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# Estimating the impact of the Families Package changes in financial incentives

**Motu** economic & public policy research

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### Disclaimer

Access to the data used in this study was provided by Stats NZ under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the author, not Stats NZ or individual data suppliers.

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI, please visit [www.stats.govt.nz/integrated-data/](http://www.stats.govt.nz/integrated-data/).

The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes and is not related to the data's ability to support Inland Revenue's core operational requirements.

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## **Abstract**

In this paper we analyse behavioural responses to changes in financial incentives associated with the 2018 Families Package. For this analysis, we followed the methods pioneered by Saez (2010) and Chetty et al. (2013), which use bunching around kink points in the income schedule to estimate the degree of behavioural response. In general, the role of financial incentives in labour supply behaviour has been the subject of investigation for many decades, and although there is considerable concern about adverse labour supply responses to increased generosity of benefits, the available evidence on labour supply responses is mixed and surprisingly muted. We find no evidence of response around the salient kink points related to the policy changes; however, in contrast to the lack of bunching around the policy points, we see clear evidence of bunching around the top two marginal tax rate (MTR) thresholds, as well as at twice these amounts by coupled parental units. This suggests the methodology is able to identify such behavioural responses if they exist. Moreover, according to the theoretical model established in Saez (2010), the degree of bunching around the MTR thresholds should be similar if not less than that around the Families Package policy points we examine. The results in that respect are surprising, though Saez (2010), Chetty et al. (2013), and others find that bunching tends to occur around high visibility, easily understood kink points which have large impacts on disposable income.

## **JEL codes**

H24, H31, H53, I38

## **Keywords**

Financial incentives, income support policies, Families Package, New Zealand

## **Summary haiku**

Tax credits create  
incentives to bunch earnings  
but no evidence

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# 1 Introduction

The provision of income support typically involves a trade-off among three main competing objectives: achieving income adequacy or poverty reduction, maintaining work incentives, and limiting the fiscal cost of the support.<sup>1</sup> Although labour supply decisions are influenced by more than simply financial incentives (Nolan, 2003), understanding the role of financial incentives in income support settings is important for policy development. If a policy substantially reduces employment, and causes higher rates of receipt, then achieving poverty alleviation goals will come at a higher fiscal cost.<sup>2</sup>

The role of financial incentives in labour supply behaviour has been the subject of investigation for many decades. Although there is considerable concern about adverse labour supply responses to increased generosity of benefits, the available evidence on labour supply responses is mixed and surprisingly muted (Bargain et al., 2014; Bargain & Peichl, 2016). In addition, there is only a small amount of New Zealand-specific evidence on the actual nature of the empirical relationship for those in receipt of income support (Dalgety et al., 2010; Fitzgerald et al., 2008; Maloney, 2000). One important empirical issue when trying to identify labour supply responses is being able to observe a sufficiently discrete and exogenous change in the relevant incentives.

The Families Package introduced in 2018 included a variety of changes to existing policy parameters as well as new initiatives, to provide additional support for low- and middle-income families with children in order to reduce child poverty. Changes to existing policies included increases to the Working for Families (WFF) Family Tax Credit (FTC) amounts, abatement rates and thresholds; and increases in the maximum Accommodation Supplement (AS) payments available to recipients. In addition, two new support policies were introduced: the Best Start (BS) payment for families with new-born children was introduced as a universal payment during the first year after birth, and a means tested payment in the second and third years; and the Winter Energy Payment (WEP) was introduced to provide financial support to help with high energy costs during winter for households receiving working age main benefits, and NZ Superannuation and Veteran's Pension recipients.

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<sup>1</sup> This is sometimes referred to as the 'iron triangle': improving any one objective is at the expense of the other two. For example, increasing the generosity of income support to improve income adequacy will require either a higher fiscal cost associated with the same financial (dis)incentives over a longer phase-out as people increase their employment, or stronger financial disincentives associated with a faster phase-out to maintain the same fiscal cost.

<sup>2</sup> Poverty alleviation goals are often two-fold: providing financial support for low-income workers and for the jobless. In-work transfer payments are not necessarily only to incentivise work but also can be designed to alleviate in-work poverty.

Each of the Families Package changes has implications for the financial incentives recipients face. In this paper, we focus on recipients' labour supply responses to the FTC changes.<sup>3</sup> We use the approach pioneered by Saez (2010) and Chetty et al. (2013) in the US, using 'kink' research designs to identify the effects of financial incentives in the Families Package changes on employment and benefit receipt behaviour. In contrast to more common difference-in-differences approaches that rely on demographically distinct comparison groups who are not subject to the changes, this approach focuses on measuring within-group bunching around salient kink-points in the income distribution, with the counterfactual being the distribution with no change in the tax rate (Chetty et al., 2011). This approach can also be readily adapted to examine responses and outcomes for population subgroups.

The research design is based on people's tendency to choose (where possible) their level of earnings based on how much their earnings contribute to disposable income, with its foundations rooted in the standard static labour supply model. This standard model predicts that utility-maximising individuals will cluster (or bunch) at points along the income schedule associated with an increase in the effective marginal tax rate (EMTR).<sup>4</sup> These increases in the EMTR are generally caused by progressive income taxes or by means-tested transfer programmes which, when marginal tax rates increase or when transfers begin to abate, change the slope of the income schedule and create 'kink points' (Moffitt, 1990; Saez, 2010). Around such points, increases in earned income just above the kink result in smaller increases in disposable income than the same increases just below the kink point, providing a financial disincentive for individuals close to the kink point to earn above this point. Intuitively, the idea being that a dollar earned just above the kink point is less valuable to the individual than a dollar earned just below the kink point – how much less valuable depends on the change in the EMTR. Conversely, individuals are predicted to cluster away from kink points in the income function associated with a decrease in the EMTR, for example at transfer policy phase-out points.

While theory predicts that there should be some behavioural response at any kink point, Saez (2010) found that, in practice, bunching happened only in specific cases and not necessarily at every kink point: he found bunching only at the first kink point of a tax credit that maximised the amount of the credit received and at the first kink point of the income tax schedule where tax liability starts. The commonality between these is that both kink points have high visibility, are easily understood, and have large impacts on disposable income. Chetty et al. (2011) also

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<sup>3</sup> We do not examine the effects of the Best Start Tax Credit (BSTC) partly because of timing: BSTC started in July 2018, so that means-testing for the first cohort of families would not begin until July 2019. Also, we do not analyse the incentive associated with the Winter Energy Payment (WEP) here; rather we defer that to a companion project focused on the effects of WEP.

<sup>4</sup> This assumes that individual preferences are convex and smoothly distributed in the population.

found bunching at a large, easily discernible kink point using incomes in Denmark but little evidence of bunching around smaller kink points.

Our analysis focuses on the more salient kink points associated with the Family Tax Credit policy changes. Specifically, we focus on the change in the FTC earnings abatement thresholds, examining whether there is any evidence of bunching at these points or any change in bunching with the policy changes. The Families Package increased both the FTC abatement threshold (from \$36,350 to \$42,700) and the abatement rate from (22.5% to 25%).<sup>5</sup> In terms of financial incentives, the change in the threshold moves the kink point, allowing families to earn more before the maximum credit begins to be reduced, and the increased abatement rate changes the slope of the income schedule beyond the kink point, reducing the value of each dollar earned beyond the kink point.

As a secondary focus, we examine whether there is any evidence of bunching around the Minimum Family Tax Credit (MFTC) entry thresholds of earnings associated with recipients' exiting main benefit, or clustering away from the earnings thresholds where the MFTC cuts out. However, this analysis is challenging, both because of the small number of MFTC recipients, and because the MFTC minimum entry thresholds depend on (hourly) wages and hours worked over the course of the year.<sup>6</sup> The Families Package resulted in the MFTC cut-out gross annual earnings increasing from \$27,680 in the 2017/18 tax year to \$30,516 in the 2018/19 tax year.<sup>7</sup> Both the MFTC entry and FTC abatement thresholds create kinks in the income schedule where recipients are expected to bunch; while the MFTC cut-out points create kinks, around which there should be a relative scarcity of recipients. Moreover, given the changes in these entry and exit thresholds, we will analyse whether there has been a shift in bunching from the old thresholds to the new thresholds.

Our analysis uses a variety of data sources held within Statistics New Zealand's (Stats NZ) Integrated Data Infrastructure (IDI). Our main analysis uses single and coupled parental units

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<sup>5</sup> In the 2018/19 tax year, the parameters did not go into effect until the second quarter. For this reason, the annualised abatement parameters for the 2018/19 tax year were the weighted averages of the pre- and post-Families Package parameters: \$41,113 and 24.4%. Since these weighted averages are close to the parameters as at 1 July 2018, we used the 1 July 2018 parameters for the analysis.

<sup>6</sup> The MFTC provides a guaranteed minimum income to families with dependent children who work a minimum number of hours, to ensure they do not face a reduction in income from moving off-benefit. To be eligible for the MFTC each week, sole parents needed to work at least 20 hours per week, and couples with children 30 hours per week. We use these weekly hour requirements together with the prevailing minimum wage to determine the (minimum) earnings entry thresholds for MFTC for sole and coupled parents – e.g., in the 2018/19 tax year, the annual gross earnings entry point was \$17,160 for sole parents and \$27,680 for couples. As the MFTC provides a fixed guaranteed minimum income, it abates at 100% over the range from the entry point to the cut-out point. Only about 3,000 single parents and 200-300 coupled parents receive the MFTC annually (see Table 7).

<sup>7</sup> The MFTC annual income is generally presented as a net income; however, for the income schedule analysis, we use the gross amounts. The gross MFTC income is found on the form IR271, 'Working for Families Tax Credits' which is published annually.



identified in the 2018 Census. We focus primarily on the distribution of parental units' annual earnings for the 2018/19 tax year, but also examine the distributions over the two prior years (2016/17 and 2017/18) and the following 2019/20 tax year which ends just as the first pandemic lockdown in New Zealand begins. We do not have comprehensive information about weekly hours worked or weeks worked per year, which is a limitation of the analysis; however, we do have self-reported usual weekly hours worked<sup>8</sup> from the 2018 Census for a subset of the population. Of course, this only provides a snapshot at a single point in time.

The paper proceeds as follows. In the next section, we provide some background to the Families Package, and discuss the relevant literature. In section 3 we describe the research design methods used to identify financial incentives from bunching in annual earnings. We describe the data construction and extract used in the analysis in section 4, and present the results in section 5. The paper concludes with a summary discussion of the implications of the results and future issues.

## **2 Background and literature**

### **2.1 2018 Families Package policy changes**

The Families Package (FP) was announced in December 2017, and the various components were implemented in April and July 2018. Its objective was to improve income adequacy for families and to reduce child poverty. Table 1 contains a summary of the main policy changes in the Families Package. In this section we first discuss the Family Tax Credit-related policy changes that affected the income schedule and hence the effective marginal tax rates, which is our primary focus; then discuss the Minimum Family Tax Credit policy and changes, which is our secondary focus; and finally discuss other FP policy changes.

#### *2.1.1 Family Tax Credit (FTC)*

The Family Tax Credit (FTC) is available for low- to middle-income families with children regardless of benefit status. As with all Working for Families payments, the FTC assessment period is annual. It is income-tested but not work-tested, and the amount of the credit is based on the number of children in the family with the amount of the first child being slightly higher than the amount for subsequent children. Prior to the Families Package, the FTC credit amounts

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<sup>8</sup> Hours of work is reported for hours worked in the person's main job and also for hours worked in their other jobs.

had not changed since 2012 when they were increased to adjust for inflation (Welfare Expert Advisory Group, 2019), and the abatement threshold had been \$36,350 since 2011.<sup>9</sup>

Changes to the Family Tax Credit (FTC) from the FP included raising the abatement threshold from \$36,350 to \$42,700 and increasing the abatement rate from 22.5% to 25%.<sup>10</sup> In addition, the FTC amount families receive increased, by \$20/week for one child (aged 0-12), and relatively more for two- and three+-child families with children in the same age range.<sup>11</sup> Under the FP, the maximum annual amount of the FTC for the eldest child on 1 July 2018 was \$5,878 (about \$113 per week) and for each subsequent child was \$4,745 (about \$91 per week). There was an increase in participation around the time of these changes, as evidenced by the increase in the number of FTC recipients paid weekly or fortnightly by Inland Revenue (IR), from approximately 140,000 recipients just prior to the change to 160,000 in July 2018 (Arneson, 2021b).<sup>12</sup>

The FTC abatement threshold and subsequent abatement rate generates a concave region around the threshold in the budget constraint associated with earnings, which creates a financial incentive to bunch at the threshold for families who would otherwise have earnings around that level. Hence, if people are responding to these incentives, the income distribution should display an irregular pattern with a cluster or 'bunch' of individuals with incomes around that point. Also, the increase in the abatement threshold associated with the FP implies any bunching should shift with the threshold, while the increase in the abatement rate beyond the threshold provides a stronger incentive for FTC recipients to bunch at the abatement threshold after the 2018 policy change. Our analysis will focus on whether there is any evidence of bunching at the threshold, whether the point of bunching shifted with the threshold increase, and whether the degree of bunching increased with the FP.

### 2.1.2 *Minimum Family Tax Credit (MFTC)*

We also explore changes to the Minimum Family Tax Credit (MFTC) which is designed to ensure that families with children are no worse off when working relative to being on-benefit. The MFTC

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<sup>9</sup> In 2016, the FTC abatement rate increased from 21.25% to 22.5%. Prior to the FP, the FTC amount depended on both the number and the age of children.

<sup>10</sup> In the 2018/19 tax year, the parameters did not go into effect until the second quarter. The annualised abatement parameters for the 2018/19 tax year were the weighted averages of the pre- and post-Families Package parameters: \$41,113 and 24.4%. Since these weighted averages are close to the parameters as at 1 July 2018 (\$42,700 and 25%), we used the 1 July 2018 parameters for the main analysis of the 2018/19 tax year but also look for potential effects using the weighted parameters.

<sup>11</sup> For families with more than one child, each child aged 0-12 yielded an additional increase (on top of the increase for the first child) of \$27/week and each child aged 13-15 an additional increase of \$18/week after the FP. After the FP, the payment rate for subsequent children 16-18yo was the same as before the FP, so there was no net change for these children.

<sup>12</sup> In the 2018/19 tax year, 290,000 families received the FTC (from either IRD or MSD), of which 60% were sole parent families. In the same tax year, 203,000 families received the in-work tax credit (IWTC), of which 120,000 were partnered families (Arneson, 2021b).

provides a minimum income level for eligible families and is subject to 100% abatement of any earnings above this minimum income. The MFTC is only available for families not receiving an income-tested main benefit (unlike the FTC which is available to families regardless of benefit receipt), and is both income-tested and work-tested: sole parents are required to work 20 hours per week, and coupled parents 30 hours per week.<sup>13</sup> In addition, MFTC eligibility is based on an annual income and on a weekly work requirement: a family is not eligible for the MFTC if its annual income exceeds the threshold, nor in any week that the hours requirement is not met. The MFTC can be paid on a weekly, fortnightly, or annual basis as chosen by the recipient; however, recipients paid sub-annually may be required to payback any overpayment at the end of the tax year.

Because of the hours-of-work requirement, the entry level of earnings associated with MFTC eligibility depends on a person's wage rate. Assuming they earn at least minimum wages for the full year, we can identify the minimum entry level of earnings for MFTC based on 20 hours per week minimum wage work for sole parents, and 30 hours for couples.<sup>14</sup> We refer to this as the 'MFTC minimum entry threshold'. The 100% abatement associated with earnings above the MFTC minimum income level strongly dis-incentivises any earnings above the MFTC minimum entry threshold. These MFTC policy settings create a region around the earnings entry levels where recipients have an incentive to bunch; and a region around the MFTC income level cut-out point around which families should choose not to locate. From now on, we will refer to this cut-out point as the 'MFTC exit threshold'.

