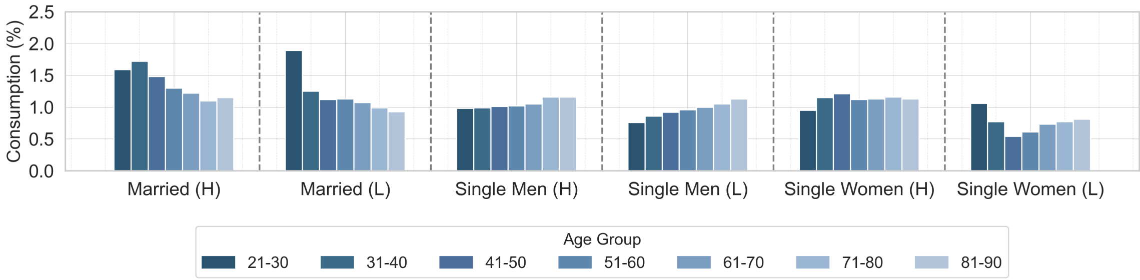


Figure 16: **Changes in consumption in response to the relaxation of CCS taper rates.**
Notes: The figure is based on Table E.5 in the Appendix. Results are reported as percentage changes relative to the benchmark economy.

0.37%, driven by the higher disposable earnings and consumption across a wide range of demographic groups. While this aggregate gain is smaller than the 0.85% increase achieved under the baseline universal system, it comes at a markedly lower fiscal cost and without imposing welfare losses on any subgroup.

The broad-based welfare improvements under the CCS taper reform translate into a meaningful aggregate gain. As reported in Table [table:incremental_reforms], ex-ante welfare for newborn households increases by 0.37%, driven by higher disposable income and consumption across a wide range of demographic groups. While this aggregate gain is smaller than the 0.85% increase achieved under the baseline universal system, it is attained at significantly lower fiscal cost and without imposing welfare losses on any subgroup.

	Couples (H)	Couples (L)	Single M (H)	Single M (L)	Single W (H)	Single W (L)
Welfare (%)	+0.42	+0.40	+0.34	+0.24	+0.26	+0.18

Table 8: **Welfare changes due to relaxing (halving) the CCS phase-out rates.** (H: High education, L: Low education, M: Men, W: Women).
Notes: Results are reported as percentage changes relative to the levels in the benchmark economy.

Majority support. Despite its favorable efficiency and equity profile, the incremental reform may struggle to attract majority support. Married households—the largest voting bloc—derive greater welfare gains under the universal regime, exceeding 1.3% (Figure 12), compared to only around 0.4% under the incremental reform. Hence, the latter policy is likely to be politically dominated, even if it is superior from an equity-efficiency standpoint.

Taking stock. The CCS taper reform is noteworthy not for the size of its aggregate gains, but for the nature of those gains. Rather than relying on large-scale redistribution, it leverages behavioral responses—particularly from high-productivity mothers—to sustain fiscal discipline, broaden the tax base, and raise disposable incomes across the board. This mechanism generates inclusive welfare improvements for both direct beneficiaries and non-beneficiaries, in contrast to universal reforms that require heavy taxation and often generate regressivity that undermines their own redistributive aims. In this light, the CCS taper reform demonstrates how carefully targeted, incremental policy adjustments can offer a pragmatic and normatively attractive path forward.

Yet the reform's distributional outcome exposes a deeper political tension. As shown, under majority voting, generous universal regimes, despite being more costly and less equitable, are more appealing to married households, the dominant voting bloc. Without institutional mechanisms to elevate disadvantaged voices or broaden public awareness of the incremental reform's inclusive benefits, such policies risk being politically marginalized. This asymmetry highlights a core challenge in welfare reform: normative desirability does not necessarily align with political viability. Reforms that promote a better balance between efficiency and equity may nonetheless fail to gain traction if they conflict with majority preferences.

Finally, a caveat is warranted. Our experiments are confined to discrete changes in selected policy parameters. A broader and more systematic exploration of the means-testing design space may uncover alternatives that further improve upon the proposed policy.

5.3 Abolishing child-related transfers

In this section, we evaluate the social desirability of Australia's existing child-related transfers. Specifically, we ask whether these programs promote efficiency and redistribution, or whether the behavioral distortions they introduce outweigh their benefits. This experiment can also serve as a benchmark against which to assess the net value of the universal and incremental reform packages. To this end, we simulate a policy scenario that abolishes both the FTB and the CCS, effectively dismantling the core pillars of Australia's financial support system for families with children. The analysis is conducted under the same public budget balance constraint as previous reforms.[26]

Abolishing the FTB and CCS programs			
Average tax rate, *pp*	+0.99	Human cap. (H), %	+8.57
Tax scale (λ)	+0.003	Savings (S), %	+23.45
Fe. Lab. Force Part. (LFP), *pp*	+10.49	Consumption (C), %	+4.27
Fe. Full time (FT), *pp*	+20.38	Output (Y), %	+3.86
Hour, %	+28.67	Welfare (EV), %	−0.66

Table 9: **Aggregate effects of eliminating child-related transfers.**
Notes: Results are reported as changes relative to the levels in the benchmark economy.

Heterogeneous maternal labor supply responses. Abolishing child-related transfers generates varying labor supply responses across demographic groups, with pronounced effects among married mothers. Figure 17 reveals that the largest increases in both labor force participation and hours worked come from low-education married mothers. A significant share of women in this group enters full-time employment during early adulthood (ages 21–40) when labor market engagement has the greatest returns in terms of human capital accumulation and earnings growth.

In contrast, single mothers exhibit minimal changes in participation. Their response occurs mainly along the intensive margin, shifting toward longer work hours to offset the income loss from foregone transfers. Though non-trivial, these adjustments are modest relative to the stronger extensive and intensive margin responses observed among married mothers. This pattern reflects the fact that single mothers were less exposed to joint-income assessments under the benchmark regime and therefore faced weaker work incentives from reductions in effective marginal tax rates.

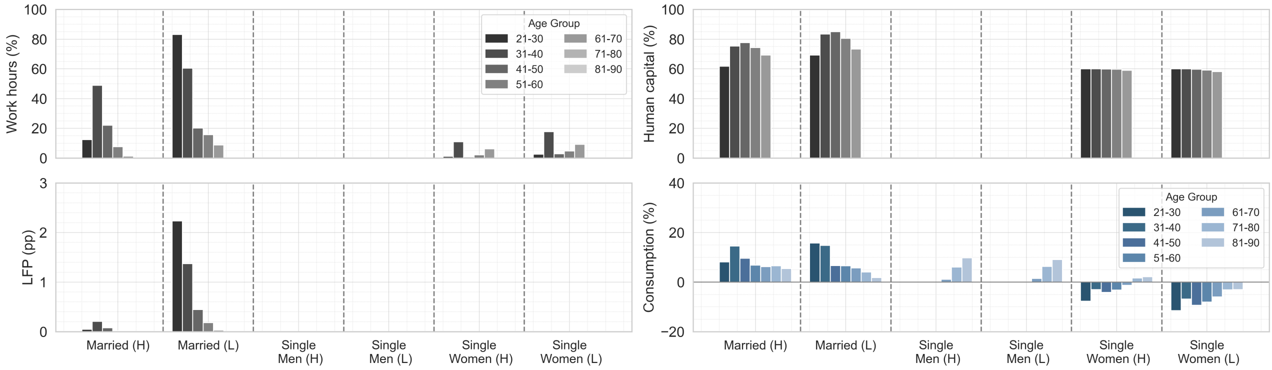


Figure 17: **Labor supply and consumption changes by demographic due to removing all child benefits. Top-left**: Work hours, **Bottom-left**: Labor force participation, **Top-right**: Human capital, **Bottom-right**: Consumption.
Notes: Results for 'Married households' capture the responses by the female spouses. Figures are based on Tables E.6 and E.7 in the Appendix. LFP and Work hours are reported as percentage point (pp) and percentage (%) changes relative to their respective values in the benchmark economy.

Aggregate maternal employment effects. The heterogeneous responses outlined above culminate in the strongest macroeconomic performance among all the policy scenarios considered. As reported in Table 9, female labor force participation increases sharply by 10.5 pp, full-time employment rises by 20.4 pp, and average hours worked grow by 28.7%. These aggregate outcomes indicate substantial efficiency improvements driven

[26] Results for the removal of the FTB or the CCS program individually are reported in the Appendix.

by eliminating the steep effective marginal tax rates (EMTRs), which previously arose from the interaction of overlapping joint-income means tests and progressive taxation. Without such transfer-induced distortions, work becomes significantly more rewarding, particularly for married mothers previously caught in the benefit phase-out zones. Ultimately, the changes generate an 8.6% increase in female human capital and a 3.9% rise in aggregate output.

Heterogeneous welfare outcomes. Despite strong aggregate performance, Table 10 and Figure 17 reveal that the welfare effects of abolishing child-related transfers are highly uneven. This asymmetry mirrors both the heterogeneity in labor supply responses and the varying degrees of dependence on the transfer system across demographic groups.

For some households, removing transfers lifts disincentives, unlocks latent labor supply, and increases disposable income. For others, particularly those with limited capacity to adjust (e.g., due to child-related monetary or time constraints), labor supply responses are relatively weaker. In such cases, child-related transfers serve as a critical form of insurance, and the resulting income gains are insufficient to compensate the welfare losses arising from the absence of public support.

	Couples (H)	Couples (L)	Single M (H)	Single M (L)	Single W (H)	Single W (L)
Welfare (%)	+1.35	−0.22	+0.02	+0.06	−4.03	−6.53

Table 10: **Welfare effects due to the elimination of all child benefits**. (H: High education, L: Low education, M: Men, W: Women).
Notes: Results are reported as percentage changes relative to the levels in the benchmark economy.

Single mothers, who fall into this latter category, are the most adversely affected by the reform. Lacking spousal income and facing heightened financial and time constraints due to children, they rely heavily on government transfers to maintain consumption during the early child-rearing years (ages 20–35)—a period marked by low earnings, limited human capital stock, and high household needs. Following the reform, their consumption falls over the life cycle, with drops of up to 10% in early adulthood. Correspondingly, welfare declines sharply: by 4% for high-education single mothers and 6.5% for those with low education. These outcomes underscore the vital insurance role that child-related transfers play in supporting vulnerable families.

Among married households, low-education couples also experience modest welfare losses (–0.22%). While they enjoy higher lifetime consumption, these gains are counterbalanced by the disutility from intensified work effort and reduced leisure. The net result is a slight decline in welfare. In contrast, high-education married households are the primary beneficiaries of the reform. They rely less on transfers and possess greater human capital potential, which allow them to benefit more from the improved work incentives. For this group, stronger early-life labor market engagement yields significant increases in lifetime earnings and consumption, achieved with relatively modest increases in labor supply. As a result, high-education married households register the largest welfare improvement of 1.35%, comparable to the gains observed under universal reforms.

Finally, single men also see slight welfare gains. As non-beneficiaries, they are largely unaffected by the removal of child-related transfers but benefit indirectly through reduced tax burdens and marginal improvements in disposable income. These gains, though small, are consistent with the broader pattern of redistribution reversal under the new policy.

Aggregate welfare effects. Abolishing the FTB and CCS programs effectively dismantles Australia's critical mechanisms that support low-income families with dependent children. Despite delivering substantial macroeconomic performance, overall welfare falls by 0.66% for newborn households (Table 9). This outcome reflects a fundamental trade-off in welfare reform: although means-tested transfers introduce behavioral distortions that reduce efficiency, their redistributive and insurance functions more than compensate in terms of household welfare.

The eliminations of these programs significantly improves work incentives, but it simultaneously erodes the capacity of low-income families—particularly single mothers—to smooth consumption during periods of low earnings and high childcare costs. Their welfare losses outweigh the gains for high-education married households, even under a utilitarian social welfare criterion that does not account for social aversion to inequality or potential impacts on fertility and child development. In this context, the efficiency gains from eliminating distortions do not, in themselves, guarantee broad-based welfare improvements. These findings reaffirm the essential role of child-related transfers as instruments of redistribution and insurance, despite their distortionary effects.

Majority support. The elimination of child-related transfers imposes significant welfare losses on vulnerable households, including low-education married couples and single mothers. Together, these groups constitute a majority voting bloc, rendering the reform politically infeasible under a simple majority rule.

Taking stock. The abolition of child-related transfers illustrates the power of policy to influence maternal labor supply. By removing high effective marginal tax rates, the reform releases previously suppressed labor supply and human capital potential among married mothers, leading to considerable aggregate efficiency gains.

Our results, particularly at the intensive margin of labor supply, are consistent with Hannusch (2022), who document the central role of child benefit policies in shaping maternal labor market behavior. However, on the extensive margin, while abolishing these transfers leads to greater participation gains than the universal and incremental reforms, it still falls short of fully bridging the maternal participation gap shown in Figure 2. Hence, although child-related transfers are a key determinant, this finding suggests that other structural barriers beyond the transfers contribute to the persistence of this gap.

More broadly, our analysis underscores the importance of accounting for behavioral heterogeneity in policy design. Family structure and related constraints shape both labor responses and welfare outcomes. While married mothers are more responsive to improved work incentives, single mothers are less able to adjust their labor supply and more vulnerable to benefit reductions. As a result, their welfare declines substantially even as the economy expands. These heterogeneous effects influence not only aggregate impacts but also the fairness and feasibility of reform. Ignoring them risks mischaracterizing the true winners and losers, thereby weakening the foundations of sound policy evaluation.

5.4 Support across reforms

This subsection provides a more comprehensive comparative assessment of the political feasibility of the child-related transfer reforms analyzed in this paper. We compare all proposed designs, providing a structured lens to evaluate which policies are likely to garner support, and which, despite technical merits, may be politically infeasible.

	Couples (H) 21%	Couples (L) 49%	Single M (H) 4.2%	Single M (L) 9.8%	Single W (H) 4.8%	Single W (L) 11.2%	Newborn (Ex-ante)
Removal	+1.35	-0.22	+0.02	+0.06	-4.03	-6.53	-0.66
Incremental	+0.42	+0.40	+0.34	+0.24	+0.26	+0.18	+0.37
Universal (Base)	+1.36	+1.34	-1.47	-1.20	-0.69	-0.51	+0.85
Universal (0.5)	+1.44	-0.02	-0.04	-0.02	+0.36	+0.10	+0.27
Universal (1.5)	+1.61	+2.59	-2.23	-1.86	-1.26	-0.88	+1.50

Table 11: **Welfare changes by household type**.

Notes: Results are reported as percentage changes relative to the levels in the benchmark economy.

	Couples (H) 21%	Couples (L) 49%	Single M (H) 4.2%	Single M (L) 9.8%	Single W (H) 4.8%	Single W (L) 11.2%	Newborn (Ex-ante)
Removal	4	5	2	2	5	5	5
Incremental	5	3	1	1	2	1	3
Universal (Base)	3	2	4	4	3	3	2
Universal (0.5)	2	4	3	3	1	2	4
Universal (1.5)	1	1	5	5	4	4	1

Table 12: **Rankings of Policy Preferences (1 = Most Preferred, 5 = Least)**.

Table 12 presents ordinal rankings of each policy alternative by demographic group. The results reveal a clear alignment between demographic structure and policy preferences. Single mothers overwhelmingly favor the incremental reform, which preserves much of the existing insurance while delivering modest efficiency gains. Conversely, married couples—especially those with higher education—consistently prefer universal regimes, especially more generous variants, due to the concentrated welfare gains they receive. Similarly, *ex ante* newborn households, who have not yet realized their demographic type, also support generous universal regimes. This reflects strong general preference for broad-based transfer entitlements in the absence of information about one's future demographic type.

These patterns imply that universal reforms are likely enjoy robust political support under majority rule, even before considering their simplicity, perceived fairness, or certainty. Furthermore, we show that once implemented, such policies are likely to become entrenched and expanded over time, even if they ultimately undermine the redistributive objectives of the original transfer system.

By contrast, an incremental reform of relaxing the CCS taper rate, which improves labor supply incentives while retaining redistributive intent, offer a more balanced approach. However, such policies are politically vulnerable: they are favored in head-to-head comparisons against the status quo or against the abolition proposals, but lose out when universal alternatives that offer larger gains to the electoral majority are included on the ballot.

Take stock. Policymakers must navigate trade-offs between political feasibility, equity, and efficiency. In the Australian context, we show that reforms that switch to a universal system enhance efficiency and command majority support, but do so at the expense of vulnerable groups. This distributional consequences become salient when assessed through a lifetime welfare perspective. Given Australia's existing institutional setting, our findings point to a political bias toward universal systems. Once adopted, such systems generate strong political inertia, making reversal or redirection toward more targeted alternatives difficult, even when such alternatives are more equitable or efficient.

Designing reforms that are both politically viable and normatively progressive therefore requires anticipating these institutional dynamics. While universal systems may be easier to implement, carefully calibrated incremental reforms could offer a more equitable and fiscally sustainable path forward.

6 Conclusion

This paper develops a dynamic general equilibrium lifecycle model of single and married households to study the impacts of different designs of a child-related transfer system on maternal labor supply, macro-aggregates and welfare in advanced economies. The model is calibrated to Australia, a country with unique policy design, which provides a distinct contrast to Europe's generous universal approach and the United States' more modest, means-tested approach.

Our quantitative analysis reveals a complex trade-off between efficiency and equity. The current means-tested system channels support to low-education married couples and single mothers while keeping fiscal costs in check. However, it imposes steep effective marginal tax rates that discourage maternal labor supply. Switching to a universal system by abolishing all means-test rules removes these distortions and leads to significant increases in maternal employment, output, and ex-ante welfare. Moreover, we show that married households—the majority—benefit from generous universal reforms, while the required tax increases reduce the lifetime income and welfare of single mothers—the minority and the intended beneficiaries of child-related transfers. These heterogeneous welfare outcomes highlight the distributional challenges of universal systems and the difficulty of securing sufficient support for more inclusive policies.

Our findings have three implications. First, well-intended policies that overlook fiscal and behavioral constraints can inadvertently harm their target populations—effects that become apparent when viewed through a life-cycle lens. Second, accounting for the institutional features of the baseline fiscal system is crucial, as they shape both the welfare consequences and the political support of a reform. Third, well-calibrated incremental reforms to the means-tested system can enhance efficiency while promoting fiscal sustainability and delivering a more equitable distribution of welfare gains.

Our findings have three key implications. First, well-intended policies that overlook fiscal burden and behavioral responses can inadvertently harm their target populations, particularly when considering effects over the entire life cycle. Second, incorporating the institutional features of the baseline fiscal system is essential, as they influence both the welfare outcomes and the political support for reforms. Third, carefully designed incremental reforms to the means-tested system can improve efficiency, enhance fiscal sustainability, and deliver a more equitable distribution of welfare gains.

Finally, our paper abstracts from endogenous fertility and marriage decisions, the analysis of transition dynamics, and the joint design of tax and transfer systems. Future research could extend the analysis along these dimensions. Moreover, explicitly modeling social preferences over equity—through alternative social welfare criteria or political economy constraints—would provide sharper normative guidance for policy evaluation.

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Technical Appendix for "Child-Related Transfers, Means Testing and Welfare"

Darapheak Tin and Chung Tran

A The design of Australia's child-related transfer system

The Australian tax and transfer system features progressive income taxes and highly targeted transfers. Key components of the income tax system include a progressive tax schedule, alongside various deductions, concessions, offsets, and surcharges. This progressive schedule applies to individual taxable income, which encompasses both labor and capital earnings. Government welfare transfers are typically subject to complex means-testing rules, including varying benefit levels, multi-tier income and asset test thresholds, phase-out rates, and demographic criteria.

Financial year	Welfare ($b)	Welfare-GDP (%)	Welfare-Revenue (%)
2010-11	140.19	8.43	34.04
2011-12	149.66	8.70	34.20
2012-13	153.24	8.89	33.62
2013-14	155.68	8.88	33.47
2014-15	165.13	9.41	35.15
2015-16	167.68	9.47	34.59
2016-17	165.76	8.95	33.02
2017-18	171.62	8.99	32
2018-19	174.24	8.80	31.18
2019-20	195.71	9.86	36.05

Table A.1: **Welfare expenditure in Australia**.

Notes: $ value is expressed in 2019−20 prices.
Source: Welfare expenditure report by the Australian Institute of Health and Welfare.

Financial year	Families & Children	Old people	Disabled	Unemployed	Others
2009-10	2.51	3.33	1.87	0.48	0.40
2010-11	2.39	3.33	1.94	0.44	0.34
2011-12	2.33	3.43	1.98	0.44	0.52
2012-13	2.31	3.57	2.00	0.49	0.52
2013-14	2.26	3.47	2.02	0.55	0.57
2014-15	2.33	3.79	2.09	0.59	0.61
2015-16	2.32	3.86	2.08	0.60	0.62
2016-17	2.02	3.72	2.01	0.57	0.63
2017-18	1.94	3.67	2.18	0.56	0.65
2018-19	1.81	3.63	2.22	0.49	0.64
2019-20	1.92	3.85	2.53	0.93	0.62

Table A.2: **Welfare expenditure to GDP (%) by target groups**.

Source: Welfare expenditure report by the Australian Institute of Health and Welfare.

		2001-05	2006-10	2011-15	2016-20*	Total
Income support	Pensions	51.74%	51.35%	57.67%	60.80%	55.79%
	Parenting payments	9.52%	6.58%	5.61%	4.63%	6.39%
	Allowances	14.80%	9.94%	10.62%	11.54%	11.59%
	Total	76.06%	67.87%	73.90%	76.98%	73.77%
Non-income support	Family payments	23.09%	24.96%	22.18%	18.02%	21.87%
	Bonus payments	0.00%	5.55%	1.31%	1.38%	2.07%
	Other non-income supports	0.59%	1.40%	2.51%	3.45%	2.10%
	Total	23.68%	31.91%	26.00%	22.85%	26.05%
Other public benefits		0.26%	0.22%	0.10%	0.18%	0.18%

Table A.3: **Components of Australian public transfers over time.**

*Notes: *Welfare transfers account for roughly 30% of government revenue in the 2016-20 period.*

There are two main child-related transfer programs that provide substantial benefits for families with dependent children: Family Tax Benefit (FTB) and Child Care Subsidy (CCS). The FTB and CCS programs are detailed below.

A.1 Family Tax Benefit part A (FTB-A)

The FTB-A program is a non-taxable transfer paid per child and the amount claimable depends on family's circumstances. In short, it is a function of combined household adjusted taxable income, annual private rent, and age and number of dependent children. Important parameters that determine the levels, kinks and slopes of the FTB-A benefit schedule are: (i) Statutory base and maximum payment rates per qualifying dependent child (i.e., FTB child); (ii) Income test thresholds for the base and maximum payments; (iii) Withdrawal or taper rates for the base and maximum payments, and (iv) Supplements such as the Large Family Supplement (LFS), the Newborn Supplement (NBS), the Multiple Birth Allowance (MBA), the Rent Assistance (RA), and the Clean Energy Supplement (CES) that are added to the statutory base and maximum payment rates per child to derive the total base and maximum payments.

These parameters constitute the main structure of the FTB-A program and may vary from year to year. For our purpose, we adopt the 2018 FTB-A parameters in the initial steady state equilibrium of the model economy. All monetary values are expressed in 2018 AUD.

We first calculate the per child total base payment, b_A, and the per child total maximum payment, m_A, of the FTB-A benefit.

$$\begin{aligned} b_{A,j} = LFS_j + NBS_j + MBA_j + CES_{A,base,j} \\ + ndep_{[0,17],j} \times FTBA_{base_1} \\ + ndep_{[18,24],j} \times FTBA_{base_2} \\ + \mathbf{I}\{\text{school=1}\} ndep_{[18,19],j} \times FTBA_{base_3} \\ + \mathbf{I}\{\text{school=0}\} ndep_{[18,21],j} \times FTBA_{base_4} \end{aligned} \tag{A.1}$$

$$\begin{aligned} m_{A,j} = LFS_j + NBS_j + MBA_j + RA_j + CES_{A,max,j} \\ + ndep_{[0,12],j} \times FTBA_{max_1} \\ + ndep_{[13,15],j} \times FTBA_{max_2} \\ + ndep_{[16,17],j} \times FTBA_{max_3} \\ + ndep_{[18,24],j} \times FTBA_{max_4} \\ + \mathbf{I}\{\text{school=1}\} ndep_{[16,19],j} \times FTBA_{max_5} \\ + \mathbf{I}\{\text{school=0}\} ndep_{[16,17],j} \times FTBA_{max_6} \\ + ndep_{[18,21],j} \times FTBA_{max_7} \end{aligned} \tag{A.2}$$

where $\mathbf{I}\{x\}$ is an indicator function with a logical argument x, *school* is a binary variable for school attendance, and $ndep_{[a,b],j}$ denotes the number of children in the age range $[a, b]$ of parents aged j. $FTBA_{base}$ and $FTBA_{max}$ are parameters corresponding to the statutory base and maximum per dependent child payment rates which vary over age of a child. In 2018, $FTBA_{base} = \{\$2,266.65;\ 0;\ \$2,266.65;\ 0\}$ and $FTBA_{max} = \{\$5,504.20;\ \$6,938.65;\ 0;\ 0;\ \$6,938.65;\ 0;\ 0\}$.

The income test thresholds for base and maximum payments, TH_{base} and TH_{max}, are

$$\begin{cases} TH_{max} & = FTBA_{T_1} \\ TH_{base} & = FTBA_{T_2} + (ndep_{[0,24],j} - 1) \times FTBA_{T_2A} \end{cases} \tag{A.3}$$

The maximum threshold is fixed while the base threshold expands at the rate of $FTBA_{T_2A}$ for every addition of a dependent child. In 2018, the starting income test thresholds $FTBA_T = \{\$52,706;\ \$94,316\}$, and the base payment income test threshold adjustment factor per additional qualifying child $FTBA_{T_2A} = 0$.

We can then calculate the FTB-A benefit

$$FTBA_j^0(y_h) = \begin{cases} m_{A,j} & \text{if } y_h \leq TH_{max} \\ \max\{b_{A,j},\, m_{A,j} - FTBA_{w_1}(y_h - TH_{max})\} & \text{if } TH_{max} < y_h \leq TH_{base} \\ \max\{0,\, b_{A,j} - FTBA_{w_2}(y_h - TH_{base})\} & \text{if } y_h > TH_{base} \end{cases} \tag{A.4}$$

where the total household taxable income $y_h = y_m + y_f + ra$ and $FTBA_w = \{0.20,\, 0.30\}$ is the withdrawal rate.

The statutory rates include extra supplement for low-income households. In our calculation, this supplement is later deducted from the total benefit payment if a household does not meet the supplement's income test cutoff. The income test is conducted separately once the full benefit has been computed

$$FTBA_j(y_h) = \begin{cases} \max\{0,\; FTBA_j^0(y_h) - FTBA_{AS} \times cond\} & \text{if } y_h > FTBA_{FT1} \\ FTBA_j^0(y_h) & otherwise \end{cases} \tag{A.5}$$

where $cond = ndep_{[0,12],j} + ndep_{[13,15],j} + \mathbf{I}(\text{school}=1)ndep_{[16,19],j})$. In 2018, the annual FTB-A supplement adjustment $FTBA_{AS} = \$737.30$ and the supplement's income test threshold $FTBA_{FT1} = \$80,000$.

Below are the formulae used to calculate the LFS, NBS, MBA, CES (for part A and part B), and RA in the model.

Large Family Supplement (LFS):

$$LFS_j = \min\left\{FTBA_{S_1} \times (ndep_{[0,24],j} - FTBA_{C_1} + 1),\; 0\right\} \tag{A.6}$$

where $ndep_{[a,b],j}$ denotes the number of children in the age range $[a, b]$ of parents aged j, $FTBA_{S_1}$is the LFS amount per child, and $FTBA_{C_1}$is the number of dependent children a family must have to be eligible for the LFS for the first child to satisfy the cutoff $FTBA_{C_1}$ and every additional child onward. In 2018, $FTBA_{C_1} = 1$ and $FTBA_{S_1} = 0$.

Newborn Supplement (NBS):

$$NBS_j = \begin{cases} \mathbf{I}\{nb_j \geq 1 \wedge fc_j = 1\}\, FTBA_{NS_1} \times nb_j + \mathbf{I}\{nb_j \geq 1 \wedge fc_j = 0\}\, FTBA_{NS_2} \times nb_j & \text{if } ppl = 0 \\ \mathbf{I}\{nb_j \geq 2 \wedge fc_j = 1\}\, FTBA_{NS_1} \times (nb_j - 1) + \mathbf{I}\{nb_j \geq 2 \wedge fc_j = 0\}\, FTBA_{NS_2} \times (nb_j - 1) & \text{if } ppl = 1 \end{cases} \tag{A.7}$$

where nb_j denotes the number of newborns to parents aged j, fc_j is a binary variable for first child, ppl is a binary variable for Paid Parental Leave (by default, we set $ppl = 0$), and $FTBA_{NS}$ is the amount of NBS per qualified child. In 2018, $FTBA_{NS} = \{\$2,158.89;\, \$1,080.54\}$.

Multiple Birth Allowance (MBA):

$$MBA_j = \begin{cases} \mathbf{I}\{sa = 3\}FTBA_{MBA_1} + \mathbf{I}\{sa \geq 4\}FTBA_{MBA_2} & \text{if } school = 1 \text{and } j_c \leq FTBA_{MAGES} \\ \mathbf{I}\{sa = 3\}FTBA_{MBA_1} + \mathbf{I}\{sa \geq 4\}FTBA_{MBA_2} & \text{if } school = 0 \text{ and } j_c \leq FTBA_{MAGE} \end{cases} \tag{A.8}$$

where sa is the number of dependent children with the same age, $school$ is a binary variable for school attendance, j_c is the age of children sharing birth date, and $FTBA_{MAGE}$ and $FTBA_{MAGES}$ are a child's age cutoffs to be eligible for the MBA if they attend and do not attend school, respectively. $FTBA_{MBA}$ is the MBA payment. For simplicity, we assume there can only be one instance of multiple births for each household. In 2018, $FTBA_{MAGE} = 16$, $FTBA_{MAGES} = 18$, and $FTBA_{MBA} = \{\$4,044.20;\; \$5,387.40\}$.

Clean Energy Supplement for the FTB part A ($\mathbf{CES_A}$):

The Clean Energy Supplement for the FTB part A (CES_A) is separated into base and maximum payments.