The minimum wage increase from \$15.75 to \$16.50 in April 2018 implies the MFTC minimum entry threshold increased from \$16,380 in 2017/18 to \$17,160 in 2018/19 for sole parents (and from \$24,570 to \$25,740 for couples). As a result of the FP, the MFTC gross (before tax) exit threshold increased from \$27,680 in the 2017/18 tax year to \$30,516 in the 2018/19 tax year: this relatively large increase reflected the increase in FTC and benefits associated with receiving the Winter Energy Payment.<sup>15</sup> Our analysis of the MFTC changes focuses on examining

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<sup>13</sup> Self-employed hours of work do not count towards the minimum requirement. Couples include de facto partners as well as those in legal marriages or civil unions. For available guidance provided to recipients and potential recipients, see [www.workandincome.govt.nz/on-a-benefit/tell-us/are-you-in-a-relationship.html](http://www.workandincome.govt.nz/on-a-benefit/tell-us/are-you-in-a-relationship.html). See [www.ird.govt.nz/working-for-families/payment-types](http://www.ird.govt.nz/working-for-families/payment-types) for more information about the MFTC as well as the other WFF payments.

<sup>14</sup> In practice, the MFTC entry level for an eligible individual (or family) will lie somewhere between these minimum entry levels and the MFTC minimum income level. Child support payments can complicate the analysis as they count as income; however, we conducted analyses with and without child support, and it did not change the overall results.

<sup>15</sup> In addition, the Families Package increased the IWTC payments, which increases the incentive to bunch at the MFTC entry points. One issue with examining the financial incentives related to MFTC is the small number of families receiving the credit: Table 7 shows only about 3,000 single parent (and 200-300 coupled parent) families received the MFTC over the period we analyse.

whether there is any evidence of bunching around (or above) the minimum entry thresholds, or any density deficit around the MFTC exit threshold.

### *2.1.3 Other components of the Families Package policy*

The FP included several other components that we discuss here but don't analyse in this paper. First is the Best Start Tax Credit (BSTC), which replaced the Parental Tax Credit.<sup>16</sup> The Best Start payment provides a universal \$60/week for the first year of a child's life (paid after any paid parental leave (PPL) payments end) for children born after 1 July 2018. In the second and third years, the BSTC is means-tested, and abated at 21% for families with income above \$79,000 (for one child, BSTC is fully abated by about \$93,900). As the Treasury's Regulatory Impact Assessment of the Families Package indicated, this benefit (in combination with other transfer payments and taxes) could increase disincentives for some families with income between \$80,000 and \$95,000 given they are likely to face an effective marginal tax rate greater than 100%.

These changes suggest examining patterns of, and changes in, bunching around the \$79,000 income level. However, because the BSTC only applied to children born after 1 July 2018, the parents of children born towards the end of the first year of the programme (i.e., May or June 2019) would not face means testing until May/June 2020. Given the effects of the pandemic started in early 2020, it would be difficult to disentangle the programme's effects from those of the pandemic. While the change from universal coverage in the first year of a child's life to a means-tested benefit in the second and third years could allow for further examination of the impact of these differing financial incentives for different families, it would likely be difficult at this time given the timing issues. As we also do not expect these credits to confound our results for the same reason, we focus on the period when most families would receive the credits without means testing.

Second, the FP introduced the Winter Energy Payment (WEP) which provides weekly payments during the winter months of \$20.46 for single-person households and \$31.82 for multi-person households on a main benefit, NZS, or Veteran's Pension. WEP increases the financial incentive to be on-benefit for those on the employment/benefit (i.e., extensive) margin because it increases the total amount of income when on benefit which is lost entirely when going off benefit. In addition, given its eligibility is restricted to five months during winter (May – September inclusive), the WEP financial incentives switch on in May and off in October, which suggests that people who might otherwise leave benefit in September may delay until their WEP

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<sup>16</sup> The Parental Tax Credit (PTC) was an income-tested benefit for families not receiving main benefits or paid parental leave. The maximum PTC was \$220 per week but lasted only 10 weeks after the birth of the child.

payments stop.<sup>17</sup> However, when looking at the effects of WEP from an annual income perspective, they are most likely seen through the change in the Effective Marginal Tax Rate (EMTR) around the minimum earnings entry levels for in-work tax credits. Since the MFTC income level established by the FP was designed to compensate for the loss of WEP when switching from a main benefit to in-work tax credits, we would not expect to see an additional effect from WEP.

Third, changes to the Accommodation Supplement (AS) policy under the Families Package substantially increased the maximum levels of payments available to recipients.<sup>18</sup> Because AS does not begin to abate until recipients' relevant main benefit cut-out income amounts (which are above the MFTC exit thresholds), these changes should not affect the MFTC focal points.<sup>19</sup> Furthermore, because the level of AS and cut-out points will vary across recipients depending on where they live, we don't expect it to qualitatively alter the nature of the FTC kink points described above. In particular, although the effective marginal tax rates will be higher for AS recipients subject to abatement around the FTC abatement threshold, this will not systematically affect the relative increase in EMTR at the kink points.

Finally, although the In-Work Tax Credit (IWTC) was not part of the FP, it was indirectly affected by the changes to the FTC abatement threshold and rates as it only begins to abate once the FTC has been fully abated.<sup>20</sup> The IWTC work eligibility requirements prior to 1 July 2020 were similar to those for the MFTC<sup>21</sup>, with sole parents required to work 20 hours per week and coupled parents 30 hours per week. Hence, the entry threshold for the IWTC was the same as the entry threshold for the MFTC and the abatement threshold is the point at which the FTC fully abates, which depends on the number of children in the family post-FP and on the number and age of the children pre-FP. Given the complexity in the calculation of these thresholds and their lack of visibility, we do not expect to see much bunching around these points.

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<sup>17</sup> Moreover, Judd and Gibbs (2020) report that clients cycling on and off benefit tended to exit into seasonal employment. Hence, the financial incentives for WEP may be most acute for seasonal workers.

<sup>18</sup> AS maximum payments had not been increased for 12 years prior to the FP increase on 1 April 2018.

<sup>19</sup> Figure A1 in the Appendix provides the income schedule for sole parents with one child using the policy date 1 July 2018 that includes WEP and both WEP and AS. These schedules are based on the policy design and assume that recipients leaving benefit continue receiving AS. However, there are a variety of ways that people have their payments cancelled when leaving benefit – and some people will require a reapplication for AS. Given this, it appears likely that there will be some non-take-up of AS by non-beneficiaries. In this scenario, it is possible that recipients may believe that they are no longer eligible for AS, in which case, the in-work tax credits are unlikely to sufficiently compensate recipients for the loss of their benefit as well as for the loss of their AS payment.

<sup>20</sup> Also, the Independent Earner Tax Credit (IETC), which the previous government had intended to abolish under the Family Incomes Package, was kept in the Families Package. The IETC provides \$10/week (\$520/year) for those earning between \$24,000 and \$44,000 and abates at 13% above \$44,000 (and abated to zero at \$48,000) for individuals not receiving WFF tax credits or a main benefit. This is beyond the scope of this analysis but suggests examining patterns of bunching around the \$24,000 and \$44,000 threshold levels.

<sup>21</sup> The main difference between the hours' requirements for MFTC and IWTC is that self-employment hours do not count towards MFTC eligibility but do count towards IWTC eligibility.

## 2.2 Literature review of labour supply responses to tax and benefit policies

Most studies of the impacts of government tax credit policies on behavioural responses to taxes and transfers adopt some form of difference-in-differences approach – e.g. Eissa and Hoynes (2004) for the US, and Dalgety et al. (2010) for New Zealand – with a focus on single parents as the treatment group relative to a control group of single adults without children. More recently, Saez (2010) and Chetty et al. (2013) have provided fruitful analyses based on more innovative ‘kink’ research designs, that have the advantage of not relying on a counterfactual control group that is not eligible for support. We review the main patterns from each of these literatures.

Much of the research in this area is based on evaluations of the US Earned Income Tax Credit (EITC), which is designed to incentivise work through a tax credit to workers (especially those with children). This policy is similar to the Working for Families (WFF) tax credits in that both are tax credits designed to supplement income from employment.<sup>22</sup> Eissa and Hoynes (2006) summarise the literature on the labour supply effects of the EITC. A number of the studies they review assess the impact of the EITC on the labour supply of single taxpayers. Overall, these studies consistently find positive impacts of the policy on employment participation rates (i.e., the extensive margin) of single women with children relative to single women without children; but the evidence on the impact on labour supply in terms of hours worked conditional on being employed (i.e., the intensive margin) is mixed. Although fewer in number, similar studies of married taxpayers have also been conducted with comparisons generally between married women with children (as the treatment group) relative to married women without children. These studies have found negative effects on the employment rates of married women with children, and also some small negative effects on hours of work for this group.<sup>23</sup>

In summary, the difference-in-differences literature generally finds strong evidence of behavioural responses to the EITC on employment participation, but the evidence for responses along the intensive margin is weak or absent. A more recent study by Kleven (2019) concludes that it was not the financial incentives from the EITC that affected employment participation (the extensive margin) but rather the confounding effects of US welfare reform (which reduced out-of-work benefits) and the business cycle that drove the results.

There are a number of reasons why finding impacts of the financial incentives of these policies on the intensive margin (generally measured using hours worked) is difficult. First,

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<sup>22</sup> While the policies are similar, there are important differences in both policy and implementation. In terms of policy, the WFF tax credits has some components that are conditional on employment and non-benefit status, whereas the EITC is entirely conditional on earned income. In terms of implementation, while WFF may be received as an end of year lump sum, it is more typically received as ongoing payments through the year, whereas the EITC is administered entirely via annual tax returns. These differences are discussed further in Section 4.

<sup>23</sup> This is likely due to the second-earner effect.

employees may not have much control over their hours. Second, hours are difficult to measure, especially if people have multiple jobs with variable hours, and using income as a proxy for hours is problematic as different industries and occupations pay differently. Third, the control groups used in these studies may not provide a good counterfactual for the treatment group. Fourth, it is straightforward for people to understand that working yields more income and diffusion of this knowledge often happens fairly quickly; however, with a complex policy like the EITC, it takes longer to diffuse knowledge about how to optimise one's income under the policy. Therefore, it may take longer to see responses along the intensive margin.

To circumvent these issues, Saez (2010) used a different 'kink' research design to detect behavioural responses along the intensive margin. This method examines the income distribution of taxpayers to see if there is bunching of observations around 'kink points' in the income schedule generated by the EITC. Saez (2010) finds clear evidence of bunching by the self-employed (i.e., taxpayers with any self-employment income) at the first kink point for the EITC (and that the bunching grows over time which is indicative of learning) and by all tax filers at the first income tax bracket (where tax liability starts in the US). He finds no other evidence of bunching. He also demonstrates that the amount of bunching observed is positively correlated with elasticity and is related to the size of the jump in the marginal tax rate. In addition, he provides an econometric method to estimate the intensive elasticity of reported income. Saez concludes that bunching around the first kink point by the self-employed provides evidence of a behavioural response to the financial incentives provided by the EITC, but it is unclear if this is due to misreporting of income to the tax authority or due to actual changes in labour supply.

Chetty et al. (2013) build on Saez's work using differences in knowledge across neighbourhoods to assess the impacts of the EITC on earnings. Areas exhibiting little knowledge of the policy (based on degree of bunching) are used as counterfactuals for behaviour in the absence of policy. Using this methodology, the authors look for behaviour change beyond the self-employed group and find that neighbourhoods with sharp bunching of the self-employed around the refund-maximising income level also have more mass in wage earnings distributions (exclusive of self-employment income) at the EITC plateau than lower bunching neighbourhoods. Chetty et al. (2013) also test these effects by looking at reported earnings of those who move to different neighbourhoods (low-bunching to high and *vice versa*) and at changes in earnings due to changes in incentives from the birth of a child. In both cases, they find additional evidence that the EITC impacts behaviour on both employment participation and on labour supplied conditional on employment and that the effect is not simply due to misreporting of income to the tax authority. They also estimate the earnings elasticity (i.e., the sensitivity of earnings to



changes in the EITC refund). Using this analysis, the authors also estimate that the EITC reduces overall poverty rates in the US by approximately 1.5 percentage points, but the reduction in wage-earners below the poverty line is much more substantial.

Studies have also been done in other countries. Blundell et al. (2016) use a structural model approach to study the UK tax and income support system to examine how in-work benefits affect the careers of women. They conclude that the UK tax credit system increases employment participation for single mothers but reduces it for partnered mothers. However, they find that these effects do not last, as evidenced by the employment rates of women with adult children being the same as if the credits were absent. Moreover, they still find that the tax credits are overall welfare-improving. Using data from a long-term social experiment conducted in Canada in the 1990s, Card and Hyslop (2005, 2009) examine the effects of a time-limited earnings subsidy for welfare leavers in full-time work on wages and on welfare participation. They find substantial short-term effects of higher employment and lower welfare participation during the course of the earnings subsidy, but limited long-run effects on employment, wages or welfare participation: Card and Hyslop (2005) conclude there were no long-run effects for the long-term stock of recipients from the temporary earnings subsidy; while Card and Hyslop (2009) estimate modest long-run effects for more recent recipients.

The New Zealand literature on the effects of financial incentives associated with income support payments is relatively limited. Maloney (2000) analysed the labour supply responses to the 1991 benefit cuts. Maloney uses regression methods to exploit the large exogenous differences in benefit cuts across discretely identified sub-populations characterised by their age, marital status and presence of children – e.g., the unemployment benefit rate for single adults aged 20-24 fell 25%, while the rate for couples without children fell 3%. He concluded that the overall impact of the benefit cuts was to raise labour force participation by about 1.6 percentage points (pp), while the reduction in benefits for some groups (especially teenagers) actually reduced participation and hours worked, this appeared to be due to an increase in human capital activity through education and training.

Fitzgerald et al. (2008) used a difference-in-differences approach to examine the effects of changes to Family Assistance tax credits that began in 2005 on partnering and employment outcomes for New Zealand women.<sup>24</sup> In their analysis, they used three alternative identifying assumptions which gave mixed results. Similar to other literature, they found increased

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<sup>24</sup> The changes that took effect around this time included an increase in Family Support, the replacement of the Child Tax Credit with the In-Work Payment (subsequently renamed the In-Work Tax Credit, IWTC), and an increase in abatement thresholds and lower abatement rates. The In-Work Payment increased support and included a work-test requirement, though the Child Tax Credit did require recipients to be non-beneficiaries.



participation in employment for women with children relative to childless women, with the effect being somewhat larger for unpartnered women. They also generally find positive effects on hours of work for both partnered and unpartnered women.