We add the former to the base level and the latter to the maximum level of the FTB-A benefit.

$$\begin{aligned} CES_{A,base,j} &= ndep_{[0,17],j} \times FTBA_{CE_1} + ndep_{[18,19]_{AS},j} \times FTBA_{CE_1} \\ CES_{A,max,j} &= ndep_{[0,12],j} \times FTBA_{CE_2} + ndep_{[13,15],j} \times FTBA_{CE_3} + ndep_{[16,19]_{AS},j} \times FTBA_{CE_3} \end{aligned} \tag{A.9}$$

where $ndep_{[a,b],j}$ denotes the number of children in the age range $[a, b]$ of parents aged j, *school* is a binary variable for school attendance, $ndep_{[a,b]_{AS},j} = \mathbf{I}\{\text{school=1}\} \times ndep_{[a,b],j}$, $FTBA_{CE}$ is the per child amount of the CES_A. In 2018, $FTBA_{CE} = \{\$36.50; \$91.25; \$116.80\}$.

Note that from 2018 onward, only households who had received the CES_A in the previous year were eligible for the supplement. In the baseline model, we assume this is true for all households.

Rent Assistance (RA):

Rent assistance adds to the per child maximum payment of the FTB-A and is available only to FTB-A recipients who rent privately which we assume to hold true for all households in the benchmark model.

$$RA_j(rent) = \begin{cases} \max\{\min\{0.75\,(rent - rent_{min}),\ RA_{max}\},\ 0\} & \text{if } FTBA_1 \geq FTBA_{min} \\ 0 & \text{otherwise} \end{cases} \tag{A.10}$$

where *rent* is the annual rent, $rent_{min}$ is the minimum rent to qualify for the RA, RA_{max} is the cap on the RA benefit, $FTBA_1$ is the FTB-A benefit excluding the RA, $FTBA_{min}$ is the minimum size of the FTB-A for which a household must be qualified to be deemed eligible for the RA. The maximum and minimum rent assistance payment are

$$RA_{max} = \mathbf{I}\{ndep_{[0,24],j} \leq 2\} \times \$4,116.84 + \mathbf{I}\{ndep_{[0,24],j} \geq 3\} \times \$4,648.28$$

$$rent_{min} = \mathbf{I}\{\text{single=1}\} \times \$4,102.28 + \mathbf{I}\{\text{couple=1}\} \times \$6,071.52$$

Before 2013, $FTBA_{min}$ is set to the base FTB-A payment and $FTBA_{min} = 0$ thereafter.

A.2 Family Tax Benefit part B (FTB-B)

The FTB-B program is paid per family. Its objective is to give additional support to single parents and single-earner partnered parents with limited means. Similar to the FTB-A, the FTB-B is a function of age and number of dependent children, but differently, the eligibility and amount claimable are determined by separate tests on the primary and secondary earners' individual taxable income, as well as the marital status of the recipients. Important parameters that determine the levels, kinks and slopes of the FTB-B benefit schedule are: (i) Maximum payment rate; (ii) Separate income test thresholds on primary and secondary earners; and (iii) Withdrawal or taper rates based on secondary earner's taxable income.

Let $y_{pe} = \max(y^m,\, y^f)$ and $y_{se} = \min(y^m,\, y^f)$ denote the primary earner's and secondary earner's taxable income, respectively, and let $m_{B_i,j} = FTBB_{max_i} + CES_{B,j}$ be the maximum payment per family. Note that the structure of the FTB-B changed in 2017. The FTB-B formula prior to 2017 is thus different to that from 2017 onwards.

Before 2017:

$FTBB_j(y^m, y^f) =$

$$\begin{cases} cond_1 \times m_{B_1,j} + cond_2 \times m_{B_2,j} & \text{if } y_{pe} \leq FTBB_{T_1} \text{ and } y_{se} \leq FTBB_{T_2} \\ \\ cond_1 \times \max\{0,\ m_{B_1,j} - FTBB_w(y_{se} - FTBB_{T_2})\} & \text{if } y_{pe} \leq FTBB_{T_1} \text{ and } y_{se} > FTBB_{T_2} \\ +cond_2 \times \max\{0,\ m_{B_2,j} - FTBB_w(y_{se} - FTBB_{T_2})\} \end{cases} \tag{A.11}$$

From 2017:

$$FTBB_j(y^m, y^f) = \begin{cases} cond_1 \times m_{B_1,j} + cond_3 \times m_{B_2,j} & \text{if } y_{pe} \leq FTBB_{T_1} \text{ and } y_{se} \leq FTBB_{T_2} \\ \\ cond_1 \times \max\{0,\ m_{B_1,j} - FTBB_w(y_{se} - FTBB_{T_2})\} & \text{if } y_{pe} \leq FTBB_{T_1} \text{ and } y_{se} > FTBB_{T_2} \\ +cond_3 \times \max\{0,\ m_{B_2,j} - FTBB_w(y_{se} - FTBB_{T_2})\} & \end{cases} \quad (A.12)$$

where $cond_1 = \mathbf{I}\{ndep_{[0,4],j} \geq 1\}$, $cond_2 = \mathbf{I}\{ndep_{[0,4],j} = 0 \wedge (ndep_{[5,15],j} \geq 1 \vee ndep_{[16,18]_{AS},j} \geq 1)\}$ and $cond_3 = \mathbf{I}\{ndep_{[0,4],j} = 0 \wedge ndep_{[5,12],j} \geq 1\} + \mathbf{I}\{ndep_{[0,12],j} = 0 \wedge (ndep_{[13,15],j} \geq 1 \vee ndep_{[16,18]_{AS},j} \geq 1) \wedge \text{single=1}\}$

In 2018, the statutory maximum FTB-B payment $FTBB_{max} = \{\$4,412.85;\ \$3,190.10\}$, the income test thresholds $FTBB_T = \{\$100,000;\ \$5,548\}$, and the withdrawal rate $FTBB_w = 0.20$.

Clean Energy Supplement for the FTB part B ($\mathbf{CES_B}$):

The Clean Energy Supplement for FTB part B (CES_B) adds to the statutory per family payment of the FTB-B benefit.

$$CES_{B,j} = \begin{cases} FTBB_{CE_1} & \text{if } ndep_{[0,4],j} \geq 1 \\ FTBB_{CE_2} & \text{if } ndep_{[0,4],j} = 0 \text{ and } (ndep_{[5,15],j} \geq 1 \text{ or } ndep_{[16,18]_{AS},j} \geq 1) \\ 0 & \text{if } ndep_{[0,15],j} = 0 \text{ and } ndep_{[16,18]_{AS},j} = 0) \end{cases} \quad (A.13)$$

where $ndep_{[a,b],j}$ denotes the number of children in the age range $[a, b]$ of parents aged j, *school* is a binary variable for school attendance, $ndep_{[a,b]_{AS},j} = \mathbf{I}(\text{school=1}) \times ndep_{[a,b],j}$, $FTBB_{CE}$ is the per family amount of CES_B. In 2018, $FTBB_{CE} = \{\$73;\ \$51.10\}$. Note that from 2018 onward, only households who had received the CES_B in the previous year were eligible for the supplement. In the baseline model, we assume this is true for all households.

A.3 Child Care Subsidy (CCS)

The Child Care Subsidy program aims at assisting households with the cost of caring for children aged 13 or younger who are not attending secondary school and is paid directly to approved child care service providers. Eligibility criteria include (i) a test on the combined family income (y_h), (ii) the type of child care service, (iii) age of the dependent child, and (iv) hours of recognized activities (e.g., working, volunteering and job seeking) by parents (n_j^m, n_j^f). The rate of subsidy is also determined by parameters such as income thresholds, work hours, and taper unit (the size of income increment by which the subsidy rate falls by 1 percentage point). Given that the current model is silent on the type of child care and therefore child care fees, we assume the followings: (i) Identical child care service operating within a perfectly competitive framework; (ii) No annual cap on hourly fee and on subsidy per child; and (iii) Households exhaust all the available hours of subsidized care.

The child care subsidy function is given by

$$CCS(y_h, n_j^m, n_j^f) = \Psi(y_h, n_j^m, n_j^f) \times \begin{cases} CCS_{R_1} & \text{if } y_h \leq TH_1 \\ \max\{CCS_{R_2},\ CCS_{R_1} - \omega_1\} & \text{if } TH_1 < y_h < TH_2 \\ CCS_{R_2} & \text{if } TH_2 \leq y_h < TH_3 \\ \max\{CCS_{R_3},\ CCS_{R_2} - \omega_3\} & \text{if } TH_3 \leq y_h < TH_4 \\ CCS_{R_3} & \text{if } TH_4 \leq y_h < TH_5 \\ CCS_{R_4} & \text{if } y_h \geq TH_5 \end{cases} \quad (A.14)$$

where $y_h = y_m + y_f + ra$ and $\omega_i = \dfrac{y_h - TH_i}{taper\ unit}$.

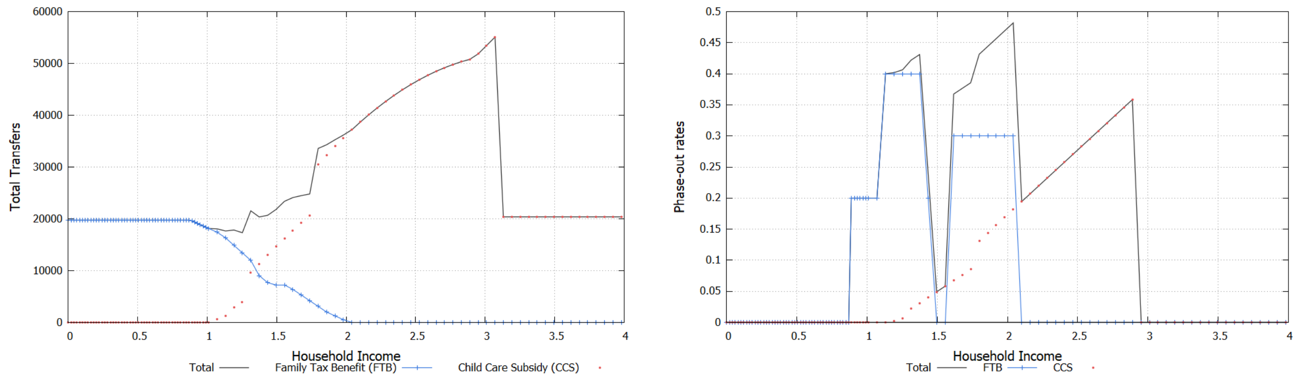
In 2018, taper unit = \$3,000; statutory (base) subsidy rates, $CCS_R = \{0.85,\ 0.5,\ 0.2,\ 0\}$; income test thresholds, $TH = \{\$70,015;\ \$175,015;\ \$254,305;\ \$344,305;\ \$354,305\}$. Let $n_j^{min} = \min\{n_j^m, n_j^f\}$. The adjustment factor is

$$\begin{aligned}\Psi(y_h, n_j^m, n_j^f) \quad &= \quad 0.24\mathbf{I}\left\{y_h \leq \$70,015 \wedge n_j^{min} \leq 8\right\} \\ &\quad +0.36\mathbf{I}\left\{8 < n_j^{min} \leq 16\right\} + 0.72\mathbf{I}\left\{16 < n_j^{min} \leq 48\right\} + \mathbf{I}\left\{n_j^{min} > 48\right\}\end{aligned}$$

Otherwise, $\Psi(.) = 0$.

A.4 Child benefit schedules

A.4.1 Two-earner married household

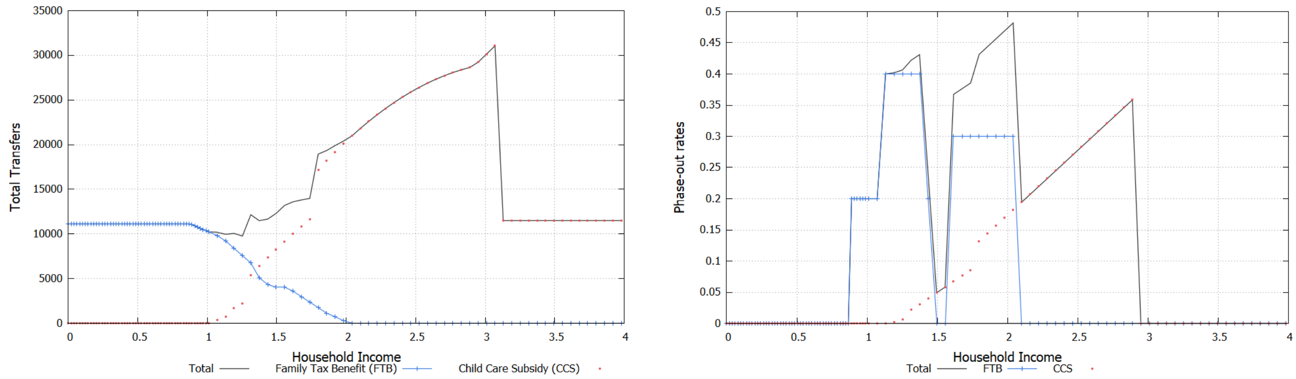


((a)) Total transfers

((b)) Phase-out rates

Figure A.1: **Child-related transfers in 2018 AUD for two-earner married households with two young children and primary earner income fixed at AUD 60,000**

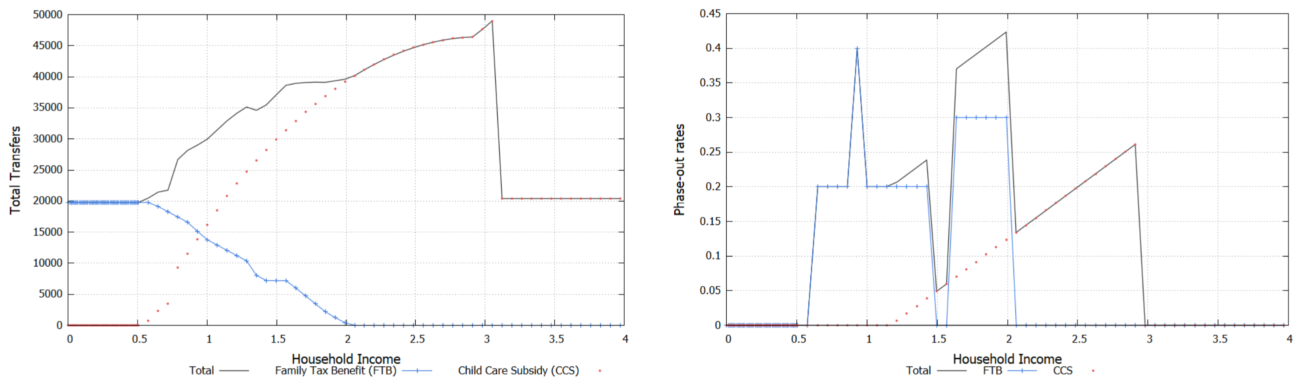
Notes: (*) Panel (a) displays total child-related transfers in 2018 AUD for two-earner married households with two children aged 2 and 4. Primary earners are assumed to earn the mean income of approximately AUD 60,000. The benefit schedule is derived from statutory rules detailed in Appendix Section A.1. Childcare subsidies (CCS) are calculated assuming a fixed hourly wage of AUD 28—corresponding to the average wage of 25-year-old married men—and account for the rise in work hours as earnings increase; (**) Panel (b) shows the associated benefit phase-out (taper) rates for the same household type; (***) The denser marker spacing along the benefit schedule reflects benefit levels and phase-out rates based on changes in primary earner income (with secondary earner income held at zero). The sparser region corresponds to increases in secondary earner income, holding the primary earner's income fixed.



((a)) Total transfers ((b)) Phase-out rates

Figure A.2: **Child-related transfers in 2004 USD for two-earner married households with two young children and primary earner income fixed at AUD 60,000**

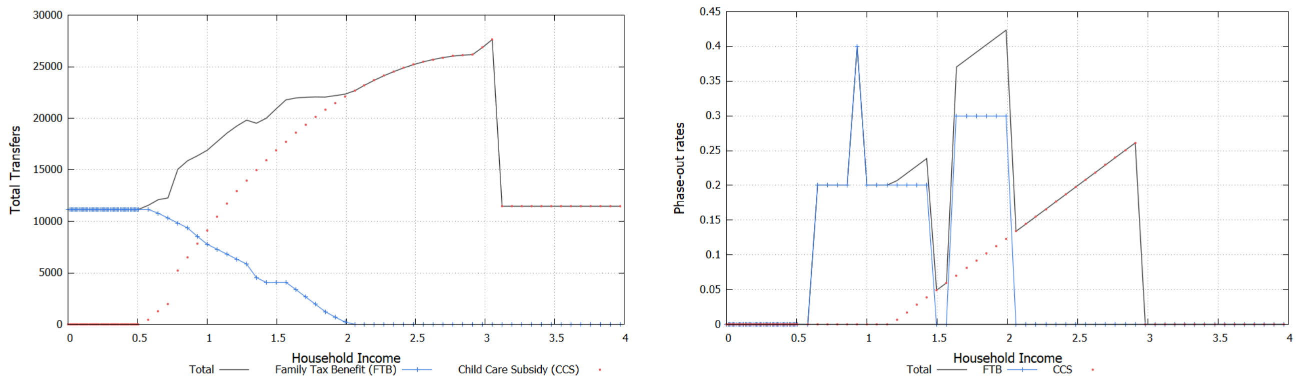
Notes: (*) Panel (a) displays total child-related transfers in 2004 USD for two-earner married households with two children aged 2 and 4. Primary earners are assumed to earn the mean income of approximately AUD 60,000. The benefit schedule is derived from statutory rules detailed in Appendix Section A.1. Childcare subsidies (CCS) are calculated assuming a fixed hourly wage of AUD 28—corresponding to the average wage of 25-year-old married men—and account for the rise in work hours as earnings increase; (**) Panel (b) shows the associated benefit phase-out (taper) rates for the same household type; (***) The denser marker spacing along the benefit schedule reflects benefit levels and phase-out rates based on changes in primary earner income (with secondary earner income held at zero). The sparser region corresponds to increases in secondary earner income, holding the primary earner's income fixed.



((a)) Total transfers ((b)) Phase-out rates

Figure A.3: **Child-related transfers in 2018 AUD for two-earner married households with two young children and primary earner income fixed at AUD 30,000**

Notes: (*) Panel (a) displays total child-related transfers in 2018 AUD for two-earner married households with two children aged 2 and 4. Primary earners are assumed to earn half the mean income (approximately AUD 30,000). The benefit schedule is derived from statutory rules detailed in Appendix Section A.1. Childcare subsidies (CCS) are calculated assuming a fixed hourly wage of AUD 28—corresponding to the average wage of 25-year-old married men—and account for the rise in work hours as earnings increase; (**) Panel (b) shows the associated benefit phase-out (taper) rates for the same household type; (***) The denser marker spacing along the benefit schedule reflects benefit levels and phase-out rates based on changes in primary earner income (with secondary earner income held at zero). The sparser region corresponds to increases in secondary earner income, holding the primary earner's income fixed.

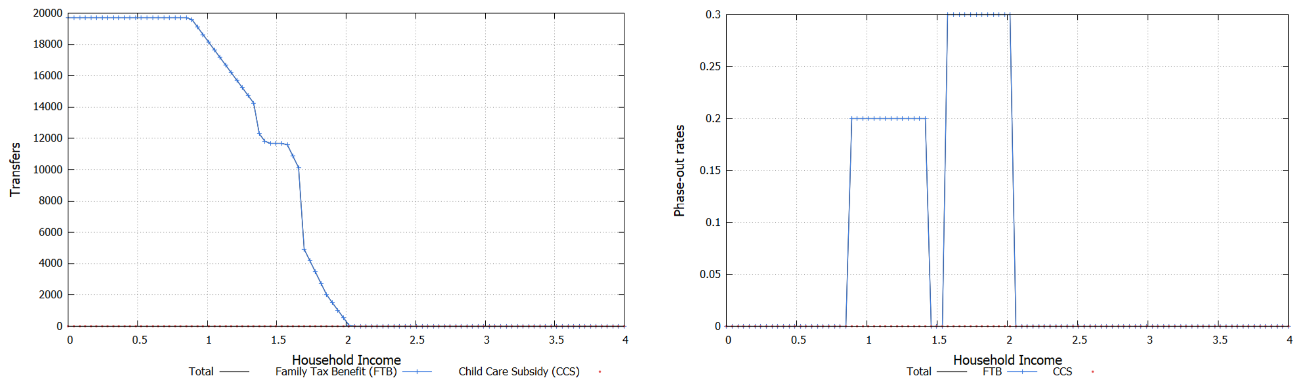


((a)) Total transfers ((b)) Phase-out rates

Figure A.4: **Child-related transfers in 2004 USD for two-earner married households with two young children and primary earner income fixed at AUD 30,000**

Notes: (*) Panel (a) displays total child-related transfers in 2004 USD for two-earner married households with two children aged 2 and 4. Primary earners are assumed to earn half the mean income (approximately AUD 30,000). The benefit schedule is derived from statutory rules detailed in Appendix Section A.1. Childcare subsidies (CCS) are calculated assuming a fixed hourly wage of AUD 28—corresponding to the average wage of 25-year-old married men—and account for the rise in work hours as earnings increase; (**) Panel (b) shows the associated benefit phase-out (taper) rates for the same household type; (***) The denser marker spacing along the benefit schedule reflects benefit levels and phase-out rates based on changes in primary earner income (with secondary earner income held at zero). The sparser region corresponds to increases in secondary earner income, holding the primary earner's income fixed.

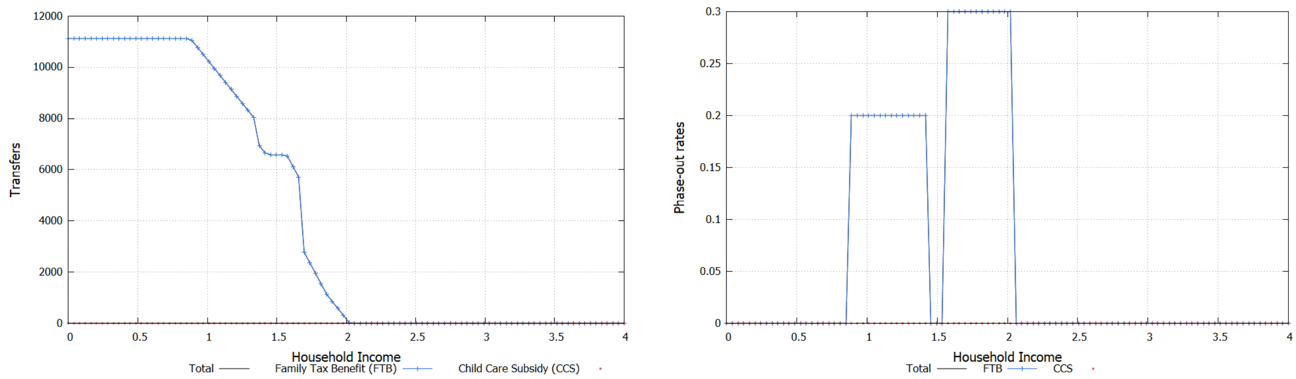
A.4.2 One-earner married household



((a)) Total transfers ((b)) Phase-out rates

Figure A.5: **Child-related transfers in 2018 AUD for one-earner married households with two young children**

Notes: (*) Panel (a) displays total child-related transfers in 2018 AUD for one-earner married households with two children aged 2 and 4. The benefit schedule is constructed based on statutory rules outlined in Appendix Section A.1. As the stay-at-home parent provides childcare at home, these households incur no childcare expenses and are therefore ineligible for the subsidy (CCS); (**) Panel (b) presents the associated phase-out (taper) rates for the same household type.

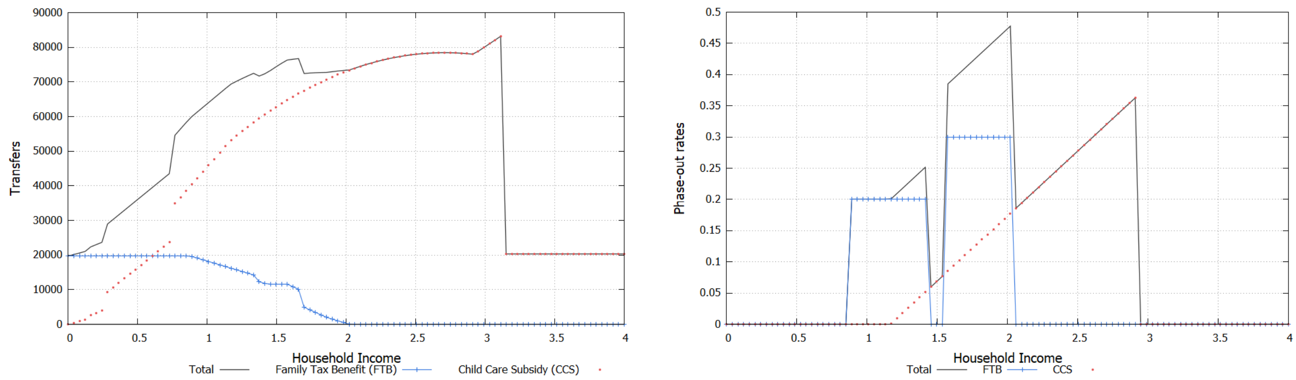


((a)) Total transfers ((b)) Phase-out rates

Figure A.6: **Child-related transfers in 2004 USD for one-earner married households with two young children**

Notes: (*) Panel (a) displays total child-related transfers in 2004 USD for one-earner married households with two children aged 2 and 4. The benefit schedule is constructed based on statutory rules outlined in Appendix Section A.1. As the stay-at-home parent provides childcare at home, these households incur no childcare expenses and are therefore ineligible for the subsidy (CCS); (**) Panel (b) presents the associated phase-out (taper) rates for the same household type.

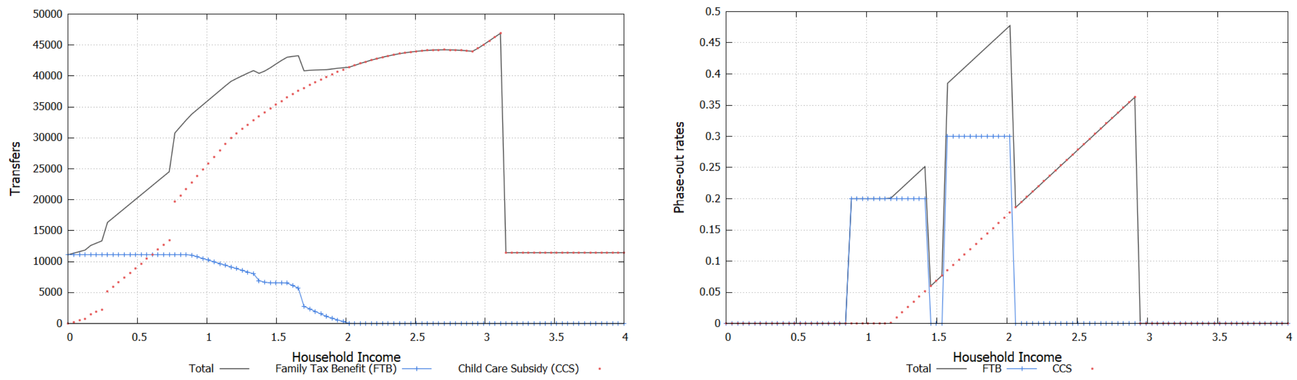
A.4.3 Single parent household



((a)) Total transfers ((b)) Phase-out rates

Figure A.7: **Child-related transfers in 2018 AUD for single parent households with two young children**

Notes: (*) Panel (a) displays total child-related transfers in 2018 AUD for single parent households with two children aged 2 and 4. The benefit schedule is constructed based on statutory rules outlined in Appendix Section A.1; (**) Panel (b) presents the associated phase-out (taper) rates for the same household type.



((a)) Total transfers ((b)) Phase-out rates

Figure A.8: **Child-related transfers in 2004 USD for single parent households with two young children**

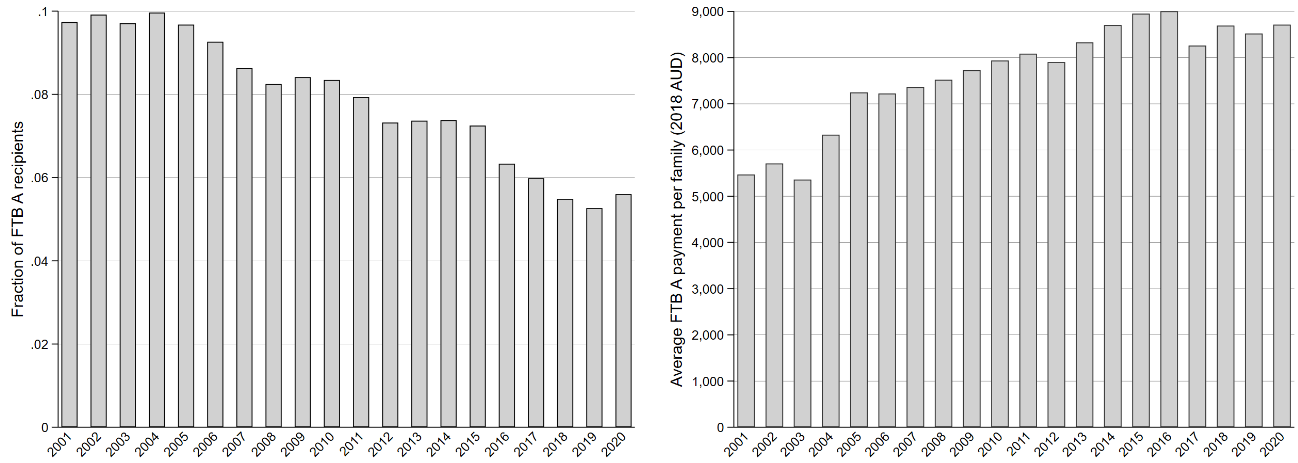
Notes: (*) Panel (a) displays total child-related transfers in 2004 USD for single parent households with two children aged 2 and 4. The benefit schedule is constructed based on statutory rules outlined in Appendix Section A.1; (**) Panel (b) presents the associated phase-out (taper) rates for the same household type.

A.5 Major changes in child-related transfers programs over time

In the past two decades, the Australian government has introduced several policy reforms to enhance the effectiveness of the Family Tax Benefit (FTB) and Child Care Subsidy (CCS) programs. This section provides an overview of the major changes to these policies.