Dalgety et al. (2010) analysed the effects of the in-work payment incentives associated with the introduction of, and subsequent changes to, Working for Families (WFF) between 2004 and 2007. This analysis focused on the labour supply response of sole parents to the policy change that replaced the non-work-tested Child Tax Credit (CTC) with the work-tested IWTC,<sup>25</sup> which required sole parent recipients to be employed at least half-time (20 hours per week) and not be in receipt of benefit. The main analysis used a regression adjusted difference-in-differences (DiD) approach, comparing changes in employment and hours worked of sole parents with those of single adults without children. The estimation found steadily increasing DiD estimates on sole parent employment: by 2007, the estimated impact was a statistically significant 6.0 pp (about 12%) increase in employment of sole parents. Consistent with the policy predictions, this increase was largely due to an increase in the rate of sole parents working at least 20 hours per week: the 2007 DiD estimate was a 9.2 pp (about 20%) increase. These estimated increases in employment were matched by similar (DiD estimated) decreases in the rate of benefit receipt by sole parents. Dalgety et al. also considered some survival analysis of exit from and re-entry to benefit, which provided broadly consistent results. Dalgety (2010) also discusses the results on an analysis of coupled parents, which found fewer second earners in coupled parent families due to the WFF changes; however, they found no change in the hours worked by second earners.

In other related work, Mok and Mercante (2014) used ex-post simulation modelling based on the Treasury's behavioural microsimulation model TAXMOD-B to evaluate the labour supply responses to the WFF package over a similar period. This approach has the conceptual advantage of being able to model the responses of broader family types, albeit with the analytical disadvantage that the identifying assumptions are unclear and based on the generic behavioural parameters included in the model. However, with this caveat in mind, Mok and Mercante estimate sole parents increased their labour force participation rate by about 1.7 pp (about 3.5%), substantially less than Dalgety et al.'s (2010) estimates. In addition, they also estimated that the WFF changes resulted in both married men and women reducing their labour supply, with married women reducing their participation rates by about 1.2 pp (about 2%). (As expected, they also estimated WFF had only small effects on the behaviour of single men and women.)

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<sup>25</sup> While the CTC was not work-tested per se, it did require recipients to be non-beneficiaries.

Alinaghi et al. (2021) recently applied the bunching methodology to examine the tax-filing behaviour of individuals around the thresholds at which the marginal tax rate changed in New Zealand over 2001–2008. They find noticeable bunching behaviour at the top two MTR thresholds (\$38,000 when the MTR increased from 21% to 33%, and \$60,000 when the MTR increased further to 39%). Consistent with Saez (2010) and Chetty et al. (2013), Alinaghi et al. show that this is almost entirely associated with individuals with self-employment earnings, with elasticity of taxable income with respect to the MTR estimated to be 0.8–1.0.

### **3 Research design**

We use the ‘kink’ research designs used by Saez (2010) and Chetty et al. (2013) as the basis for our analysis of the effects of financial incentives from the Families Package on employment and income. This research design overlays the income schedule on the distribution of taxable income to look for anomalies in the distribution around discontinuities in the income schedule caused by changes in effective marginal tax rates. These anomalies provide compelling evidence of behavioural responses to tax policies along the intensive margin (Saez, 2010).

This approach has several advantages over the other study designs used in the literature. First, the identification approach is easy to understand and explain, especially if using graphs to show the bunching in the income distribution at the kink points in the income schedule. Second, it facilitates analysis of responses along the intensive margins of labour supply. Third, unlike other research designs (e.g., difference-in-differences), the control group does not depend on criteria that are related to selection into the policy (e.g., women without children). The counterfactual is the distribution if there were no change in the tax rate (Chetty et al., 2011). Moreover, this methodology has been used to evaluate behavioural responses to financial incentives for other government policies such as retirement policies.

To do the analysis, the first step was to determine the income schedule for each recipient type (e.g., families with different numbers and ages of children), which varies depending on the benefits for which each group is eligible. We built the income schedule as a function of annual earnings using the income thresholds, abatement rates and other eligibility criteria for the various programmes from the parameters in MSD’s EMTR model.

Given that the family tax credits are closest to the EITC, we started with the simplest case – assuming that the family is eligible only for the suite of family tax credits – using the eligibility criteria that came into effect in July 2018. We created schedules for couples with one child, couples with four children, single parents with one child, and single parents with four children. We chose to focus on families with one child and four children to assess the added effects of

multiple children from both the FTC and IWTC.<sup>26</sup> The FTC amount increases incrementally for each additional child, but the IWTC is at the same rate for up to three children and then increases incrementally for additional children. We focus on bunching around the kink points in these simple income schedules.

Saez (2010) and Chetty et al. (2013) showed the amount of bunching that occurs around the EITC kink point after a policy change grows over time. So to put the Families Package changes into context, we conduct a similar analysis over time to see if we find similar evidence of bunching at kink points for these benefits. However, given the short time since the implementation of many components of the Families Package and the complexity of the changes in 2018, it may take time to see the full behavioural response to these financial incentives.

Once we determined the income schedules for different recipient types, we analysed the annual income distributions of different recipient types (e.g., single parents, coupled parents). Similar to Saez (2010) and Chetty et al. (2013), we split the groups between those with any self-employment income ('the self-employed') and those with wage earnings only ('wage earners') because we expect the self-employed to have more control over their hours and income.

To examine bunching at the kink points (including the kink points where the benefits are phased out), we created histograms and graphed the distribution of earnings. While the standard model predicts that individuals will locate exactly at the kink point, the literature generally acknowledges that individuals may not have sufficient control over their incomes to hit the kink point exactly; hence, we may only observe clustering or humps around the kink points. As Saez (2010, p. 189) notes, "kernel density estimates are helpful to smooth noisy histograms and visually detect excess clustering" in these scenarios. Kernel density estimates can over-smooth bunching, so we also use a combined approach which plots the midpoints of the histogram bins which allows us to look for peaks along the earnings distribution.

It is important to note that there are some key differences between New Zealand's Family Tax Credits and the EITC that may complicate the analysis. For example, in New Zealand, the in-work tax credits (i.e., the IWTC and the MFTC) were based on an hours-of-work requirement (20 hours per week for a single parent and 30 hours per week for a couple) during our analysis period,<sup>27</sup> which is not the case in the US where it is solely based on income. To adjust for this, we

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<sup>26</sup> In the 2013 and 2018 Censuses, approximately 6% of households with dependent children had four or more children, whereas approximately 40% of these households had one dependent child.

<sup>27</sup> The hours-of-work requirement was dropped for IWTC on 1 July 2020; however, it is still in effect for the MFTC. IWTC recipients do, however, still need to be non-beneficiaries to be eligible.

estimate an initial 'income' threshold for the IWTC and MFTC based on the minimum wage<sup>28</sup> and an annualised hours-of-work requirement<sup>29</sup>. This threshold acts more as a reference point indicating where entry is likely to occur rather than as an exact income threshold, such as the FTC abatement threshold which is solely based on annual income. However, since we use income bands to analyse the income distribution, we may still be able to find natural clustering in the income band starting around the minimum entry threshold and occurring before the exit threshold for the MFTC, if recipients respond similarly to the policy.

Second, the EITC is simply administered by having taxpayers include it on their tax form which all US taxpayers are required to file every year. These tax forms also include all the information about the family and annual income required to determine eligibility for the credit. These data provide the basis for the EITC research literature. In New Zealand, tax filings are not as common given that the tax system is primarily administered by collecting taxes from employers. For our analysis, information about the family for recipients while they are receiving these benefits is primarily available from administrative data. However, for non-recipients and for periods when families are not receiving these benefits, no similar data is available. We therefore construct the family composition and income from the 2018 Census combined with administrative data about couples and children (see below for more details), which may not be as accurate. We expect this to be most problematic for partnered families.

In the US, itemised deductions also give taxpayers more control over their taxable income, particularly for the self-employed, so it is possible that the bunching found in the US is a function of accounting rules rather than a labour supply response. However, Saez (2010) finds bunching even for taxpayers taking the standard deduction. As New Zealand has a much simpler tax system with fewer deductions, deductions are less likely to be problematic, though it is also possible that those with self-employment earnings can adjust their income to correspond with the tax year without actually adjusting their labour supply. Chetty et al. (2013), however, use changes in EITC eligibility due to the birth of a child to examine responses in wage earnings and find that *wage earnings* change sharply to obtain larger EITC refunds, which they conclude is

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<sup>28</sup> Since self-employment hours do not count towards MFTC eligibility, we use the minimum wage as the lowest wage possible. For TY2019, minimum wage was \$16.50 per hour. We also estimate the value of the hourly wage at the MFTC exit threshold assuming the hours-of-work requirement is minimally met. In TY2019, this was approximately \$20 for coupled parents and \$29 for single parents. Hence, the wage range for coupled parents is fairly narrow, but the range for sole parents is much wider.

<sup>29</sup> Parents, particularly sole parents, may not qualify for MFTC in all 52 weeks. However, assuming that sole parents instead work 48 weeks rather than 52 at the minimum wage and minimum earnings requirement, this would reduce their annual earnings by \$1320 in TY2018. For coupled parents, the equivalent amount would be \$1980. Moreover, as parents reduce their weeks of work, the net gain from switching from benefit to the tax credits is also reduced which would likely dampen the financial incentive of moving off-benefit.

primarily from intensive-margin earnings increases and on par with extensive-margin responses previously found in the literature.

In this paper, we focus on the salient, policy-related kink points; however, we recognise that these are only two points on what can be very complex budget constraints. In the US case, the EITC is the single income support policy for most families, whereas New Zealand has a plethora of overlapping support policies for different sub-populations. The effect of this is that any behavioural responses for the whole population may be diffused across a range of kink points along the income schedule rather than concentrated in a few areas as in the US case.

## 4 Data

### 4.1 Calculating income schedules and EMTRs

To derive the income schedules for the different recipient types, we used the policy parameters in the MSD EMTR model using different ‘as-of’ dates – 1 April 2016, 1 April 2017, 1 July 2018, 1 April 2019 – to calculate income schedules representative of the 2017, 2018, 2019, and 2020 tax years respectively (hereafter referred to as TY2017, TY2018, TY2019, and TY2020). We estimated these income schedules for given levels of earnings for working-age adults (ages 25-64) who are either single parents (i.e., sole parents) or coupled parents.

We calculated the annualised main benefit amount for any level of earnings. The main benefit available to coupled parents during this time period is Jobseeker Support (JSS),<sup>30</sup> and single parents’ main benefit is generally Sole Parent Support (SPS).<sup>31</sup> Main benefits are based on a family’s income (couples include both married and de-facto partners) and are taxable. Starting on 1 July 2018, anyone on a main benefit is eligible to receive the Winter Energy Payment in winter months (May-October) so the annualised WEP amount was added to the annualised main benefit values for the relevant tax years.<sup>32</sup> We also calculated the tax credit amounts for which each family type is eligible. All families with children (including those on main benefit) are eligible for the Family Tax Credit (FTC), subject to income eligibility requirements. The other tax credits for families with children – the IWTC and MFTC – are subject to work requirements, and recipients are ineligible if receiving a main benefit. For both, single parents are required to work

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<sup>30</sup> JSS is paid for up to 52 weeks while recipients look for or are in training for work or are unable to work due to a health condition, injury, or disability. Part-time workers are eligible for JSS but benefit amounts are adjusted based on income. After 52 weeks, recipients must complete a reapplication process to continue receiving JSS.

<sup>31</sup> Single parents whose youngest child is aged 14 years or over receive JSS, but the eligibility criteria, abatement thresholds and abatement rates for single parents are the same as those for single parents on SPS. (Welfare Expert Advisory Group, 2019) To simplify matters, we refer to the main benefit for single parents as SPS regardless of their children’s ages.

<sup>32</sup> In 2018, the winter period was defined as the 13 weeks from 1 July, but thereafter, it was defined as the 22 weeks from 1 May. (Welfare Expert Advisory Group, 2019)

at least 20 hours per week and married parents are required to work at least 30 hours per week (combined hours for the couple).

We calculate net incomes using the tax thresholds, tax rates, and ACC (accident compensation) levy rates for the relevant time period, though only earnings are subject to ACC levies while main benefits are not. To calculate the Minimum Family Tax Credit, we use earnings net of taxes but not net of ACC levies. To estimate the earnings threshold for the IWTC and MFTC, we assumed the recipients work the minimum hours per week for 52 weeks at a given wage rate (starting with the minimum wage). For example, a single parent is assumed to work, or at least be paid for 1,040 hours in the year.<sup>33</sup>

We estimate the income schedule and corresponding EMTRs using a number of different assumptions including the following: the family does not receive a main benefit; the family receives a main benefit until they meet the minimum work requirement to receive the in-work tax credits; and the family stays on main benefit (with and without WEP) even after they meet the minimum work requirement to receive the in-work tax credits.

## 4.2 Dataset construction

Our main analytical sample is derived from the 2018 Census. We could have used administrative data from the tax credit and main benefit programmes which includes information about recipients' families captured while the family is receiving those benefits. However, the administrative data does not cover non-recipients nor does it include information about recipients' families outside of the benefit period, which we consider important to see the full income distribution. Therefore, we started with the 2018 Census data which provides the family structure both for recipients and non-recipients in a consistent manner.<sup>34</sup> We constructed families after dropping census records enumerated from administrative records and by using dwelling IDs (census night and usual residence) to find family units.

This process involved several non-linear stages, detailed in Appendix 1, to identify the partnership status of adults in the Census; the partner of individuals who are partnered;<sup>35</sup> and whether a single (unpartnered) adult or couple had dependent children (aged under 18). We use

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<sup>33</sup> Parents, particularly sole parents, may not qualify for MFTC in all 52 weeks. However, assuming that sole parents instead work 48 weeks rather than 52 at the minimum wage and minimum earnings requirement, this would reduce their annual earnings by \$1320 in TY2018. For coupled parents, the equivalent amount would be \$1980. Moreover, as parents reduce their weeks of work, the net gain from switching from benefit to the tax credits is also reduced which would likely dampen the financial incentive of moving off-benefit.

<sup>34</sup> The 2018 Census was held on 6 March 2018, so the data are not completely synchronous since many of the changes to benefits began 1 July 2018. Still, we believe that the structure of most families will not have dramatically changed over this time period.

<sup>35</sup> Identifying partners is complicated by the fact that benefits and the WFF tax credits are not based solely on married and civil union couples but extend to de facto partners as well.

the term ‘parental unit’ (PU) to refer to either a single adult or coupled-adult unit with dependent children, and non-parental units for single or coupled adults without dependent children. Our analytical focus is on the behaviour of parental units.

The Census data also provided information on individuals’ socio-demographic characteristics, labour force status and hours worked at the time of the Census. The Census sample of PUs was then linked to IRD’s incomes tables<sup>36</sup> in the IDI to construct the relevant PU incomes and earnings values for each of the 2017–2020 tax years.

Although we believe this provides the best available approach to identifying the partnership and family status across a broad population, it has some potential weaknesses for our analysis. First, there are well-documented response and coverage problems with the 2018 Census: while Statistics NZ conducted an extensive exercise to attempt to in-fill the responses from various (administrative and past-census) sources, the resulting information is at best imperfect. In addition, and perhaps relatedly, reliably identifying the partnership status and the partner’s identity of those partnered is non-trivial from the 2018 Census information in the IDI. As a result, we also used partnership information from the IDI core data tables to help identify partners and PUs in dwellings.<sup>37</sup>

Second, the census-based approach provides family structure information only at a point in time, and ignores any family formation, dissolution or other changes over the period before or after the census date.<sup>38</sup> We believe that the identified structure of families should be reliable for analyses of the tax years (to end of March) 2018 and 2019, and also will not have changed dramatically for analysis of the 2017 and 2020 tax years.<sup>39</sup> That said, we suspect that those whose partnership and family status do change may be of particular interest for this analysis, while also having quite complicated circumstances.