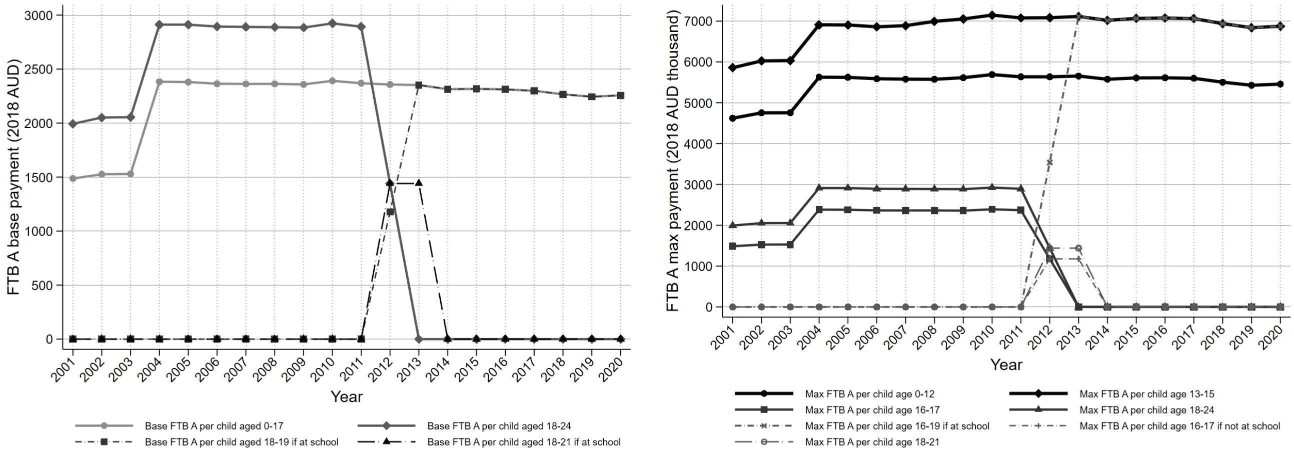
A.5.1 Major changes in Family Tax Benefit Part A (FTB-A)

The proportion of households receiving the FTB-A (out of all households observed in the survey data) has fallen from 10% in 2001 to slightly over 5% in 2020, (see Figure 9(a)). This can be attributed, in part, to the falling birth rate and threshold-creep due to inflation. Despite the overall decline, the benefit remains concentrated among low-income families.



((a)) Proportion of FTB-A recipients over time. ((b)) Average FTB-A payment per family (2018 AUD) over time.

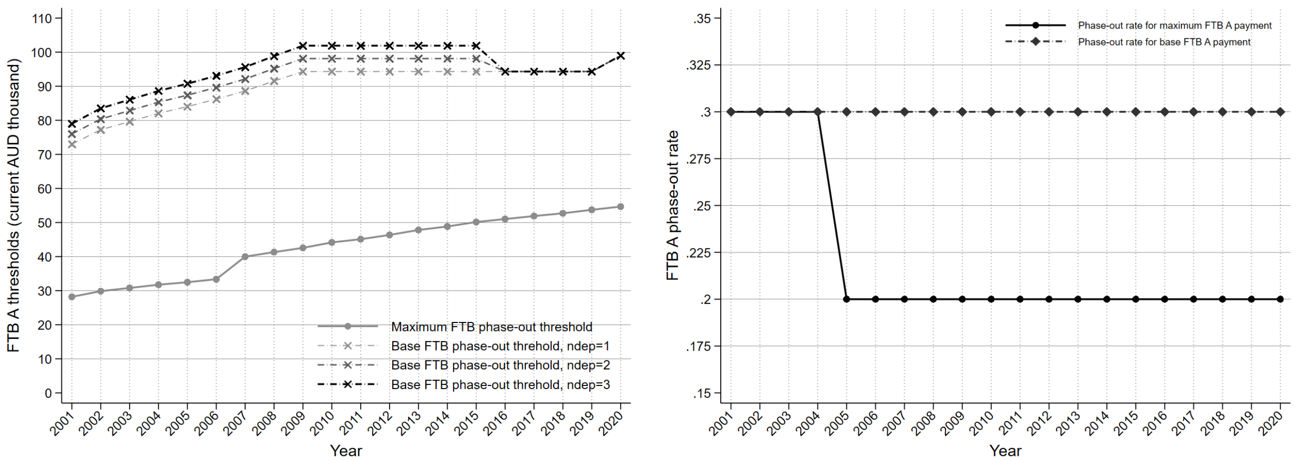
Figure A.9: **FTB-A recipients and average benefit over time time**



((a)) FTB-A base payment rates per child.

((b)) FTB-A maximum payment rates per child.

Figure A.10: **FTB-A base rate and maximum payment rates**



((a)) FTB-A income test thresholds for maximum and base payment rates.

((b)) FTB-A phase-out rates for maximum and base payments.

Figure A.11: **FTB-A income test thresholds and phase out rates over time**

At the intensive margin, the FTB-A alone represents a significant sum of inflation-indexed transfers. Figures 10(a) and 10(b) illustrate that there have been minimal changes to the base and maximum statutory payment rates for children under 18 since 2004. Qualified families with a child aged 13-15 could receive up to $7,000 (2018 AUD). The maximum rate per dependent child aged 12 or younger is slightly lower, but still exceeds $5,500. Given that payments are allocated per child, a two-children family could receive up to $14,000. Moreover, Figure 9(b) shows that the benefits delivered to eligible families have been rising. The average FTB-A payout increased from $8,000 to $8,500 (2018 AUD) over the past decade. Moreover, because the scheme predominantly targets single-earner families, especially single parents, single parent households claimed higher benefits on average compared to couple parent households, as seen in Figure A.12.

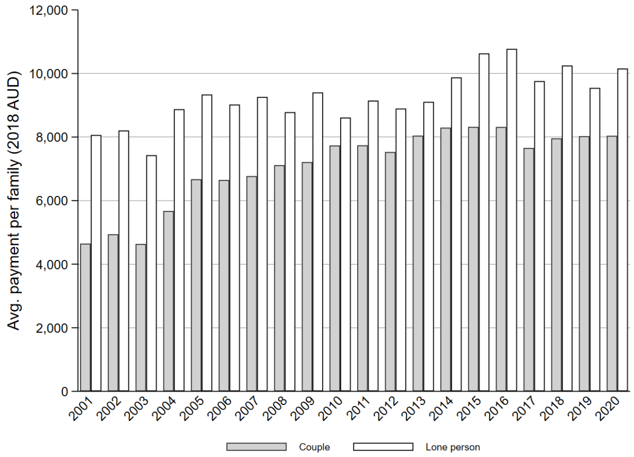
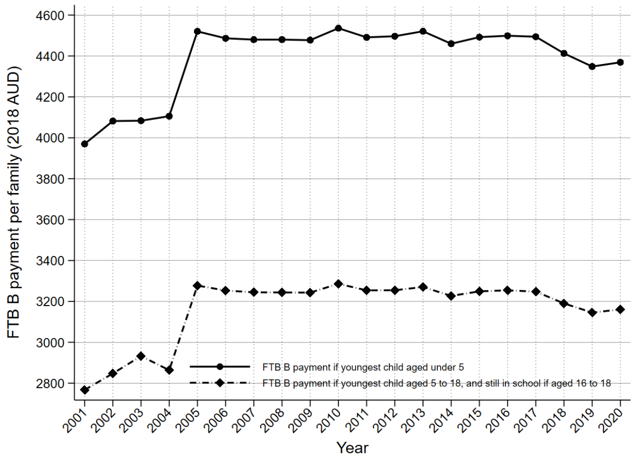
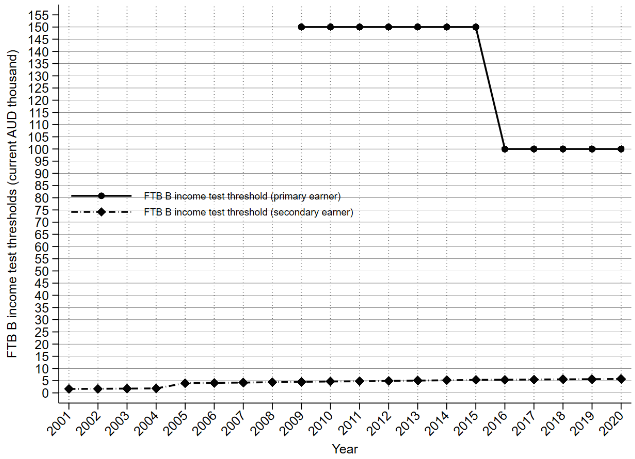


Figure A.12: Average FTB-A payment per family by marital status

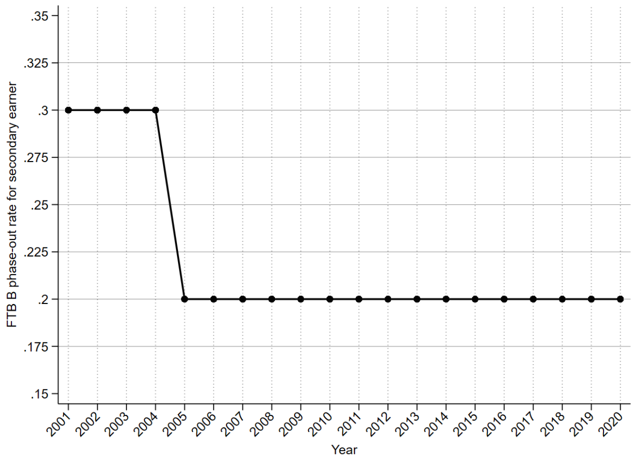
A.5.2 Major changes in Family Tax Benefit Part B (FTB-B)



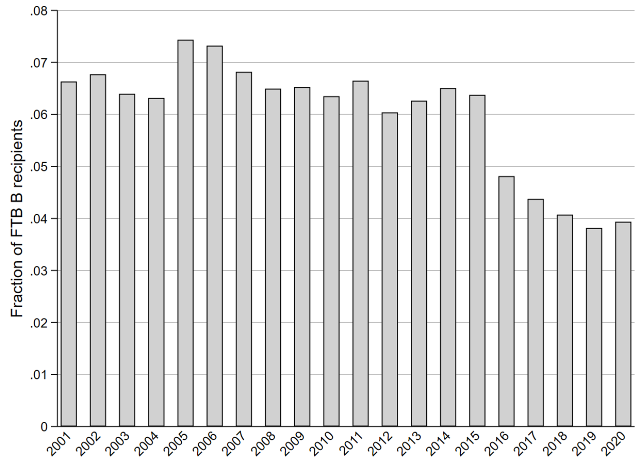
((a)) FTB-B payment rates per family by age of the youngest child.



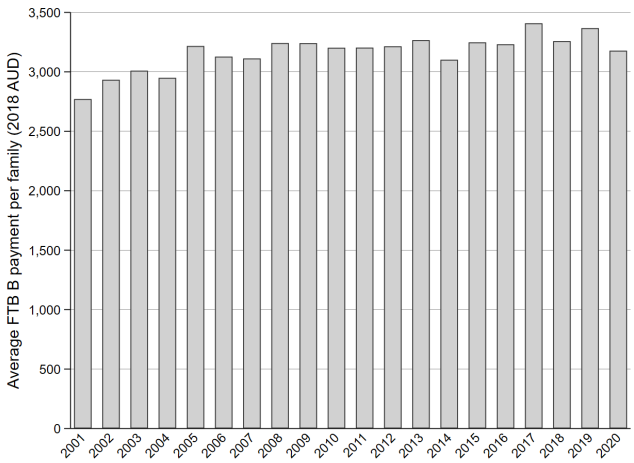
((b)) FTB-B thresholds over time on primary and secondary earners over time.



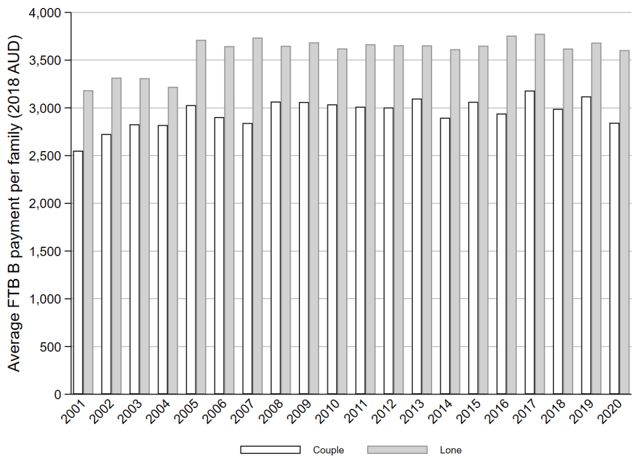
((c)) FTB-B taper rates over time.



((d)) Proportion of FTB-B recipients over time.



((e)) Average FTB-B payment (2018 AUD) over time.



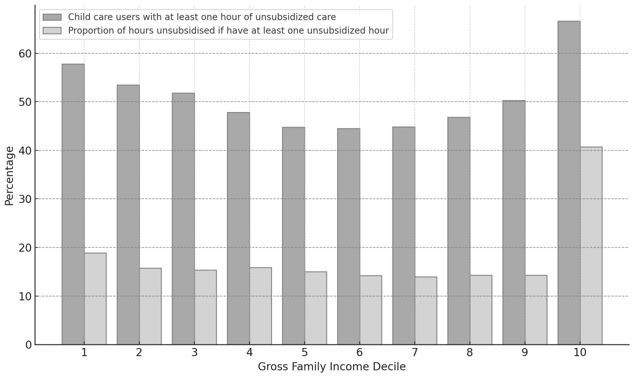
((f)) Average FTB-B payment by marital status.

Figure A.13: **Major changes in FTB-B**

Because FTB-A recipient status is necessary for a household to access the FTB-B benefits, we can infer from Figures 9(a) and 13(d) that the majority of FTB-A households also claimed the FTB-B. Although the FTB-A is the larger of the two benefits, the FTB-B offers a non-trivial amount. As shown in Figure 13(a), the FTB-B payment remained steady at approximately $4,500 (2018 AUD) for eligible families whose youngest child is under 5 years of age, and $3,200 if their youngest child is between 5 and 18 years old.

At the extensive margins, the proportion of claimants fell over time. Compared to the 2000s and the first half of 2010s, the fraction of married FTB-B households dropped by nearly 50% by 2018 (Figure 13(d)). This could be partially explained by factors similar to those affecting the FTB-A, such as fertility trends and threshold creep. For the FTB-B in particular, the recent drop in married recipients can also be attributed to the $150,000 (current AUD) income-test threshold for primary earners introduced in 2009, and the subsequent tightening in 2016 as the threshold decreased further to $100,000 (current AUD). These stricter measures, which complemented the existing test on secondary earners, significantly reduced the claimant pool. However, because the primary earner's income test exclusively determines eligibility (controlling the extensive margin), it had no discernible effect on the average benefit rate for recipients. The right panel of Figure 13(f) demonstrates that in 2020, eligible single parents could still expect to receive over $3,500 (2018 AUD), while couple parents could expect just under $3,000 — similar to the amount they would receive in 2005.

A.5.3 Major changes in Child Care Subsidy (CCS) over time



over time

Figure A.14: Proportion of hours paid for that are unsubsidized by gross family income decile in 2018-19 financial year.