Table 2 summarises the characteristics of our analysis sample. In the table, the first three columns of figures are for the full sample of parental units, and the three right-most columns are a sub-sample of parents who both submitted an individual 2018 Census form and had a dwelling

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<sup>36</sup> The administrative tax data may not fully reflect the true annual income of individuals. For example, someone entering the labour force may only have income for a portion of the year. Similarly, migrants or people with overseas incomes may not be reflected in the income reported. For further discussion of measurement earnings in administrative data, see Hyslop & Townsend (2020). However, the administrative tax data should be a fair assessment of income for benefit eligibility for most people. The main exception is child support payments, but these are available in the Working for Families data.

<sup>37</sup> The core data contain a table on relationships of individuals which is derived from administrative records. Partner relationships were sourced from DIA (marriage and civil unions), Working for Families, and Ministry for Social Development data. The administrative data contain start and end dates for each relationship record; however, these were not generally useful for understanding when each relationship actually began and ended. Hence, we combined these data with the Census data to determine which partners were found living in the same dwelling.

<sup>38</sup> The 2018 Census was held on 6 March 2018, so the data are not perfectly synchronous to the Families Package changes on either 1 April or 1 July 2018.

<sup>39</sup> In examining the Working For Families data tables, however, we found that the vast majority of recipients did not change status over a four-year period.



ID assigned. While administratively enumerated cases are largely not included in our main analysis sample,<sup>40</sup> some of the individuals may only have been enumerated on the household listing with Statistics NZ imputing other information about the individual. Hence, we report the characteristics for the subsample who submitted an individual form in addition to the characteristics of the overall sample.

In total, there are 337,479 single parents and 411,183 coupled parents for a total of 748,662 parental units.<sup>41</sup> Overall, 84.6% submitted an individual form; however, people in couples were more likely, relative to singles, to have submitted an individual form (91% vs. 68%, respectively). Age and gender profiles across the two samples are similar, with the exception of singles who submitted an individual form being more likely to be female (65.5% vs 61.5%). Given the high proportion of missing qualifications information for single parents in the overall sample (29.4%), it is difficult to compare across groups.

In the full sample, 88.9% of parental units had some form of income in 2018 as reported in the IDI income summary tables, but this was 94.5% in the subsample who submitted an individual census form, with the difference being primarily driven by single parents (78.7% in the full sample of singles compared to 89.1% in the subsample of singles).<sup>42</sup> The average total income reported in Table 2 is conditional on the parental unit having income, and the average total earnings are conditional on the parental unit having earnings. The average parental unit income in the overall sample is generally less than that for the subsample, but again, the difference is largely driven by single parents. Moreover, the average income for single parents is substantially lower than for coupled parents – for the full sample, the average for singles was \$27,040 and \$112,236 for couples. Income from earnings was slightly lower than total income for all groups but otherwise had similar patterns.<sup>43</sup> However, the difference between average total earnings and average total income was larger for singles compared to couples (approximately \$5,000 for singles compared to \$2,600 for couples). Table 2 also reports the percentage of those parental units with earnings who also have self-employment earnings – in our overall sample, 26.5% have self-employment earnings, but the rate for singles is much lower than for couples (12.1% vs. 34.4% respectively). The rates for the subsample are similar (11.8% for singles and 34.6% for couples).

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<sup>40</sup> The exceptions would be for coupled parents where one of the matched partners may have been administratively enumerated.

<sup>41</sup> Statistics NZ estimates 589,000 two-parent families and 239,000 single parent families who usually live together in a household for a total of 828,000 parental units.

<sup>42</sup> Some proportion of those without income is due to problems with linking IRD records to Census respondents. There seemed to be a substantial number of Census respondents who did not link to any other data sets.

<sup>43</sup> Earnings include both employment and self-employment earnings.



In the overall sample, 76.7% of parental units had hours-worked information, with single parents being much less likely than coupled parents to have hours-of-work information (57% vs. 92.9% respectively). However, the subsample had similar rates (60.6% vs. 93.5%). Of those parents with hours information, single parents worked approximately 20 hours per week and coupled parents worked approximately 61 hours per week (combined), with both samples having similar rates within each group.

For tax credit recipients, we primarily relied on WFF data tables in the IDI provided by IRD. In particular, we used the WFF Family Return Details (FRD) table for the tax years 2017-2020. The FRD table provides information about primary caregivers, their partners, number of children, and separate amounts for their annual tax credits (FTC, IWTC, and MFTC). The table also includes information about the family's income but there appeared to be some errors in these fields, so we instead merged data from the summary income tables for primary caregivers and their partners, just as we did with the census sample. We used this information to determine the number of recipients of each type of tax credit and the amounts families received before and after implementation of the FP. We also used these data to examine the income distributions for recipients as a robustness check of the main analysis using the 2018 Census sample.

## 5 Results

### 5.1 The effects of policy changes on the income schedule

We calculated the total tax credits for our family types using the maximum amount of each tax credit for each family type – sole and coupled parents with one child and with four children – shown in Table 3 pre-FP (as of 1 April 2016 and 1 April 2017) and post-FP (as of 1 July 2018 and 1 April 2019), with the 'as-of' date reflecting the data for the policy parameters.<sup>44</sup> For our family types, we chose four children since the IWTC increases for each child beyond three. Thus, the main difference between families with one child and those with two or three children is the size of their FTC which affects the FTC cut-out point and, hence, the IWTC abatement threshold which only abates once the FTC is fully abated. The FTC maximum amount increased on 1 July 2018 from \$4,822 to \$5,878 for families with one child and from \$14,875 to \$20,113 for families with four children (an additional \$4,745 for each additional child). This also changed the IWTC

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<sup>44</sup> The 'as-of' dates to which the policy rules apply were 1 April 2016, 1 April 2017, 1 July 2018, and 1 April 2019. We assume all children are 12 years or younger. The Families Package eliminated differences in tax credit amounts based on children's ages; however, for comparison to time periods prior to the Families Package, we use the tax credit amounts for this age group.

abatement threshold from \$57,781 to approximately \$66,212 for one-child families and from \$102,459 to \$123,152 for four-child families as shown in Table 4.

Figure 1 shows the amount of each tax credit for each dollar of earning for sole and coupled parents with one child, assuming that parents earn minimum wage and switch from main benefit to receiving the in-work tax credits as soon as they meet the minimum number of weekly hours for eligibility. From this, we can see that the IWTC begins to abate once the FTC fully abates (i.e., FTC is fully abated just below \$60,000 in pre-FP and just below \$70,000 post-FP). Figure 1 also shows the additional MFTC available to families post-FP compared to pre-FP and its effect on the total amount of tax credits the families receive. The actual estimated amounts are shown in Table 3.

From Table 3 and Figure 1, we can see the IWTC does not vary from year-to-year but varies only for families with one child compared to those with four children. In contrast, the maximum MFTC amount does not vary by number of children but differs by parent type because of the difference in the hours of work required to be eligible. Moreover, the maximum MFTC amount varies year-to-year due to changes in the minimum income level and in the minimum wage.<sup>45</sup> For example, the maximum on 1 April 2016 is greater than the maximum available on 1 April 2017 (\$9,689 and \$9,319 respectively) even though the minimum income level did not change, the gross minimum family income level was increased from \$27,680 to \$30,516 between 1 April 2017 and 1 July 2018 as shown in Table 4.

Using these tax credit schedules, we present both the gross and net annual income schedules for these family types pre- and post-FP in Figure 2. The income schedules in panel (a) exclude the Winter Energy Payment (WEP), while the schedules in panel (b) include WEP. In each panel, the schedules for sole and coupled parents with one child are shown in the top two graphs, and schedules for parents with four children are shown in the bottom two graphs.

To generate the income schedules in Figure 2, we assumed that parents switch from main benefit to in-work tax credits when they reach the hours threshold (20 hours for sole and 30 hours for coupled parents), earning the minimum wage for 52 weeks. Figure 2 shows that sole parents earning minimum wage have a wider income range over which they receive the MFTC than coupled parents. Moreover, we can see how the implementation of the FP affected families' incomes. First, the increase in income due to switching from main benefit to the in-work tax credits is substantially more after the FP implementation. For coupled parents with one child earning the minimum wage, the increase in net annual income was approximately \$1,500

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<sup>45</sup> The MFTC is not indexed to inflation; however, the minimum income level is calculated to ensure a certain gap between main benefits and earnings from employment. As part of the FP, the gap was increased to account for the loss of WEP when families leave main benefit. (Welfare Expert Advisory Group, 2019)

before the FP and approximately \$3,000 (including WEP) after the FP.<sup>46</sup> For sole parents with one child, the same increases were approximately \$2,700 and \$4,300, respectively. For parents with four children, the pre- and post-FP differences were similar.

Table 5 provides our calculations of the gross and net changes in annual income when families switch from receiving a main benefit to receiving the in-work tax credits as soon as they are eligible (i.e., they cross the MFTC minimum entry threshold shown in Table 4). The top set of figures in Table 5 provides the income changes for families earning the minimum wage, and the bottom set of figures provides the income changes for families earning a wage such that their annual income at the in-work hours requirement is just above the MFTC income level (i.e., no MFTC is received). The results are presented with and without WEP. These values represent the additional disposable income from the last dollar earned that put them over the MFTC minimum entry threshold. This is essentially the absolute value of the EMTR at the point where the family crosses the threshold.<sup>47</sup>

The results in Table 5 show that the income changes from switching were much larger after the implementation of the FP even when accounting for the loss of WEP. For example, a sole parent with one child earning minimum wage would have an increase in annual net income of \$4,274 (including WEP) in the year after FP implementation compared to an increase of \$2,679 in the year before the FP. Even for sole parents with incomes just over the MFTC exit threshold, their net change in income from switching increased from \$1,545 in TY2018 to \$3,082 post-FP in TY2019. In fact, all of the family types shown in Table 5 received more from switching post-FP, with the magnitudes of the differences being similar across all groups.

Figure 3 focuses on the income schedules for parents with one child before and after the FP policy changes. This figure shows the effect of the FP changes to the FTC on families' income schedules – with the flatter pre-FP lines reflecting the lower abatement rate (22.5% vs 25%)<sup>48</sup> and the light blue, vertical lines showing the lower FTC abatement threshold in pre-FP compared to post-FP. However, despite the higher FTC abatement rate starting on 1 July 2018, the earnings cut-out point is similar in both time periods due to the increase in the abatement threshold post-FP. The vertical grey lines in Figure 3 represent the MFTC exit threshold for parents earning minimum wages for 52 weeks at the minimum in-work hours requirement. The hours requirements were not changed as part of the FP; therefore, the difference between the two

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<sup>46</sup> Without WEP, the net income increase is about \$3,400 for coupled parents.

<sup>47</sup> The EMTR is calculated as follows:  $EMTR = 1 - \Delta DI$  where  $\Delta DI$  is the change in disposable income from a one dollar increase in earnings. Since the change in disposable income at this point is positive, the EMTR would be negative.

<sup>48</sup> In TY2019, the first quarter (1 April to 30 June) used the parameters in effect on 1 April 2018, and the remainder of the year (1 July to 31 March) used the parameters that went into effect on 1 July 2018. Hence, the annualised abatement rate for TY2019 was the weighted average of the two abatement rates (24.4%). For simplicity, we model the rate as at 1 July 2018 for TY2019 since it does not substantially change the results and is representative of the post-FP period.

lines represents just the increase in the minimum wage (\$15.75 as of 1 April 2017 and \$16.50 as of 1 July 2018).

To examine the changes in the EMTRs caused by the changes to the FTC, we calculate the EMTRs for our four family types assuming that families remain on main benefit until the cut-out point, and once off-benefit they continue to receive the FTC (as shown in Figure 4).<sup>49</sup> (We also abstract from WEP receipt post-FP because the loss of WEP is such a large change that including it makes the EMTR graph difficult to read.) This scenario allows us to see that the FP did not change the EMTRs for recipients receiving a main benefit and also shows the effects of the FTC abatement changes on the EMTRs.

To see the additional effects of WEP on EMTRs, we use the same scenario as that shown in Figure 4 but include WEP in the main benefit calculation. These results are shown in Table 6, where the maximum EMTR value for the net income calculation of ‘main benefit, earnings, FTC, and WEP’ represents the EMTR at the point when the family stops receiving main benefit. For sole parents, the maximum EMTR was 0.89 for the policy date 1 Apr 2017 (prior to WEP) but was 414 for policy date 1 Jul 2018 and 700 for policy date 1 Apr 2019, which shows the effect of WEP on the EMTR.<sup>50</sup> This reflects the fact that WEP does not abate – recipients lose WEP in its entirety when they stop receiving a main benefit.

Based on our analysis of the income schedule and EMTRs, we would expect sole parents with incomes between the MFTC minimum entry threshold and the MFTC exit threshold to be the most likely group to show evidence of responding to changes in financial incentives, given the size of the EMTR. However, the complexity of the MFTC income calculations, the small number of recipients, and the weekly hours requirements will likely make it more difficult to find bunching. Similarly, we might also expect coupled parents to respond given the size of the EMTR at the MFTC minimum entry threshold for this group; however, the range between MFTC minimum entry threshold and the MFTC exit threshold for coupled parents is much smaller than the range for single parents (due to the difference in the hours requirements between the two groups), which makes it likely that even fewer parental units will be eligible to receive the credit.<sup>51</sup> While we will examine the region between the MFTC entry and exit thresholds, we expect that it will be difficult to find evidence of bunching.

On the other hand, given the large number of families receiving the FTC as well as the changes from the FP in the abatement threshold and rate, we may expect to see changes in the

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<sup>49</sup> In order to draw the graphs, we created earnings amounts in increments of \$16.50, which was the minimum wage on 1 July 2018 so the EMTRs shown are averaged over these earnings increments.

<sup>50</sup> The difference in these amounts is due to WEP being paid for 13 weeks in 2018 and for 22 weeks in 2019.

<sup>51</sup> This is further indicated by the fact that 91% of MFTC recipients in TY2019 were sole parents. (Arneson, 2021a)

income distribution around the FTC abatement thresholds. If recipients are responsive to these incentives, we would expect to see a shift in bunching from the pre-FP FTC threshold to the post-FP FTC threshold. This may not happen immediately after implementation as families may have difficulty adjusting or may not be aware of the change, so we will look for changes in the income distribution between thresholds as well as around the thresholds themselves.

Since these thresholds do not depend on the number of children, we examine the income distributions of family types based solely on the type of parental units (e.g., coupled parents and single parents).

## 5.2 Effects of policy change on tax credit receipt

We analysed tax credit receipt for tax years 2017-2020 using the WFF Family Returns Details (FRD) table in the IDI.<sup>52</sup> From this table, we separately examined three groups of tax credit recipients: MFTC recipients, IWTC recipients, and FTC recipients. In a given tax year, a recipient was included in the recipient group if they had received the relevant tax credit in that tax year. For example, MFTC recipients in TY2017 were those with positive (i.e., non-zero) MFTC amounts in TY2017. We discuss the distribution of amounts each group received for each tax credit.

Generally speaking, the number of MFTC recipients was relatively small compared to the number of IWTC and FTC recipients. Table 7 shows the number of single and coupled recipients in each tax year with non-zero MFTC values, as well as other summary statistics about the distribution of tax credits for these groups. Over the four tax years, the number of single parents receiving MFTC ranged from 2,811 (TY2019) to 3,450 (TY2020), and the number of coupled parents ranged from 210 (TY2019) to 363 (TY2020).

Given the increase in the MFTC income level between TY2018 and TY2019, we would expect to see an increase in MFTC recipients, but TY2019 actually had the lowest number of MFTC recipients for both coupled parents and single parents. However, there was a large increase in the number of both single and coupled parents receiving MFTC in TY2020. For coupled parents, TY2019 also had the lowest number of coupled parents (210) and TY2020 the largest (363).