Notes: This figure uses data from Table 31 in the 2021 Child Care Package Evaluation report by the AIFS. The lowest decile earned at most $31,399. *The top decile earned* $240,818 *or more.*

Figure A.14 illustrates the proportion of unsubsidized child care hours, highlighting the program's expansive coverage. Excluding the top decile, the majority of families received fully subsidized child care. Case in point, between 50-55% of families situated around the median income received full subsidies. The prevalence of families with at least one hour of unsubsidized child care increases among the lower deciles, likely due to the work activity requirement. Yet, approximately 40% of families in the bottom decile still received full subsidies. Additionally, even among families with at least one unsubsidized child care hour, provided that they were not in the top income bracket (with annual earnings above $240,818), the average unsubsidized hours did not exceed 20% of their total child care hours.

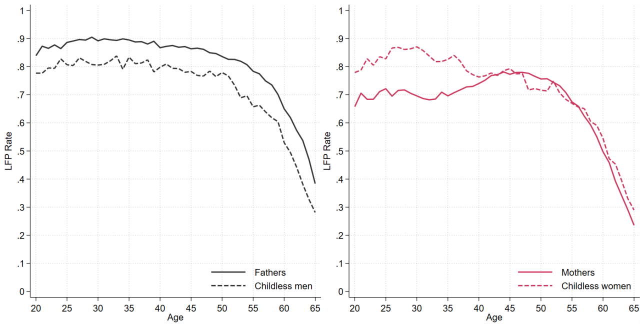


Figure B.1: **Age profiles of labor force participation. Left:** fathers (solid) and childless men (dashed). **Right:** mothers (solid) and childless women (dashed).

Notes: The age profiles stitch together 20-year snapshots of life cycle for selected cohorts. The youngest cohort is cohort 12 aged 20-39 in the data, and the oldest cohort is cohort 12 aged 75-94.

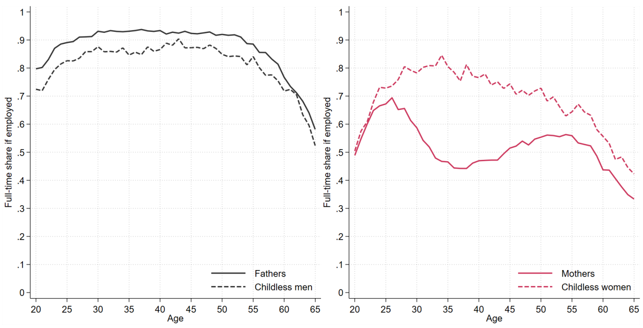


Figure B.2: **Age profiles of full-time share of employment. Left:** fathers (solid) and childless men (dashed). **Right:** mothers (solid) and childless women (dashed).

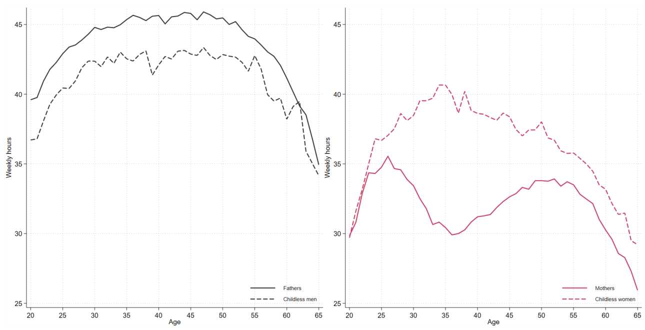


Figure B.3: **Age profiles of work hours (if employed) by key demographics (gender and parenthood). Left:** fathers (solid) and childless men (dashed). **Right:** mothers (solid) and childless women (dashed).

Notes: The age profiles stitch together 20-year snapshots of life-cycle for selected cohorts. The youngest cohort is cohort 12 aged 20-39 in the data. The oldest cohort is cohort 4 (aged 60-79) on the left panel and cohort 5 (aged 55-74) on the right panel. We omit the very old cohorts due to data limitation.

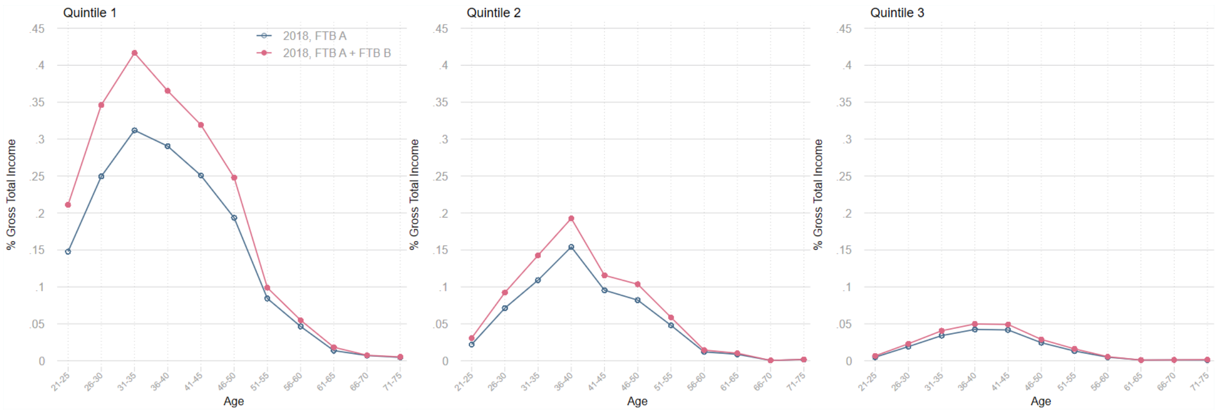


Figure B.4: **Age profiles of FTB share of gross household income for the first three quintiles by family market income in 2018.**

B Supplementary figures: Life-cycle profiles

C Equilibrium and numerical solution

C.1 Competitive equilibrium

C.1.1 The distribution of households

Let $\phi_t(z_j)$ and $\Phi_t(z_j)$ denote the stationary density and cumulative distribution of households aged j at time t unadjusted for population growth, respectively.[27] Given that households enter the economy with identical female human capital level, set at unity ($h^f_{j=1,\lambda,\ell} = 1$), and no assets ($a_{j=1} = 0$), the initial distribution of newborns ($j = 1$) in every period t is determined by:

$$\begin{aligned} \sum_{\Lambda\times\Theta}\int_{A\times H\times S^2} d\Phi_t(\lambda, a, h, \theta, \eta^m, \eta^f) &= \sum_{\Lambda\times\Theta}\int_{S^2} d\Phi_t(\lambda, 0, 1, \theta, \eta^m, \eta^f) = 1, \quad \text{and} \\ \phi_t(\lambda, 0, 1, \theta, \eta^m, \eta^f) &= \prod_{x\in\{\lambda,\theta,\eta^m,\eta^f\}} \pi(x) \end{aligned}$$

We suppress subscripts and superscripts of the state variables wherever appropriate for brevity. Here, $\pi(x)$ is the unconditional probability density of state $x \in \{\lambda, \theta, \eta^m, \eta^f\}$ for $\lambda \in \Lambda,\ \theta \in \Theta,$ and $\eta^m, \eta^f \in S$.

From age $j = 2$ onward, the population density $\phi_t(z)$ evolves according to the following law of motion

$$\phi_+(z_+) = \sum_{\Lambda\times\Theta}\int_{A\times H\times S^2} \mathbf{I}\{a_+ = a_+(z,\Omega),\ h_+ = h_+(z,\Omega)\} \times \pi(\lambda_+|\lambda) \times \pi(\eta^m_+|\eta^m) \times \pi(\eta^f_+|\eta^f)\, d\Phi(z) \tag{C.1}$$

The time subscript is omitted for brevity. Ω is a vector of behavioral, technology, and policy parameters at time t; $\pi(\eta^i_+|\eta^i)$ is the probability of η^i_+ conditional on η^i for $i \in \{m, f\}$; and $\pi(\lambda_+|\lambda)$ is the probability of λ_+ given λ from the transition probabilities in Table 1. Assets and human capital are continuous states that evolve endogenously. The share of households on each (a^+, h^+) pair is obtained through linear interpolations of a_+ and $\log(h_+)$ on the discretized domains of assets (A) and human capital (H), respectively.

C.1.2 Aggregate variables

There are J number of generations living in every period t. Let the share of each living cohort j at time t be denoted by $\mu_{j,t}$ such that $\sum_{j=1}^{J} \mu_{j,t} = 1$. Taking into account the optimal decisions $\{c(z_j, \Omega_t),\ \ell(z_j, \Omega_t),\ a(z_j, \Omega_t)\}_{j=1}^{J}$ and the unit mass of households, aggregate variables for the model economy are equivalent to per household variables. For an economy governed by a vector of parameters Ω_t in time t, the aggregate consumption C_t,

[27] Because population growth rate is constant, adjustment for population growth is done when aggregating over cohorts. Mortality is age-dependent and is accounted for by the transition probabilities of family type λ as described in Table 1.

wealth A_t, female labor force participation rate LFP_t, and labor supply in efficiency units for male LM_t and female LF_t are expressed as

$$
\begin{aligned}
C_t &= \sum_{j=1}^{J} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} c(z_j,\Omega_t)\mu_{j,t}\, d\Phi_t(z_j) \\
A_t &= \sum_{j=1}^{J} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} a(z_j,\Omega_t)\mu_{j,t}\, d\Phi_t(z_j) \\
LM_t &= \sum_{j=1}^{JR-1} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} h^m_{j,\lambda} e^{\theta+\eta^m_j} n^m_{j,\lambda}\mu_{j,t}\, d\Phi_t(z_j) \\
LF_t &= \sum_{j=1}^{JR-1} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} \mathbf{I}\left\{\ell(z_j,\Omega_t)>0\right\} h^f_{j,\lambda,\ell} e^{\theta+\eta^f_j} n^f_{j,\lambda,\ell}\mu_{j,t}\, d\Phi_t(z_j) \\
LFP_t &= \sum_{j=1}^{JR-1} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} \mathbf{I}\left\{\ell(z_j,\Omega_t)>0\right\} \mu_{j,t}\, d\Phi_t(z_j)
\end{aligned}
$$

The aggregate government variables are

$$
\begin{aligned}
T^C_t &= \tau^c_t C_t, \\
T^K_t &= \tau^k_t (Y_t - w_t A_t L_t) \\
T^I_t &= \sum_{j=1}^{JR-1} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} T_\lambda\left(y^m_\lambda(z_j,\Omega_t), y^f_\lambda(z_j,\Omega_t)\right)\mu_{j,t}\, d\Phi_t(z_j) \\
Tr_t &= \sum_{j=1}^{JR-1} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} \left[FTB_\theta\left(y^m_\lambda(z_j,\Omega_t), y^f_\lambda(z_j,\Omega_t)\right)\right] \\
&\qquad +CCS\left(y_{j,\lambda}(z_j,\Omega_t),\, n^m_{j,\lambda},\, \mathbf{I}\left\{\ell(z_j,\Omega_t)>0\right\} n^f_{j,\lambda,\ell}\right)\mu_{j,t}\, d\Phi_t(z_j) \\
\mathcal{P}_t &= \sum_{j=JR}^{J} \sum_{\Lambda} \int_{A} pen\left(a_j(z^R_j,\Omega_t), y_{j,\lambda}(z^R_j,\Omega_t)\right)\mu_{j,t}\, d\Phi_t(z^R_j)
\end{aligned}
$$

where $T_\lambda(.)$ is the household income tax function calculated using Equation (11); $FTB(.) = tr^A(.) \times nc_{j,\theta} + tr^B(.)$ is the sum of FTB-A of Equation (12) and FTB-B of Equation (13); $CCS(.)$ is the CCS function with subsidy rate $sr_j(.)$ from Equation (14); $pen(.)$ is the Age Pension from Equation (17); and L_t in the company tax (T^K) equation is the total labor supply in efficiency units, an aggregator of LM_t and LF_t.

C.1.3 Definition of competitive equilibrium

Given the household, firm and government policy parameters, the demographic structure, and the world interest rate, a steady state equilibrium is such that

(a) The collection of individual household decisions $\{c_j, \ell_j, a_{j+1}\}_{j=1}^{J}$ solves the household problem (19) and (22);

(b) The firm chooses labor and capital inputs to solve its profit maximization problem (8);

(c) The government periodic budget constraint (18) is satisfied;

(d) The factor markets clear, $K^s_t = K^d_t = K_t$ and $L^s_t = L^d_t = L_t$, where $L^s_t = LM_t + LF_t$;

(e) The goods market clears:

$$
\begin{aligned}
Y_t &= C_t + I_t + G_t + NX_t \\
NX_t &= (1+n)(1+g)B_{F,t+1} - (1+r)B_{F,t} \\
B_{F,t} &= A_t - K_t - B_t
\end{aligned}
$$

where $I_t = (1+n)(1+g)K_{t+1} - (1-\delta)K_t$ is investment; $B_{F,t}$ is the required foreign capital to clear the domestic capital market; NX_t is the trade account and $NX_t > 0$ denotes a trade account surplus.[28]

(f) The lump-sum bequest is the total untapped end-of-period private wealth left by deceased agents in time t. Given the known survival probabilities, the total amount of bequest available at any time t is $BQ_t = \sum_{j=1}^{J} \sum_{\Lambda\times\Theta} \int_{A\times H\times S^2} (1-\psi_{j,\lambda})(1+r_t)a(z_j,\Omega_t)\, d\Phi_t(z_j)$, where $\psi_{j,\lambda}$ is the conditional survival probability for each household type λ at age j. Let $m_{j,t}$ represent the mass of households. We assume bequest is uniformly distributed to each living working-age household. The amount of bequest to a household aged j at time t is[29]

$$beq_{j,t} = \frac{BQ_t}{\sum_{j=1}^{JR-1} m_{j,t}} \tag{C.2}$$

C.2 Numerical solution

The quantitative model is solved numerically in FORTRAN. We first solve the model for household optimal allocations, their distributions, and aggregate variables along the initial balanced-growth path steady state equilibrium. The model economy is calibrated to the Australian economy's key micro and macro economic moments during 2012-2018 (a relatively stable period for these moment values). With the benchmark economy in place, we then conduct policy experiments by solving for counterfactual allocations, distributions, and aggregates in the final steady state equilibria of our alternative policy regimes. The algorithm is as follows:

1. Parameterize the model and discretize the asset space $a \in [a_{min}, a_{max}]$. The choice of grid points is such that: Number of grid points, $N_A = 70$; $a_{min} = 0$ (No-borrowing constraint); The grid nodes on $[a_{min}, a_{max}]$ are fairly dense on the left tail so households are not restricted by an all-or-nothing decision (i.e., unable to save early in the life cycle due to the lack of choices on the grid nodes for small asset levels); a_{max} is sufficiently large so that: (i) household wealth accumulation is not artificially bound by a_{max}, and (ii) there is enough margin for upward adjustments induced by new policy regimes;

2. In a similar manner, discretize the human capital space $h^f_{\lambda,\ell} \in [h^f_{min,\lambda,\ell}, h^f_{max,\lambda,\ell}]$ for each λ and ℓ types such that: Number of grid nodes, $N_H = 25$; $h^f_{min,\lambda,\ell} = 1$ for all λ and ℓ; $h^f_{max,\lambda=0,\ell} = h^m_{max,\lambda=0,\ell}$ and $h^f_{max,\lambda=2,\ell} = h^m_{max,\lambda=1,\ell}$ for every ℓ;

3. Guess the initial steady state values of the endogenous aggregate macro variables (K_0 and L_0) and government policy variable (ζ_0), taking $r = r^w$ where r^w is a given world interest rate;

4. Solve the representative firm problem's first-order conditions for market clearing wages w;

5. Given the vector of the benchmark economy's macro and micro parameters (Ω_0)—such as the parameters governing the conditional survival probabilities (ψ) and income (η_m, η_f), factor prices (w, r), and the government policy structure—solve the household problems for optimal decision rules on future asset holdings (a^+), joint consumption (c), female labor supply (ℓ) and the value function of households by backward induction (from $j = J$ to $j = 1$) using *value function iteration method.* The numerical optimization and root finding algorithms are from a toolbox constructed by Hans Fehr and Fabian Kindermann;

[28] See Appendix Subsection C.2 for detailed explanation on $B_{F,t}$ and NX_t.