We found that the MFTC amounts received by families were towards the lower end of amounts that families could receive (as shown in Table 3), particularly for sole parents, and there is no discernible bunching around the maximum (results not shown). As shown in Table 7, we see that the median (P50) MFTC receipt for sole parents is \$2,917 in TY2018 and \$3,658 in TY2019.

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<sup>52</sup> This table includes the vast majority of tax credit recipients; however, there was a small number of recipients who received FTC through MSD and were not found in the FRD table. Most of the FTC recipients found in the MSD supplementary income tables were also in the WFF table.

For coupled parents, the median is \$1,848 in TY2018 and \$2,462 in TY2019. Even at the 90<sup>th</sup> percentile, MFTC receipt for single parents ranges from \$7,200 to \$8,934 over the four tax years. For couples, the 90<sup>th</sup> percentile ranges from \$4,499 to \$8,755 over the period. The maximum MFTC estimated for this time period (shown in Table 3) ranged from \$9,322 to \$11,019 for singles and from \$2,553 to \$3,941 for couples. These values are also shown in Figure 5. Single parents largely seemed to receive less than the maximum amount available to them, but coupled parents in the higher percentiles of MFTC receipt were receiving more than the estimated maximum. It is unclear what may be causing this, but it could be due to single parents being reclassified as coupled at some point during the year.

Table 7 also shows co-receipt of these tax credits for each group. MFTC recipients were largely reported as receiving both the IWTC and FTC, as expected due to their low income. The vast majority of MFTC recipients received the maximum IWTC and FTC amounts available to them (both of which depend on number of children), as expected. However, not all MFTC recipients were reported as receiving IWTC. This is particularly true in TY2020 where 6% of coupled parents and 3% of sole parents who received MFTC did not appear to receive IWTC.

For IWTC recipients, the number of sole parents ranged from 75,672 (TY2020) to 85,017 (TY2018) and coupled parents ranged from 101,505 (TY2020) to 127,164 (TY2017). Moreover, since the IWTC is the same for families with between one and three children (\$3770), the maximum available to these families will be the same, but for each additional child beyond three, families receive incrementally more for each child (\$780 annually). As can be seen from the percentiles for all three samples, the 50<sup>th</sup>, 75<sup>th</sup>, and often even the 90<sup>th</sup> percentile amounts were \$3,770 indicating that most families received the IWTC amount for one to three children. This may be largely because most families in these samples had between one and three children. When stratified by number of children, most families were receiving the maximum IWTC available to them (results not shown).

Of IWTC recipients, approximately 90% of sole parents (ranging from 87-92%) and approximately 75% of couples (ranging from 72-79%) also received some non-zero FTC in the same tax year. For sole parents receiving both IWTC and FTC, the average FTC ranged between \$5,000 and \$6,700 with means closer to \$5,000 in TY2017 and TY2018 reflecting the lower available amounts pre-FP (the maximum credit for one child in TY2017 and TY2018 was \$4,822 compared to \$5,878 in TY2018 and TY2019 as shown in Table 3). For coupled parents, the average FTC – conditional on receiving FTC – ranged between \$5,200 and \$7,200, again with TY2017 and TY2018 being closer to \$5,200 reflecting the lower amounts available in those years. Note that because of the overlap between IWTC and MFTC recipients, we do not reproduce the

MFTC percentiles for this subsample as they are largely the same as those for the MFTC subsample.

For the FTC sample, the number of sole parents ranged from 108,228 in TY2019 to 132,171 in TY2017, and the number of coupled parents ranged from 98,070 in TY2020 to 110,883 in TY2019. When we examined the distribution of FTC amounts, we found clustering around the maximum available to these families, with differences based on the number of children and the tax year (\$4,822 in TY2016-TY2017 and \$5,878 in TY2018-TY2019 for families with one child).<sup>53</sup> We see these amounts reflected in the median values of this sample – for example, the median FTC for sole parents in TY2017 and TY2018 was \$4,822 but this increased to \$5,615 in TY2019 and to \$6,007 in TY2020. We see similar trends for coupled parents.

Of our FTC recipients, the percentage who also received some non-zero IWTC in the same tax year ranged between 56% and 65% of sole parents and between 81% and 85% of coupled parents. For FTC recipients, the average IWTC for single parents with non-zero IWTC ranged from \$2,900 to \$3,100, and for coupled parents, the average ranged from \$3,400 to \$3,900. However, as can be seen from the percentiles for both single and coupled parents, a large percentage of recipients are receiving the maximum IWTC for between one and three children (\$3,770). It is also interesting to note that, among those receiving FTC, the 90<sup>th</sup> percentile IWTC amount for coupled parents is \$4,550 which is the maximum amount available for families with four children.

For these groups of recipients, we also matched their WFF records to the 2018 Census data to examine the distribution of weekly hours worked (both in terms of total hours for all jobs as well as hours for their main jobs) as reported in the census.<sup>54</sup> The distribution of these weekly hours for sole parents in each subsample is shown in Table 8. From this, we see that MFTC recipients tended to work substantially fewer hours than sole parents in the other two samples. In the MFTC sample for TY2019, we found that sole parents tended to cluster at 20 hours per week – at the 25<sup>th</sup> percentile, the weekly hours worked was 20, and at the median, it was 21 hours. We did not see the same clustering in the IWTC or FTC samples around 20 hours for sole parents – clustering in these samples was primarily around 40 hours per week. At the lower end of these distributions, sole parents receiving FTC tend to work slightly fewer hours than those receiving IWTC; however, this likely reflects the fact that the FTC does not have an hours-of-work requirement.

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<sup>53</sup> The maximum FTC in the 2016 and 2017 tax years also varied by the age of the children: the amount given is for children aged up to 15 years.

<sup>54</sup> We only used recipients with hours values that were not imputed.



### 5.3 Evidence on bunching in the earnings distribution

We begin our analysis by describing graphically the shape and main features of 2019 annual earnings distributions of parental units. For this, we first plot the distribution for all parental units in Figure 6. In panel (a) this is done using a histogram with \$250 bar-widths. To aid the visual appearance, we have truncated earnings below at \$0 and above at \$150,000.<sup>55</sup> In panel (b), we focus on a narrower earnings range of \$0–\$60,000, around the range of MFTC entitlement and FTC-abatement threshold, and also use finer \$100 bar-widths<sup>56</sup>. In both panels we include vertical lines at the MFTC minimum entry thresholds for single and coupled families (dash-dot lines), the common MFTC exit threshold (dash-dot-dot line), the FTC abatement threshold (solid line), and the MTR tax-thresholds (dotted lines).<sup>57</sup>

There is no apparent bunching in these figures near either of the (minimum wage) MFTC-entry thresholds or the FTC-abatement threshold, nor a ‘deficit’ in the distribution near the MFTC exit threshold. For example, the frequency at the FTC-abatement threshold (\$42,700)<sup>58</sup> is almost the same (1,179) as the average of the frequencies on either side (1,176) in panel (a); while the frequency at the MFTC exit threshold (\$30,516) is actually higher (918) than on either side (average=884). However, there are clear spikes in the earnings distribution at the MTR-related thresholds, as well as several apparent spikes elsewhere, particularly around \$10,000 multiples<sup>59</sup>. For example, the frequencies at the \$48,000 and \$70,000 tax-rate thresholds are respectively about 20% and 50% higher than the frequencies on either side; similarly, the frequencies at twice these thresholds (\$96,000 and \$140,000) are 30% and 110% higher than the frequencies either side.<sup>60</sup>

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<sup>55</sup> This covers almost three-quarters (74%) of our 2018 Census parental units who have annual income in the Incomes tables: 10.1% have zero earnings, 0.3% have negative earnings, and 15.6% have earnings above \$150,000.

<sup>56</sup> The bar-widths are in \$100 increments, but the axis in panel (b) of Figure 6 is in \$1,000 increments.

<sup>57</sup> The MFTC entry thresholds are calculated for minimum wage (e.g., \$17.70 per hour) work for 20 hours (singles) and 30 hours (couples) per week respectively. These correspond to the minimum legal eligible earnings for MFTC to receive the maximum annual payment. Full-year MFTC recipients should have annual earnings starting around these values and less than the \$30,508 cut-out point. In panel (a), we have also included vertical lines corresponding to twice the top two MTR thresholds (i.e., at \$96,000 and \$140,000 respectively).

<sup>58</sup> In TY2019, the first quarter (1 April to 30 June) used the parameters in effect on 1 April 2018, and the remainder of the year (1 July to 31 March) used the parameters that went into effect on 1 July 2018. Hence, the annualised abatement threshold for TY2019 was the weighted average of the pre- and post-Families Package thresholds, \$41,113. For simplicity, we used the threshold at 1 July 2018 for TY2019 since it does not substantially change the results and is representative of the post-FP period. Moreover, we examined the distribution of incomes between the pre- and post-FP thresholds since families may not have been able to fully adjust their earnings in the first year of implementation. Even if fully able to adjust, families may have focused on the publicised threshold implemented by the package. The form IR271 for TY2019 did not specify the FTC threshold as the weighted average – it only showed the annualised amounts at which the FTC begins to abate in each period. Hence, families would have had to calculate the TY2019 threshold themselves.

<sup>59</sup> For example, we see a spike at \$40,000 which could be due to bunching around the FTC threshold; however, we see a similar spike for TY2018 before the FTC was changed. Hence, these spikes are likely due to annual salary amounts.

<sup>60</sup> As Alinaghi et al. (2021) show, most of the MTR-spikes are associated with those with self-employment earnings (see below) and, as expected, the latter two spikes are entirely associated with Coupled PUs. Also, we expect part of the much higher frequencies at \$70,000 and \$140,000 are due to these being at round \$10,000 values: for example, the frequencies of PUs with only wage and salary earnings at these points are approximately 20% higher than either side.



In Figure 7 we describe the earnings distributions over the \$0–\$60,000 range separately for Single PUs (panel (a)) and Coupled PUs (panel (b)). Unsurprisingly, the (combined) earnings of couples are typically greater than the earnings of singles. But, again, there is no evidence of any bunching around the MFTC entry or FTC abatement thresholds for either single or coupled PUs, nor any deficit near the MFTC exit threshold.

Both Saez (2010) and Alinaghi et al. (2021) find evidence of substantially more bunching associated with those who have self-employment earnings than those with only wage and salary earnings. To explore this dimension, we separately describe the earnings distributions for those with any self-employment earnings and those with no self-employment earnings in Figure 8 for Single PUs, and Figure 9 for Coupled PUs. Again, we find no evidence of any bunching at the MFTC minimum entry thresholds or the FTC abatement threshold for either those with or without self-employment earnings, and similarly, no evidence of a deficit around the MFTC exit threshold. The only clear bunching occurs at the \$48,000 MTR threshold for both single and coupled PUs with self-employment earnings.

As part of the Families Package changes, the FTC abatement threshold increased from \$36,500 to \$42,700, and the MFTC exit threshold increased from \$27,680 to \$30,516. To assess whether any bunching behaviour may take time to adjust to policy changes and because the 2018 Census sample of parental units better matches the 2017/18 tax year data, in Figure 10 we describe the 2017/18 distribution of annual earnings. Panel (a) plots the frequencies over the \$0 – \$60,000 range for all parental units, and panels (b) and (c) plot the frequencies for those with and without self-employment earnings respectively. In line with the 2018/19 distributions, these figures show no evidence of any bunching around the FTC abatement threshold, nor deficit around the MFTC exit threshold, in 2018/19.

Finally, we examine changes in the distribution of earnings over the period, again focusing on whether there are any noticeable shifts around the salient MFTC or FTC thresholds. Figure 11 describes both the one-year changes between the 2018 and 2019 tax years (solid lines), and the three-year changes between the 2017 and 2020 tax years (dashed lines).<sup>61</sup> We plot the changes for all parental units in panel (a), and subsamples with and without self-employment earnings in panels (b) and (c) respectively. These show no sign of large shifts in the distribution of earnings around either the MFTC or FTC thresholds<sup>62</sup>, although the distribution changes for those with self-employment earnings are particularly noisy due to the small samples.

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<sup>61</sup> Because the frequency changes associated with \$100-bins are quite noisy, we have used centred \$1,000 moving averages for each of the plots.

<sup>62</sup> This includes changes in the distribution between the two thresholds, as we might not expect families to fully adjust immediately.

For robustness, we also examined the distribution of earnings using the WFF FRD tables matched to the same income summary data used in the main analysis and using the partner relationships in the FRD tables. We used earned income with and without adjusting for child support received and used similar splits in the data (sole and coupled parents, with and without self-employment earnings) as those used in the main analysis. We found similar results to the main analysis with no signs of bunching in earnings around the thresholds even after adjusting for child support (results not shown).

#### 5.4 Demographics of parents around thresholds

We also looked at the characteristics of parents whose family income was around the MFTC and FTC thresholds. We primarily used the two \$300 bins on either side of each threshold using TY2018 and TY2019 parameter values. We generally find no differences in the characteristics of parents on either side of the threshold. However, we do find differences in the characteristics of parents around the different threshold levels. For example, as shown in Figure 12, single parents are particularly overrepresented around the lower income thresholds, with the highest percentage of single parents around their MFTC minimum earnings threshold. However, around the FTC abatement threshold (\$42,700) implemented in TY2019 by the FP, single parents are overrepresented to a much lesser extent. Interestingly, at the 2019 FTC threshold, the percentage of single parents in TY2017 and TY2018 is much lower than in TY2019 and TY2020. Since single parents tend to be younger on average than coupled parents, the age distributions around the thresholds also reflect the overrepresentation of single parents in the younger age groups (shown in Figure 13).

The results by ethnicity are shown in Figure 14. Parents with Pacific ethnicity are overrepresented around these thresholds. Parents with European ethnicity are underrepresented at these thresholds, but this is primarily due to underrepresentation of coupled Europeans, particularly at the lower thresholds. Parents with Māori ethnicity are also overrepresented around the thresholds, with this being particularly true for coupled Māori. Asian parents are overrepresented around these thresholds, with the rates of coupled Asian parents much higher around these thresholds than is seen for coupled parents generally. Parents of other ethnicities are found at approximately the same rates seen in the overall population.

Single parents around these thresholds for whom we have employment status as reported in the 2018 Census also primarily report that they were employees in 2018 (shown in Figure 15). Coupled parents were much more likely than sole parents around these thresholds to report that they were self-employed (with or without employees) in the 2018 Census. Moreover, the

percentage of coupled parents around the highest threshold reporting that they were self-employed was much lower than the percentage of coupled parents reporting self-employment at the lowest threshold.

Finally, we examined housing tenure for the parental unit as reported in the 2018 Census. From the 2018 Census, approximately 35% of all households live in a dwelling that is neither owned nor held in a family trust by them (i.e., renters)<sup>63</sup>, and for those households with incomes of \$20,000 or less, this rises to approximately 58% of households. For single parents in this income range, the proportion renting is substantially higher (over 80%), as shown in Figure 16. For coupled parents, the rate is closer to the household rate (around 60%). Even for parents with incomes around the highest threshold, the proportions are not much different than those for parents around the lowest threshold.

In looking at the kernel densities for these different groups, we also found that some groups appeared to cluster around the lower FTC threshold in the first two tax years (TY2017 and TY2018) and that the cluster then shifts to the higher FTC threshold by the last tax year (TY2020). The clearest example of this is for single parents who rent, and for this group, we find very low elasticities which appear to be sensitive to the specification used (results not shown).

## **6 Concluding discussion**

In this paper we have used Saez's (2010) bunching methodology to analyse behavioural responses to financial incentives in the 2018 Families Package. Focusing on the kink points associated with the FTC abatement threshold and the MFTC minimum entry level, we find no evidence of any bunching, nor do we find any evidence of density deficit around the MFTC exit threshold. Hence, we find no evidence of a behavioural response to the policy. We see clustering around 20 hours of work per week by sole parents receiving MFTC but not for those receiving IWTC and FTC; however, this clustering by MFTC recipients may be more a function of the group eligible for MFTC (given the low minimum income level) than an indication of a behavioural (i.e., labour supply) response. This seems further supported by the lack of clustering in MFTC amounts and in the hours worked by IWTC and FTC sole parents.

In contrast to the lack of bunching at the FP/WFF thresholds, we see clear evidence of bunching around the top two marginal tax rate (MTR) thresholds (\$48,000 and \$70,000), similarly to Alinaghi et al. (2021), as well as at twice these amounts by coupled parental units. This suggests the methodology is able to identify such behavioural responses if they exist. The

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<sup>63</sup> We classify renters as those who live in a dwelling that is neither owned nor held in trust by the household.

contrast between the degree of bunching and the lack of bunching around the FTC abatement threshold is somewhat surprising given that the change in the marginal tax rate is 12.5% at the \$48,000 MTR threshold and 3% at the \$70,000 MTR threshold, while the change in the rate of the FTC abatement threshold ranged between 22.5% and 25% over our analysis period. According to theory developed in Saez (2010), the degree of bunching should be proportional to the net-of-tax rate (i.e., the change in the marginal tax rate relative to the base net-of-tax rate), which would indicate that the degree of bunching around the FTC threshold would at least be on par with if not exceed that found around the \$48,000 MTR threshold, all else being equal.

Given our results are in stark contrast to the US evidence on bunching around the Earned Income Tax Credit (EITC) thresholds in Saez (2010) and Chetty et al. (2013), it is worth considering why? We believe there are various contributing factors. First, the US EITC policy is explicitly stated and administered on an annual tax-year basis. In contrast, although New Zealand's WFF tax credit policies are expressed in annual terms, the administration of eligibility for and receipt of WFF payments may be on a partial, within-year basis. As a result, if recipients are responding to the financial incentives on an intra-year basis, the effects of such responsive behaviour may not be evident in terms of their annual earnings. Moreover, the EITC has no hours-of-work requirement and is strictly based on annual earned income in the tax year, whereas the MFTC and IWTC both had an hours-worked requirement when the FP was implemented. Moreover, the hours-of-work requirement for MFTC is based on hours worked each week which means that the entry threshold in income terms could vary quite a bit for different families, making bunching more difficult to detect. Since we have very limited information about hours worked, our estimated MFTC minimum entry threshold is more of a reference point than a strict threshold.

Second, in contrast to the US case in which the EITC is the single income support policy for most families, New Zealand has a plethora of overlapping support policies for different sub-populations. The effect of this is that any behavioural responses for the whole population may be diffused across a range of kink points along the income schedule rather than concentrated in a few areas as in the US case. Moreover, the income thresholds may be difficult for recipients to ascertain. For example, IWTC only begins to abate once the FTC has fully abated, and since the FTC depends on the number of children in the family, the IWTC abatement threshold for a family may not be easy to determine. As noted previously, Saez (2010) found that, in practice, bunching happened only in specific cases and not necessarily at every kink point.<sup>64</sup> The commonality

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<sup>64</sup> He finds bunching at the first kink point of a tax credit that maximised the amount of the credit received and at the first kink point of the income tax schedule where tax liability starts.

between the points where he did find bunching were for kink points that had high visibility, are easily understood, and have large impacts on disposable income. Chetty et al. (2011) also found bunching at a large, easily discernible kink point using incomes but little evidence of bunching around smaller kink points. It is possible that the kink points that we examine do not share these characteristics.

For some families the thresholds may be more binding than for others, so families will vary in their responsiveness to these different incentives. It is possible that families in areas with higher costs of living may be more responsive than families in areas with lower costs of living, and this may be an area for future work. However, for the current work, it means that detecting bunching, and hence behavioural responses to the policy, is difficult without better identification of those families who are responding to the incentives.

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Figure 1: Tax credits for parents earning minimum wage with 1 child, pre- and post-FP

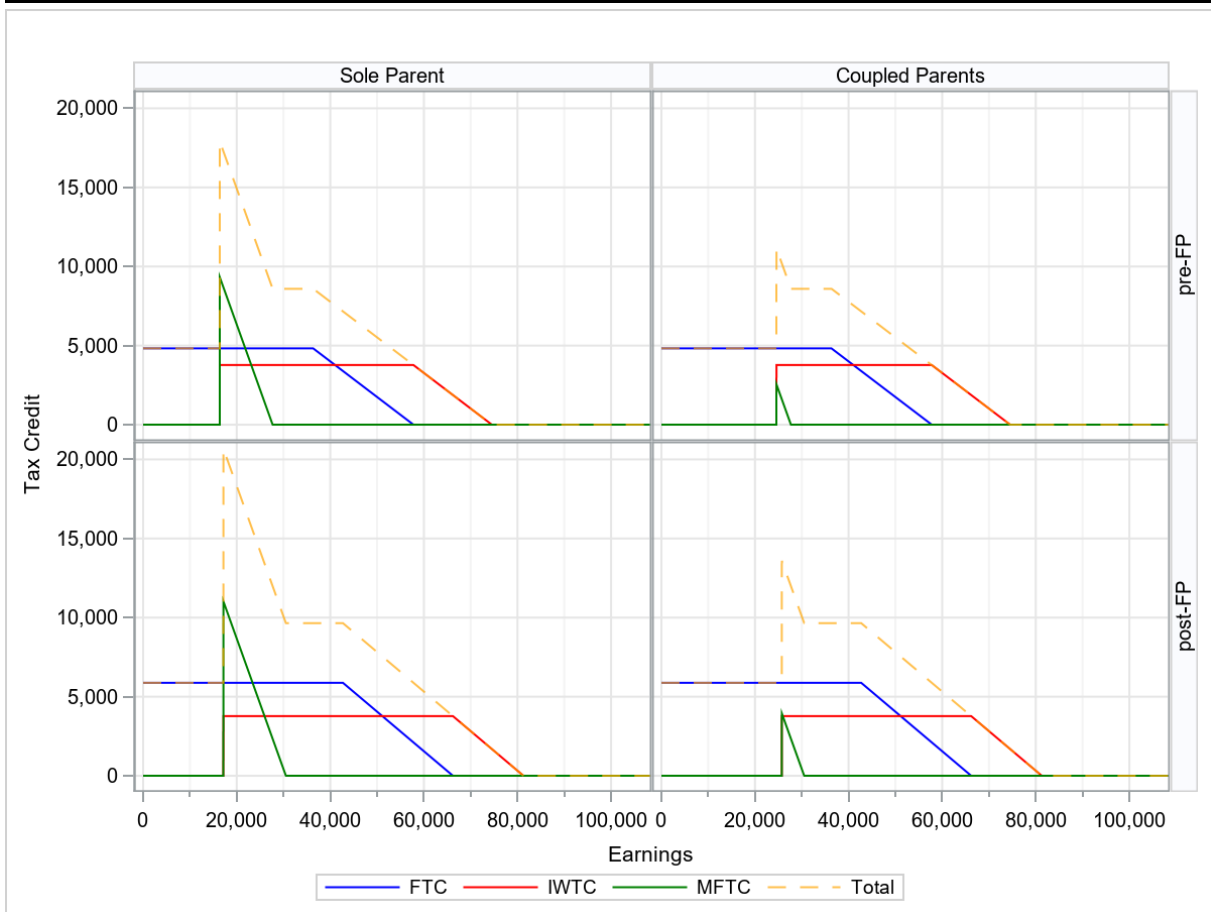
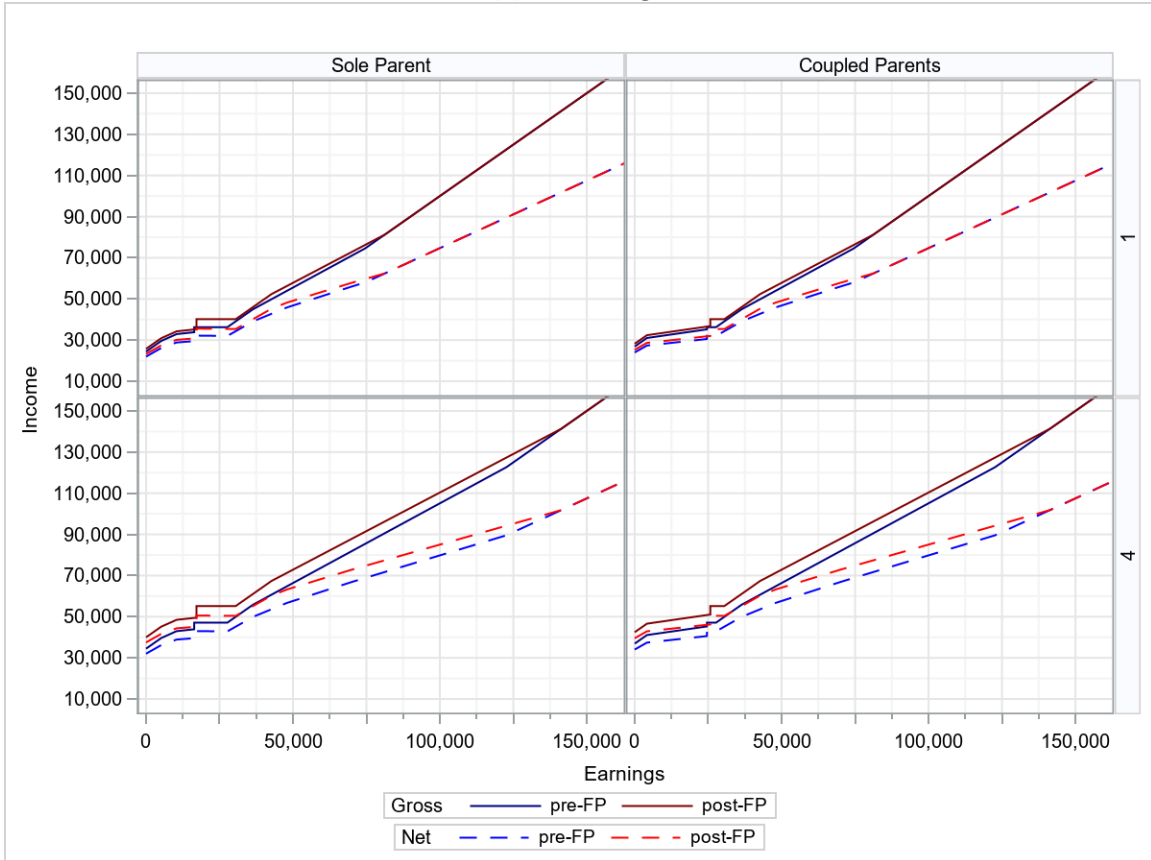


Figure 2: Income schedules pre- and post-FP by parent type and number of children

(a) Excluding WEP



(b) Including WEP

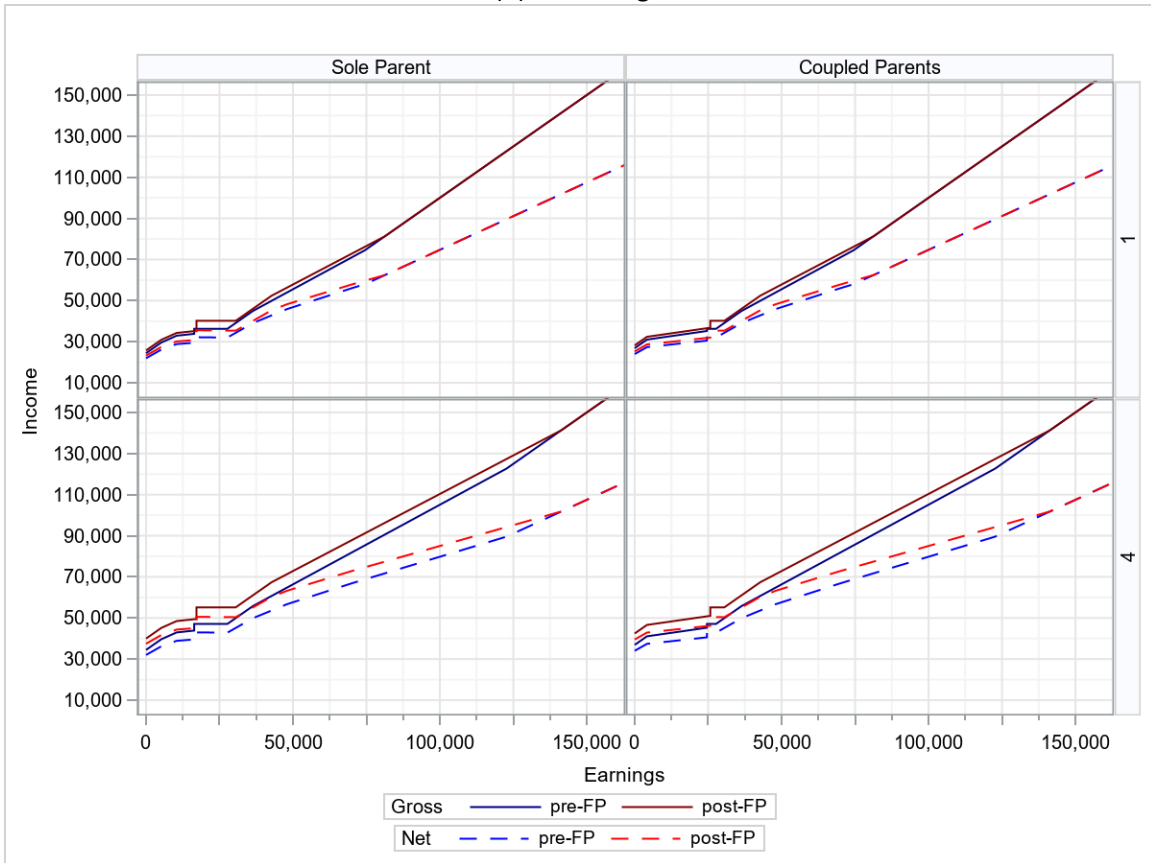




Figure 3: Income schedules including WEP pre- and post-FP by parent type, 1 child