[29] For married households ($\lambda = 0$), $\psi_{j,0} = 1 - (1-\psi^m_j)(1-\psi^f_j)$ is the probability that both spouses survive and the household maintains its status quo marital status. Bequest to each surviving household aged j at time t is determined by a general formula

$$beq_{j,t} = \left[\frac{b_{j,t}}{\sum_{j=1}^{J} b_{j,t}\, m_{j,t}}\right] BQ_t$$

where $b_{j,t}$ is the share of bequest for each surviving household aged j at time t. Since we assume uniformly distributed bequest, $b_{j,t} = \frac{1}{JR-1}$ if $j < JR$ and $b_{j,t} = 0$ otherwise.

6. Starting from a known distribution of newborns ($j = 1$), and given household optimal allocations, compute the measure of households across states z_j and over the life cycle by forward induction, using: (i) the computed decision rules $\left\{a_j^+(z_j, \Omega_t), c_j(z_j, \Omega_t), \ell_j(z_j, \Omega_t)\right\}_{j=1}^{J}$; (ii) the time-invariant survival probabilities $\{\psi_{j,m}, \psi_{j,f}\}_{j=1}^{J}$; (iii) the Markov transition probabilities of the transitory earnings shocks η^m and η^f; and (vi) the law of motion of female human capital from Equation (7);

   For determining the next period measure of households on the asset (a) and female human capital (h) grids, we employ a linear interpolation method;

7. Accounting for the measure of living households, sum across all state elements to get the aggregate levels of assets (A), consumption (C), female labor force participation (LFP), labor supply (L), output (Y), tax revenue, transfers, and other relevant variables. Aggregate variables necessary for the market clearing conditions (L, K, I, C and Y) are updated via a convex updating process to ensure a stable convergence;

8. Solve for the government policy variable ζ (overall tax size) using the public budget balance equation 18;

9. The goods market convergence criterion for a small open economy at time t is $\left|\frac{Y - (C + I + G + NX)}{Y}\right| < \varepsilon$, where the trade balance NX is the difference between current and future government foreign debts. That is, $NX_t = (1+n)(1+g)B_{F,t+1} - (1+r)B_{F,t}$ and $B_{F,t} = A_t - K_t - B_t$ is the required foreign capital to clear the domestic capital market. $NX < 0$ implies a capital account surplus or current account deficit (net inflow of foreign capital and thus an increase in the foreign indebtedness); $\varepsilon = 0.001$;

10. Return to step 3 until the goods market convergence criterion is satisfied.

Our steady-state analysis is capable of capturing the ex-ante welfare effect of a regime shift (i.e., effect on the newborn households). However, grasping the full impact of a policy change requires that one also investigates the welfare effect on the current generations (non-newborns) living in the reform period. This requires that we consider the dynamics of the problem in-between steady states by solving for the transition path of the economy. Due to computational costs resulting from the high dimensionality of our model, we leave these to future endeavor. For this study, only the steady-state results are presented.

D Calibration: Supplementary results

D.1 Life cycle profiles of assets and consumption

Figure D.1 presents the estimated cross-sectional age profiles of wealth (left panel) and consumption (right panel) in 2018 AUD. For the real-world counterpart of assets (or wealth) in the model, we use average household net worth (financial + non-financial), defined as total assets net of total debts. For consumption, we estimate the household expenditure profile by age.

Both consumption and asset profiles exhibit a hump-shaped pattern. Household assets gradually accumulate, peaking at approximately 550,000 AUD around age 65—coinciding with the model's mandatory retirement age—before declining. Notably, consumption peaks earlier, around age 45, at approximately 45,000 AUD. The decline in consumption after age 45 aligns with the "empty nest" phase, a period when children leave home, leading to significant changes in household dynamics and consumption patterns.

Two key observations in Figure D.1 highlight divergences between the model assumptions and the data. First, household assets (or net worth) at age 21—the economic birth of households in the model—are not zero in the data, unlike the model's assumption. This discrepancy arises because in reality: (i) some individuals begin working before age 21, and (ii) inter vivos transfers, such as parental gifts, are non-negligible.[30] Second, the observed asset profile evolves gradually, with no indication that assets fall to zero in later life. In contrast, the model imposes a zero-asset terminal condition, meaning all households fully deplete their wealth if they

[30] For example, net worth includes bank accounts and vehicles, which are often gifted to young adults at the start of college.

survive to the maximum age 100. This assumption is necessary for computational feasibility, as it enables the household problem to be solved via backward induction using value function iteration.

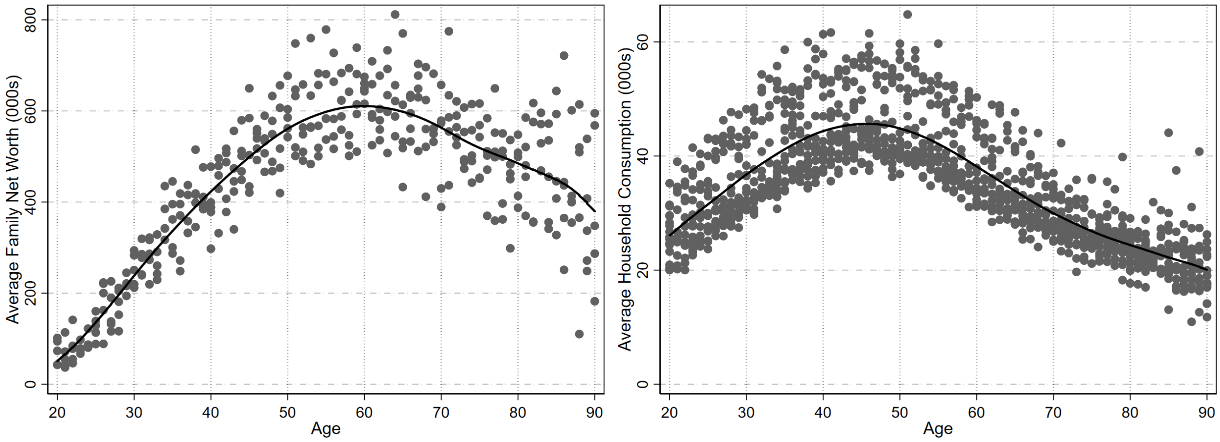


Figure D.1: **Life cycle profiles of wealth and consumption in 2018 AUD.**

Notes: (*) The estimated wealth profile represents household net worth (assets minus debts) based on HILDA household survey data. Scatter points represent net wealth across different years and age groups. Assets include financial assets (bank accounts, superannuation) and non-financial assets (property assets, business assets, collectibles). Debts consist of credit card debt, HECS debt, property debt, other personal debt, and overdue household bills. Further details on asset and debt classifications are available on page 74 of the HILDA User Manual - Release 20. (**) The estimated consumption profile is derived from annualized household expenditures across multiple categories, including food and beverages, transportation, clothing and footwear, communication and utilities, healthcare, leisure and recreation, household expenses (repairs, renovations, furniture, household appliances), and education and technology. Further details on expenditure classifications are available on page 85 of the HILDA User Manual - Release 20.

Relative measures of wealth and consumption to average annual income (of the working-age population) are used to compare model-generated values with the data, as presented in Figure D.2. These cross-sectional profiles indicate that consumption peaks at approximately 80% of average income before declining to around 40% by age 90. Wealth reaches a peak of approximately 5.5 times average annual income. This estimate is conservative, as net worth values below 1.5 times the lower quartile or above the upper quartile are treated as outliers and removed. This filtering helps exclude the super-rich, whose wealth accumulation mechanisms (e.g., inheritance, entrepreneurship) are not explicitly modeled in this study.

D.2 Human capital profile and the gender wage gap

Effective wages are determined by the product of market wages, education, and human capital. The endogenous component of wages is human capital follows a learning-by-doing process and is distinct from the education level obtained before workforce entry. Moreover, since market wages, education, and shocks are exogenous, the driver of the evolution of the gender wage gap over the life cycle is female human capital.[31]

Figure 3(b) highlights two key observations. First, model-generated human capital trajectories for women are consistently lower than those for men across all ages. Second, high-education (high-skilled) women exhibit higher human capital levels than their low-education counterparts throughout the life cycle, with steeper trajectories during the first 10 years of their careers before the arrival of their first child (at age 28). Childbirth leads some high-education women to reduce their labour supply, thereby lowering their subsequent human capital accumulation.

While the gender wage gap is not the primary focus of this study, this section provides a brief discussion of the model's implied gender wage gap (driven by endogenous human capital accumulation) to further assess its ability to match non-targeted moments. As shown in Figure 3(a), the model overestimates the gender wage gap,

[31] Recall that male human capital is exogenous.

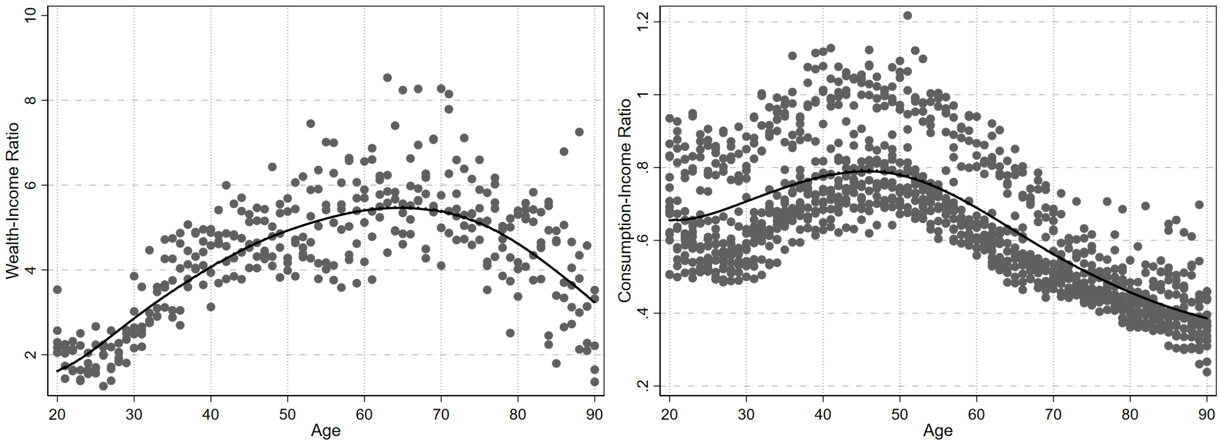
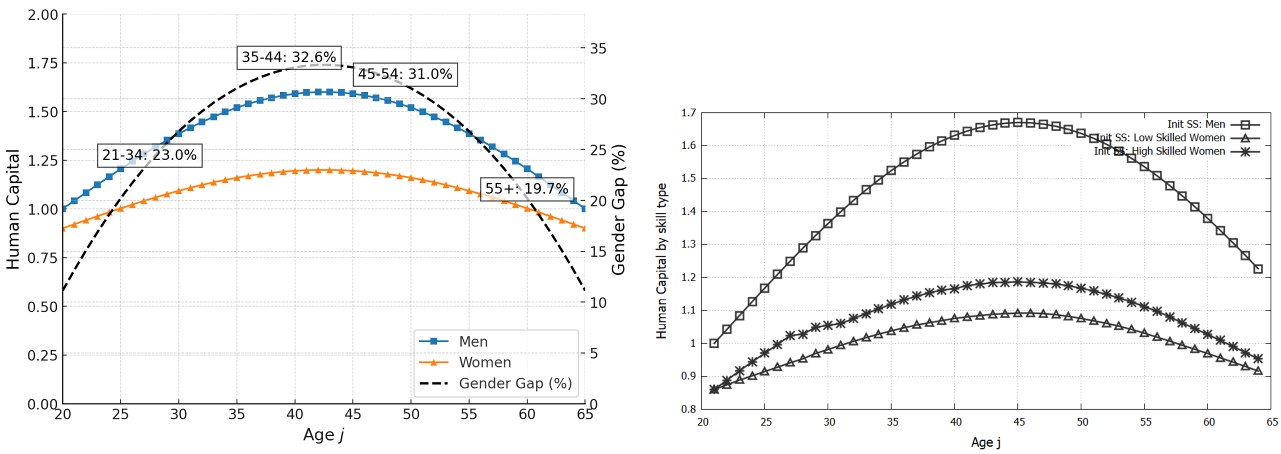


Figure D.2: **Life cycle profiles of wealth and consumption relative to average income.**
Notes: (*) The estimated wealth profile represents household net worth (assets minus debts) relative to the average annual income of working-age population, based on HILDA household survey data. Scatter points represent net wealth across different years and age groups. Assets include financial assets (bank accounts, superannuation) and non-financial assets (property assets, business assets, collectibles). Debts consist of credit card debt, HECS debt, property debt, other personal debt, and overdue household bills. Further details on asset and debt classifications are available on page 74 of the HILDA User Manual - Release 20. (**) The estimated consumption profile is expressed relative to the average annual income of working-age population, based on HILDA household survey data. Consumption is derived from annualized household expenditures across multiple categories, including food and beverages, transportation, clothing and footwear, communication and utilities, healthcare, leisure and recreation, household expenses (repairs, renovations, furniture, household appliances), and education and technology. Further details on expenditure classifications are available on page 85 of the HILDA User Manual - Release 20.



((a)) **Gender wage gaps across the life cycle.** ((b)) **Human capital profile by gender and education level.**

Figure D.3: **The gender wage gap and human capital profile.**
Notes: The male profile represents full-time married fathers and is exogenously determined. Female profiles are endogenously generated by the model, reflecting the interaction between women's labor supply decisions at each age (governed by the calibrated human capital gain and loss rates).

particularly during prime working years. Specifically, it predicts an average gender wage gap of approximately 30% for the 35–44 and 45–54 age groups, whereas the ABS data reported in the AGEC report (2020) indicates pay gaps of 17.3% and 15.6% for full-time earnings in the same age groups. However, the model aligns more closely with observed gaps for younger and older workers, predicting 23% for the 21–34 age group (compared to 14.2% in the data) and 19.7% for the 55+ age group (compared to 17.7%). These results suggest that labor force participation decisions and human capital accumulation alone generate substantial wage gaps, indicating the need for additional mechanisms to fully explain the observed gender wage gap.

Several factors contribute to the model's overestimation of the gender wage gap. First, for tractability, the calibration assumes assortative matching, ensuring that female wage profiles mirror those of their male counterparts if they work continuously over the life cycle. For instance, married women are assumed to have the same human capital growth potential (governed by the human capital gain parameters $\xi_{1,\lambda,\ell}$ and $\xi_{2,\lambda,\ell}$) as their male spouses, and similarly for single men and women. Second, the human capital accumulation process follows a second-degree polynomial function to minimize the number of parameters required. Since it is governed by only two gain parameters, this structure lacks the flexibility needed to capture the smaller observed gender gap during prime working years.

E Policy reforms: Supplementary results

E.1 Baseline universal child-related transfers (with current payment rates)

Labor supply responses by mothers to universalized child-related transfers

LFP (*pp*)	21-30	31-40	41-50	51-60	61-70	**FT** (*pp*)	21-30	31-40	41-50	51-60	61-70
M (H)	+0.0390	+0.3347	+0.1323	+0.0126	-0.0161	M (H)	+0.4783	+1.0791	-0.0287	-0.0879	-0.0814
M (L)	+0.9228	+0.7844	+0.3895	+0.0542	-0.0153	M (L)	+2.3560	+0.4973	+0.3216	+0.0178	-0.0855
S (H)	0	0	0	-0.0003	-0.0004	S (H)	-0.0305	-0.0192	-0.0036	-0.0088	0
S (L)	0	0	-0.0001	-0.0005	+0.0009	S (L)	+0.0131	-0.0276	-0.0015	-0.0042	+0.0032

Hour (%)	21-30	31-40	41-50	51-60	61-70
M (H)	+6.33	+21.87	+1.69	-1.25	-6.12
M (L)	+28.49	+9.42	+4.64	+0.60	-3.11
S (H)	-1.26	-1.40	-0.32	-0.89	-0.12
S (L)	+0.24	-0.88	-0.06	-0.20	+0.48

Table E.1: **Labor supply responses by married (M) and single (S) female households to universal child-related transfers** (H: high education, and L: low education).
Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy.

C (%)	M (H)	M (L)	SM (H)	SM (L)	SW (H)	SW (L)
Age 21-30	+4.56	+12.70	-4.12	-3.65	-3.64	-1.12
Age 31-40	+8.59	+6.18	-4.11	-3.90	-1.69	-2.65
Age 41-50	+3.82	+2.40	-4.08	-3.97	-0.96	-2.25
Age 51-60	+2.92	+2.30	-4.03	-3.97	-1.05	-2.30
Age 61-70	+3.02	+2.56	-3.35	-3.13	+0.15	-0.93
Age 71-80	+3.81	+2.54	-0.31	-0.44	+2.34	+1.03
Age 81-90	+3.53	+2.12	+1.96	+1.21	+3.08	+1.70
Welfare (%)	+1.36	+1.34	-1.47	-1.20	-0.69	-0.51

Table E.2: **Consumption and welfare responses to universal child-related transfers** (M: Married, SM: Single men, SW: Single women (Single mothers); H: High education and L: Low education).
Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy.

Labor supply responses by mothers												
	0.5×Baseline rates				Baseline rates				1.5×Baseline rates			
LFP (*pp*)	21-30	31-40	41-50	51-60	21-30	31-40	41-50	51-60	21-30	31-40	41-50	51-60
M (H)	−0.0935	+0.0634	+0.0397	−0.0149	+0.0390	+0.3347	+0.1323	+0.0126	+0.0379	+0.3452	+0.1266	+0.0019
M (L)	+0.1662	+0.5453	+0.3592	+0.0440	+0.9228	+0.7844	+0.3895	+0.0542	+2.1401	+0.9600	+0.3522	+0.0051
S (H)	0	0	0	−0.0004	0	0	0	−0.0003	0	0	0	−0.0004
S (L)	0	0	−0.0002	−0.0018	0	0	−0.0001	−0.0005	0	0	−0.0001	−0.0002
FT (*pp*)	21-30	31-40	41-50	51-60	21-30	31-40	41-50	51-60	21-30	31-40	41-50	51-60
M (H)	+0.1906	+0.0613	−0.0649	−0.0746	+0.4783	+1.0791	−0.0287	−0.0879	+0.5678	+1.3883	−0.1174	−0.1880
M (L)	−0.2479	+0.1150	+0.1595	+0.0119	+2.3560	+0.4973	+0.3216	+0.0178	+4.1052	+0.5985	+0.4306	+0.0131
S (H)	+0.0035	+0.0365	−0.0034	−0.0078	−0.0305	−0.0192	−0.0036	−0.0088	−0.0318	−0.0301	−0.0038	−0.0091
S (L)	+0.03	+0.0710	−0.0013	−0.0039	+0.0131	−0.0276	−0.0015	−0.0042	−0.0318	−0.1518	−0.0018	−0.0050
HRS (%)	21-30	31-40	41-50	51-60	21-30	31-40	41-50	51-60	21-30	31-40	41-50	51-60
M (H)	+1.60	+1.88	−0.29	−1.51	+6.33	+21.87	+1.69	-1.25	+7.47	+26.81	+0.33	−3.12
M (L)	−1.31	+4.78	+3.44	+0.48	+28.49	+9.42	+4.64	+0.60	+52.70	+11.41	+5.05	+0.14
S (H)	+0.14	+2.66	−0.30	−0.79	−1.26	−1.40	−0.32	−0.89	−1.31	−2.20	−0.34	−0.91
S (L)	+0.55	+2.27	−0.06	−0.25	+0.24	−0.88	−0.06	−0.20	−0.58	−4.86	−0.07	−0.22

Table E.3: **Labor supply responses by married (M) and single (S) female households to universal child-related transfers varied by transfer size** (H: high education, and L: low education).

Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy.

Consumption and welfare changes by household type																		
	0.5×Baseline rates						Baseline rates						1.5×Baseline rates					
C (%)	M (H)	M (L)	SM (H)	SM (L)	SW (H)	SW (L)	M (H)	M (L)	SM (H)	SM (L)	SW (H)	SW (L)	M (H)	M (L)	SM (H)	SM (L)	SW (H)	SW (L)
21-30	+3.6	−0.7	−0.1	−0.1	+0.4	+0.8	+4.6	+12.7	−4.1	−3.7	−3.6	−1.1	+5.1	+21.4	−6.2	−5.6	−5.2	−3.8
31-40	+5.0	+3.5	−0.1	−0.1	+3.0	+1.5	+8.6	+6.2	−4.1	−3.9	−1.7	−2.7	+9.9	+9.2	−6.1	−5.9	−3.9	−5.0
41-50	+3.9	+3.5	−0.1	−0.1	+2.9	+1.2	+3.8	+2.4	−4.1	−4.0	−1.0	−2.3	+4.0	+3.3	−6.1	−5.9	−3.0	−4.0
51-60	+3.5	+3.7	−0.1	−0.1	+2.8	+1.2	+2.9	+2.3	−4.0	−4.0	−1.1	−2.3	+3.0	+3.1	−6.0	−5.9	−3.0	−4.1
61-70	+3.8	+4.1	+0.3	+0.3	+3.4	+1.8	+3.0	+2.6	−3.4	−3.1	+0.2	−0.9	+3.1	+3.3	−5.1	−4.7	−1.5	−2.1
71-80	+4.6	+3.8	+2.3	+2.0	+4.2	+2.8	+3.8	+2.5	−0.3	−0.4	+2.3	+1.0	+4.0	+3.3	−1.3	−0.9	+1.7	+0.9
81-90	+4.3	+3.1	+3.7	+2.8	+4.4	+2.9	+3.5	+2.1	+2.0	+1.2	+3.1	+1.7	+3.6	+2.7	+1.5	+1.4	+2.8	+2.0
Welfare (%)	+1.4	−0.02	−0.04	−0.02	+0.4	+0.1	+1.4	+1.3	−1.5	−1.2	−0.7	−0.5	+1.6	+2.6	−2.2	−1.9	−1.3	−0.9

Table E.4: **Household consumption and welfare responses to universal child-related transfers varied by transfer size** (M: Married, SM: Single men, SW: Single women (Single mothers); H: High education and L: Low education).

Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy.

C (%)	M (H)	M (L)	SM (H)	SM (L)	SW (H)	SW (L)
Age 21-30	+1.59	+1.89	+0.98	+0.76	+0.95	+1.06
Age 31-40	+1.72	+1.25	+0.99	+0.86	+1.15	+0.77
Age 41-50	+1.48	+1.12	+1.01	+0.92	+1.02	+0.54
Age 51-60	+1.30	+1.13	+1.02	+0.96	+1.05	+0.60
Age 61-70	+1.22	+1.07	+1.05	+1.00	+1.17	+0.76
Age 71-80	+1.20	+0.99	+1.16	+1.03	+1.16	+0.87
Age 81-90	+1.15	+0.93	+1.19	+1.01	+1.13	+0.88
Welfare (%)	+0.42	+0.40	+0.34	+0.24	+0.26	+0.18

Table E.5: **Heterogeneous household consumption and welfare responses to halving the CCS taper rates** (M: Married, SM: Single men, SW: Single women (Single mothers); H: High education and L: Low education).

Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy.

Labor supply responses by mothers to the removal of FTB and CCS programs

LFP (*pp*)	21-30	31-40	41-50	51-60	61-70	**FT** (*pp*)	21-30	31-40	41-50	51-60	61-70
M (H)	+0.0454	+0.2091	+0.0777	+0.0177	+0.0012	M (H)	+0.1740	+0.4243	+0.2189	+0.0687	+0.0025
M (L)	+2.2350	+1.3731	+0.4436	+0.1798	+0.0290	M (L)	+2.7824	+2.5401	+1.0656	+0.6916	+0.0955
S (H)	0	0	0	0	0	S (H)	+0.0013	+0.0075	+0.0004	+0.0012	+0.0015
S (L)	0	0	0	+0.0002	+0.0008	S (L)	+0.0159	+0.0647	+0.0091	+0.0151	+0.0112

Hour (%)	21-30	31-40	41-50	51-60	61-70
M (H)	+12.36	+48.96	+22.06	+7.64	+1.25
M (L)	+83.20	+60.50	+20.12	+15.65	+8.80
S (H)	+1.08	+10.98	+0.74	+2.07	+6.13
S (L)	+2.57	+17.76	+2.89	+4.77	+9.28

Table E.6: **Labor supply responses by married (M) and single (S) female households to the elimination of all child-related transfer programs** (H: high education, and L: low education).

Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy.

E.2 Universal child related transfers with different payment rates

E.3 Relaxing the childcare subsidy (CCS) phase-out rates

E.4 Abolishing either the FTB or the CCS program

In this subsection, we extend the analysis to address the question whether the existing child benefit programs are socially desirable. We do so by considering three radical counterfactual policy reforms: (i) abolishing the FTB, (ii) abolishing the CCS, and (iii) abolishing both the FTB and the CCS.

Column [1] and [2] of Table 9 present the aggregate outcomes—including overall welfare and key macroeconomic indicators, such as female labor supply and human capital, consumption, and output—of abolishing the FTB (while retaining the CCS) and the CCS (while retaining the FTB), respectively.

Eliminating the FTB removes the work disincentives—in particular, the wage distortions due to means testing and the positive wealth effect—associated with the program, leading to a 5.76 percentage point (*pp*) increase in female workforce participation, with an even stronger 9.21*pp* increase in full-time rate. This suggests a post-reform switch from part-time to full-time work for a sizeable portion of mothers. Overall, discontinuing the FTB program raises consumption by 1.1% and output by 1.38%, making it an attractive option from employment, consumption, and output perspectives. However, this new regime also brings about an ex-ante welfare loss of 3.7% relative to the status quo, driven by the loss of leisure, an increased tax burden, and insufficient government insurance for those in need, particularly single mothers. A society concerned with the long-term welfare of its newborns would likely oppose this reform.[32]

The removal of the CCS is likely to be met with resistance from the same society. Without the subsidy to reduce formal child care costs and mitigate the FTB's work disincentives, female labor force participation falls by 10*pp*, with a 4.55*pp* drop in full-time rate. The decreased labor supply can be attributed to (i) the status quo CCS program's work activity test, which encourages full-time employment by granting larger subsidies for longer work hours, and (ii) the FTB's work disincentives, which are fully felt without the CCS.[33] Overall, output and welfare decrease by 3.48% and 1%, respectively, making the removal of the CCS a lose-lose reform.

Notably, the general equilibrium effects via the tax channel indicate that eliminating either program produces little to no budget savings and may even increase the tax burden. For instance, removing the FTB causes a surge in the number of working mothers, resulting in a nearly 50% expansion of the CCS program. While the tax base grows, it cannot cover the increased cost of the CCS, leading to a 2.5*pp* rise in the average tax rate. This can be partially explained by the fact that much of the increase in labor supply comes from low-skilled mothers whose earnings place them in the lower income tax brackets.

[32] The adverse distributional effects (or inequities) are qualitatively comparable across the three reforms, and thus, only the third scenario associated with the removal of all child benefits (Column [3] of Table 9) is discussed. Additionally, because behavioral responses in consumption and labor supply to different child benefit reforms are driven by similar mechanisms, detailed discussions of these responses are not repeated. They can be found in prior Subsections 5.1.1, 5.1.2, and 5.2.

[33] Considering the short coverage of the subsidy (limited to children aged 13 or younger), the impact of reforming the CCS is most significant on younger mothers, especially single mothers whose family insurance is absent.

C (%)	Couples (H)	Couples (L)	Single Men (H)	Single Men (L)	Single Women (H)	Single Women (L)
Age 21-30	+8.12	+15.74	-0.11	-0.07	-7.74	-11.55
Age 31-40	+14.59	+14.83	-0.06	-0.06	-3.04	-6.88
Age 41-50	+9.65	+6.71	-0.03	-0.01	-4.20	-9.39
Age 51-60	+6.80	+6.59	+0.03	+0.07	-3.22	-8.03
Age 61-70	+6.24	+5.69	+1.12	+1.44	-1.32	-6.00
Age 71-80	+6.61	+4.10	+6.10	+6.36	+1.66	-3.09
Age 81-90	+5.48	+1.80	+9.83	+9.11	+2.13	-3.06
Welfare (%)	+1.35	-0.22	+0.02	+0.06	-4.03	-6.53

Table E.7: **Consumption and welfare effects by demographic due to the elimination of all means-tested child-related transfers** (H: High education and L: Low education).
Notes: Results are reported in terms of percentage changes relative to the levels in the benchmark economy.

	Abolishing one or both child benefit programs		
	[1] No FTB	[2] No CCS	[3] No FTB&CCS
CCS size, %	+49.80	–	–
FTB size, %	–	+10.89	–
Average tax rate, *pp*	+2.50	-0.70	+0.99
Tax scale, λ	-0.014	-	+0.003
Fe. Lab. For. Part. (LFP), *pp*	+5.76	-10.00	+10.49
Fe. Full time (FT), *pp*	+9.21	-4.55	+20.38
Fe. Hour, %	+13.75	-	+28.67
Human cap. (H), %	+3.88	-4.83	+8.57
Savings (S), %	+5.83	-1.41	+23.45
Consumption (C), %	+1.10	-3.26	+4.27
Output (Y), %	+1.38	-3.48	+3.86
Welfare (EV), %	-3.70	-1.00	-0.66

Table E.8: **Aggregate effects of eliminating child benefit program(s).**
Notes: Results are reported as changes relative to the levels in the benchmark economy.

Hence, from these experiments, two lessons of relevance to policy making emerges: (i) the interplay between the child-related transfer programs could negate the budget-saving effect of a single program reform; (ii) while the two reforms lead to welfare reductions and are thus undesirable, removing the means-tested lump sum transfer (FTB) yields aggregate gains in the form of higher female labor supply, human capital, consumption, and output, whereas removing the means-tested subsidy (CCS) offers no such benefits.