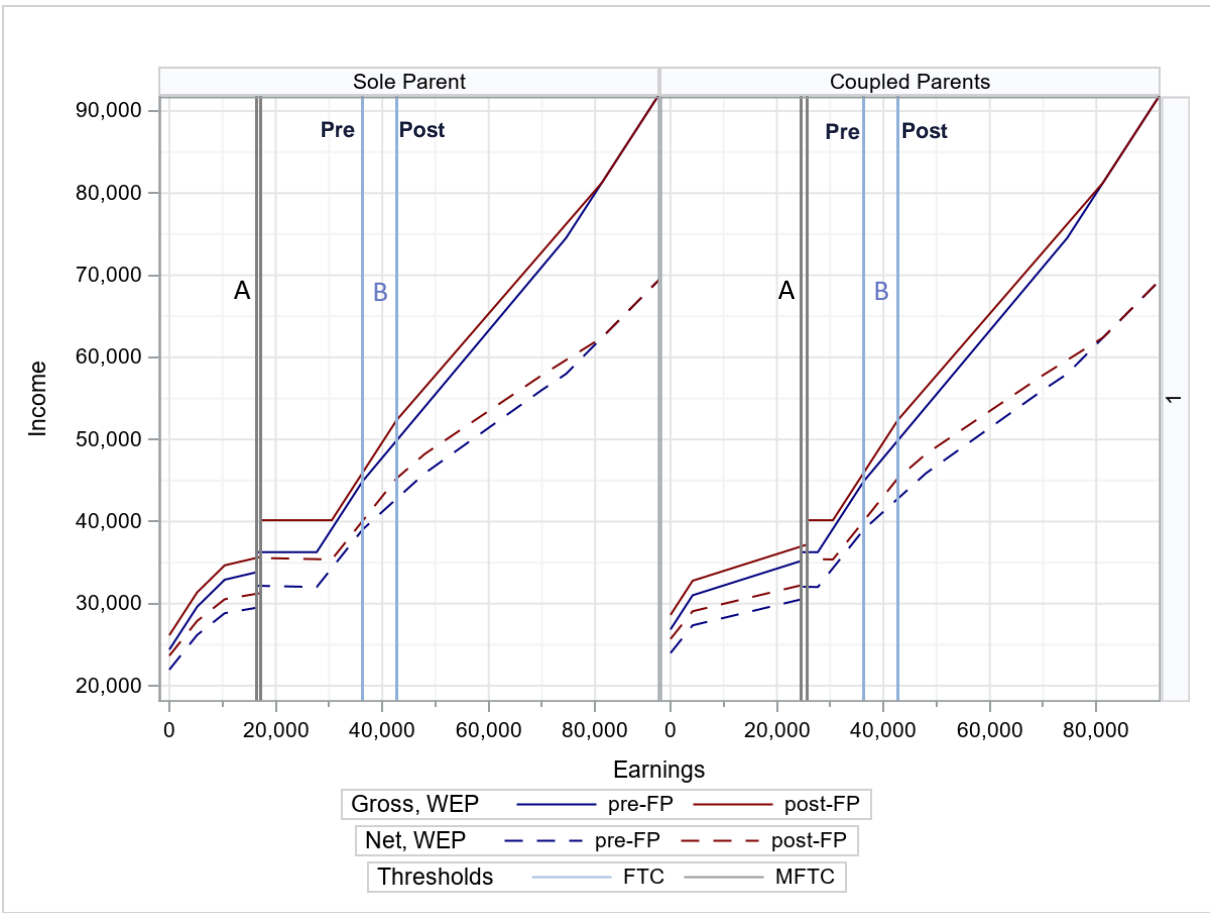
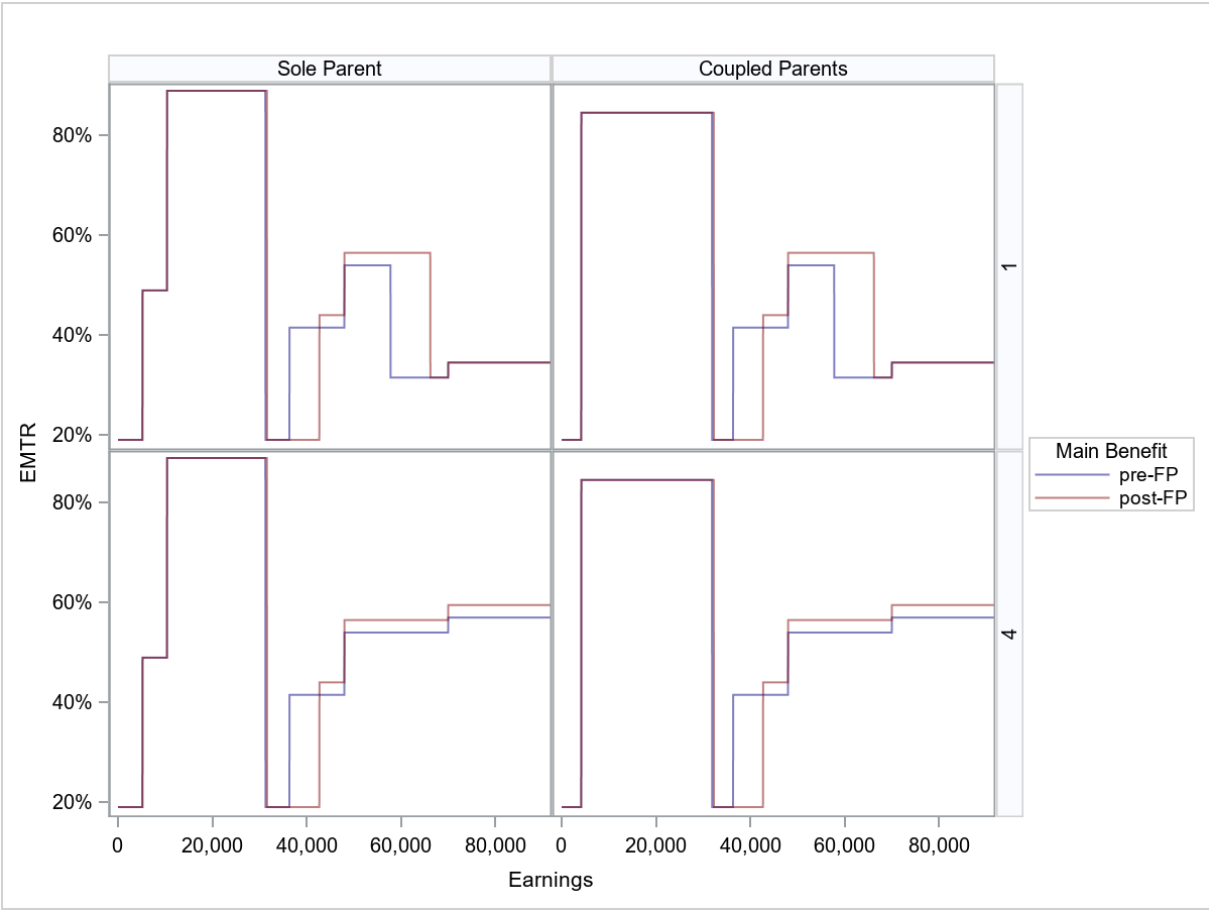


Figure 4: EMTRs for families on main benefit receiving FTC pre- and post-Families Package



Notes: The left hand panels relate to Sole parent families; the right hand panels to Coupled parent families; the top panels pertain to families with one child; and the bottom panels to families with four children.

Figure 5: Distribution of MFTC amounts by parent type, 2017-2020

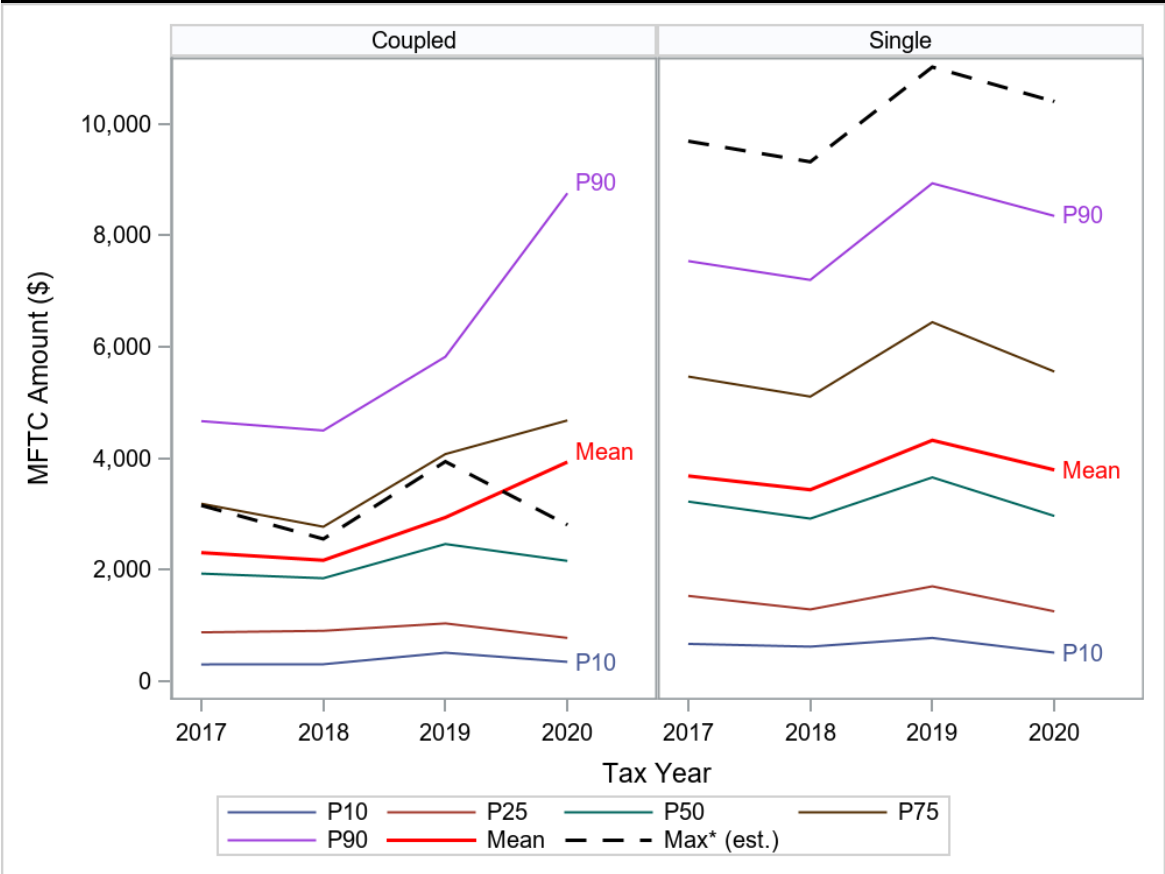
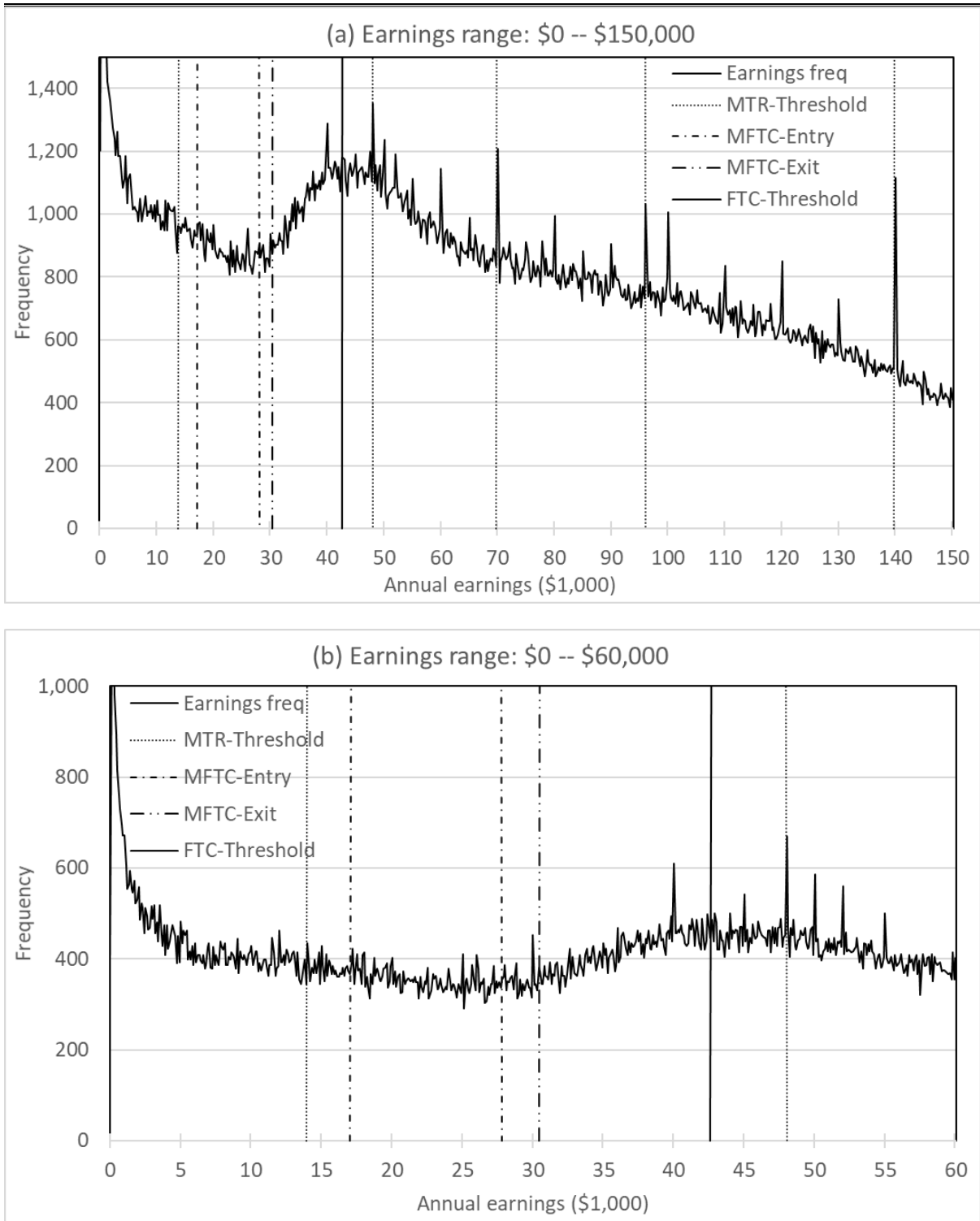


Figure 6: Distribution of parental unit earnings – 2019 tax-year



Notes: Of parental units with income in the Incomes Tables, 0.3% have negative earnings, 10.1% have zero earnings, and 15.6% have earnings above \$150,000. In panel (a), the marked 'MTR-thresholds' at \$96,000 and \$140,000 correspond to twice the \$48,000 and \$70,000 thresholds.

Figure 7: Distribution of single and coupled parents earnings – 2019 tax-year

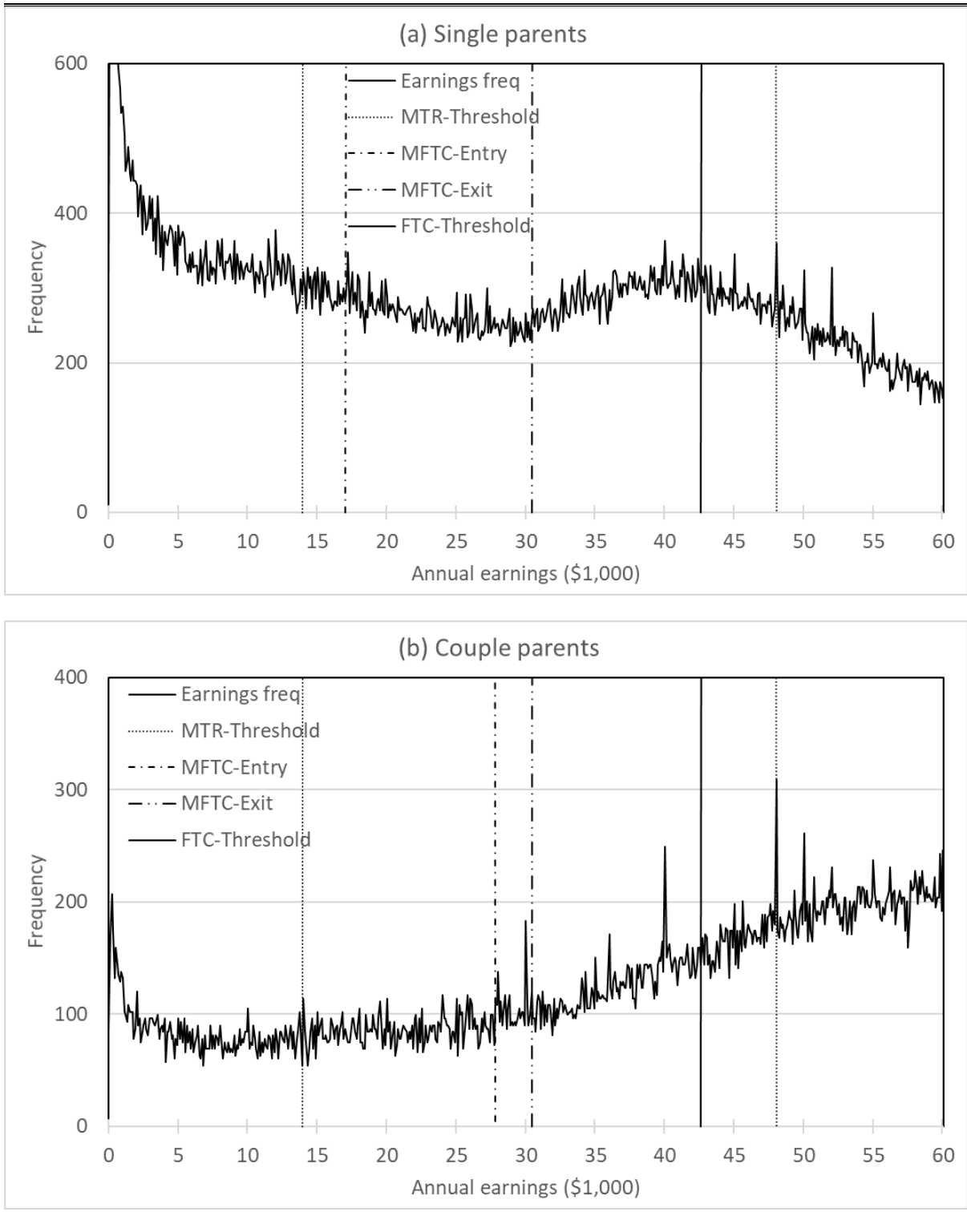


Figure 8: Distribution of single parents earnings – 2019 tax-year

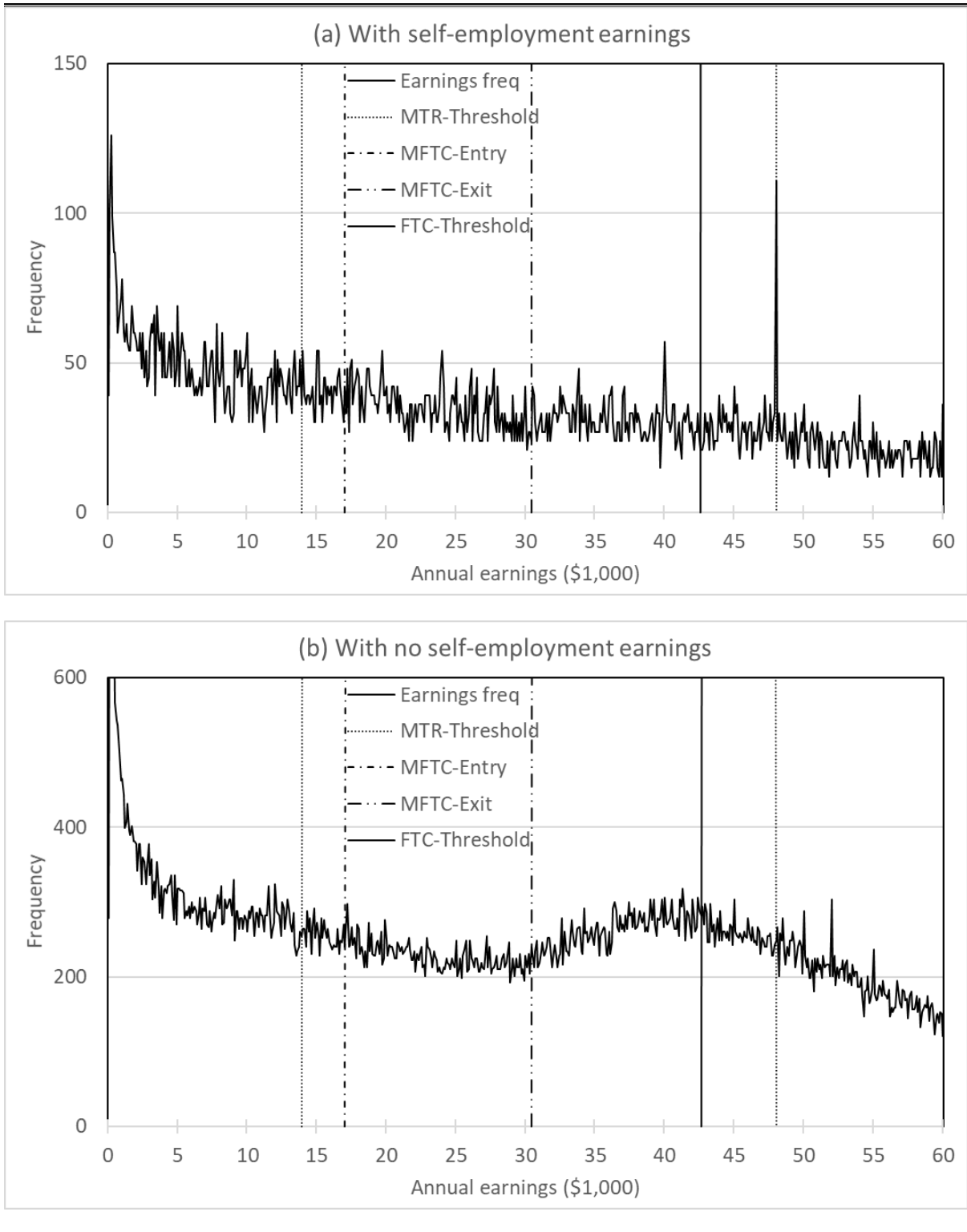


Figure 9: Distribution of coupled parents earnings – 2019 tax-year

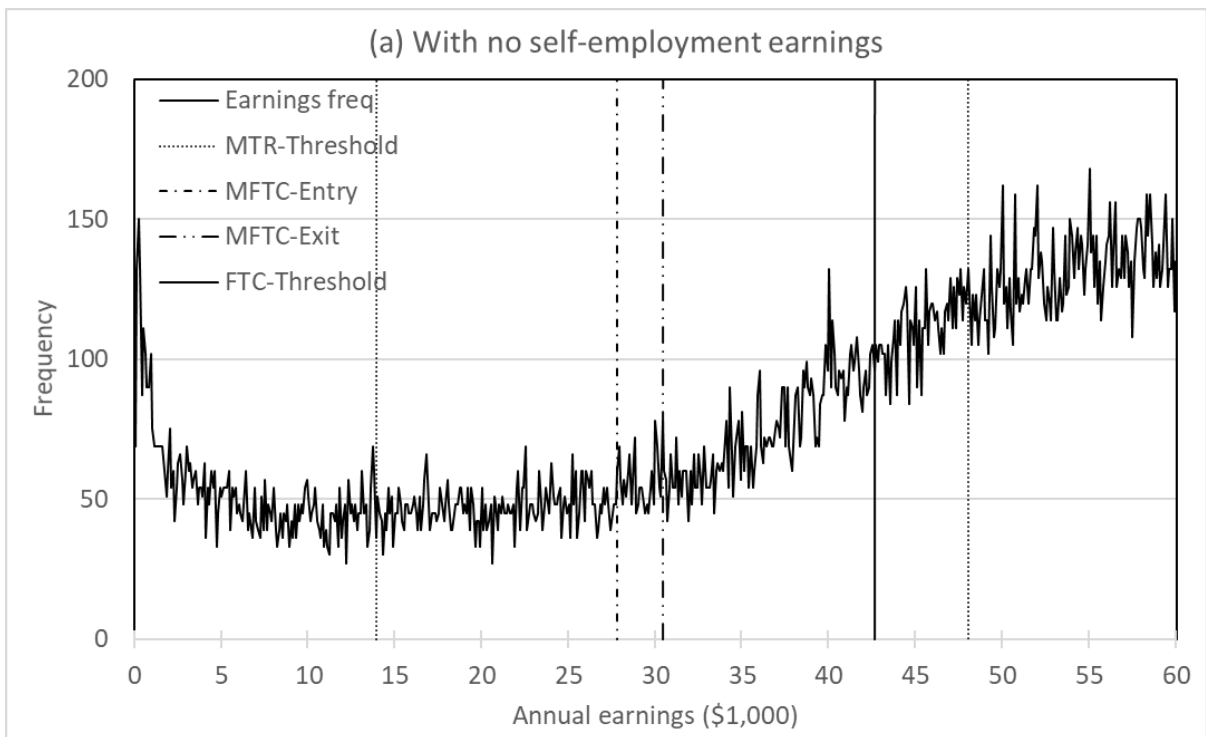
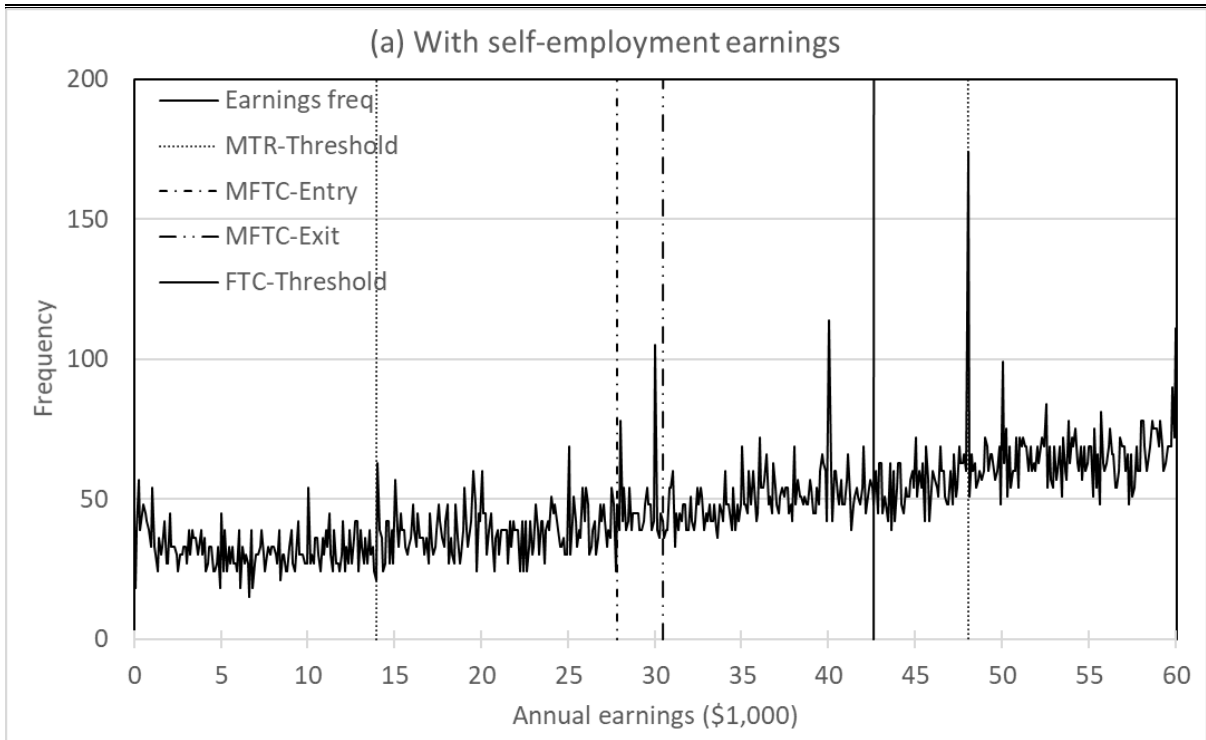


Figure 10: Distribution of parental unit earnings – 2018 tax-year

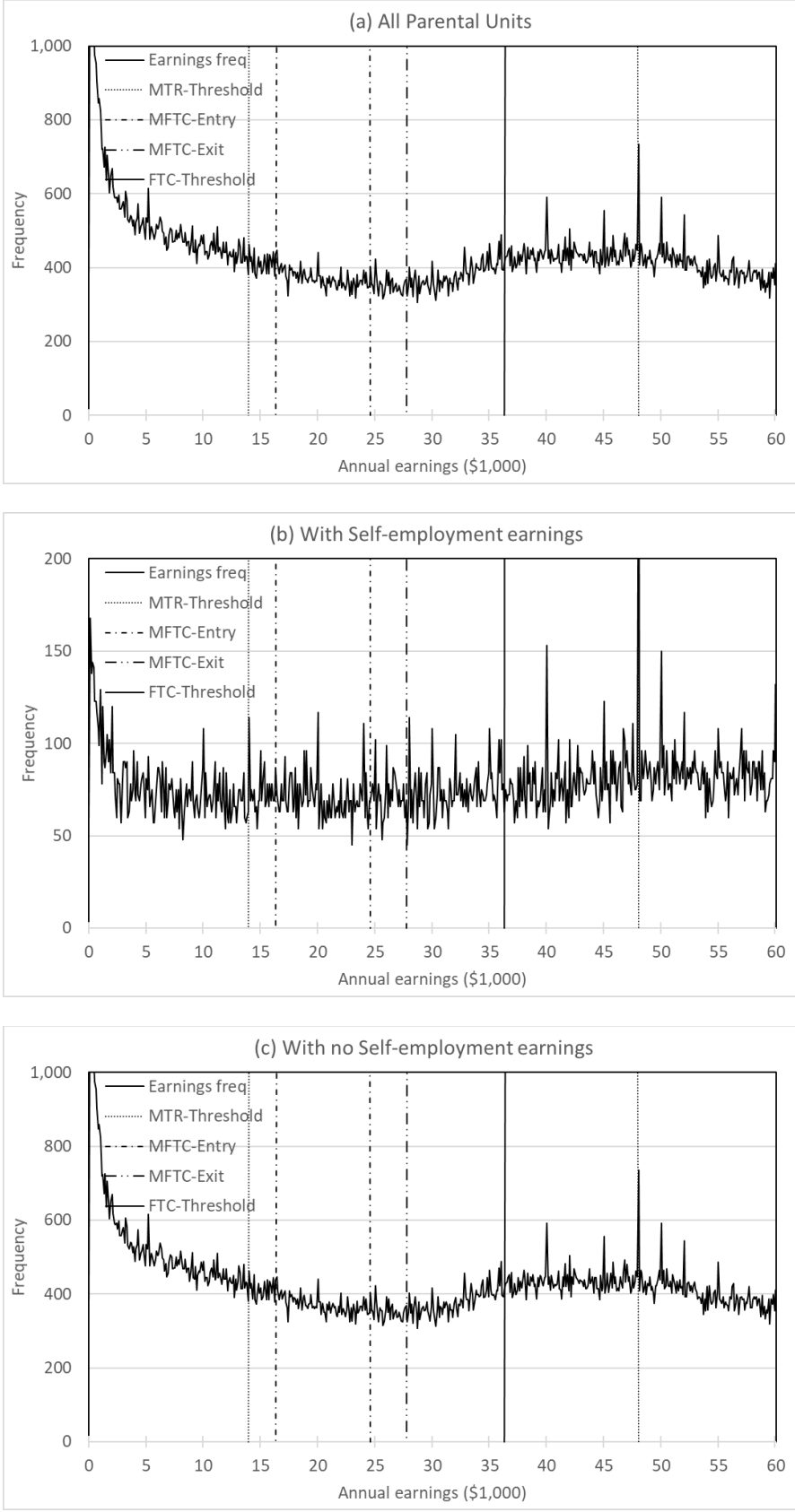
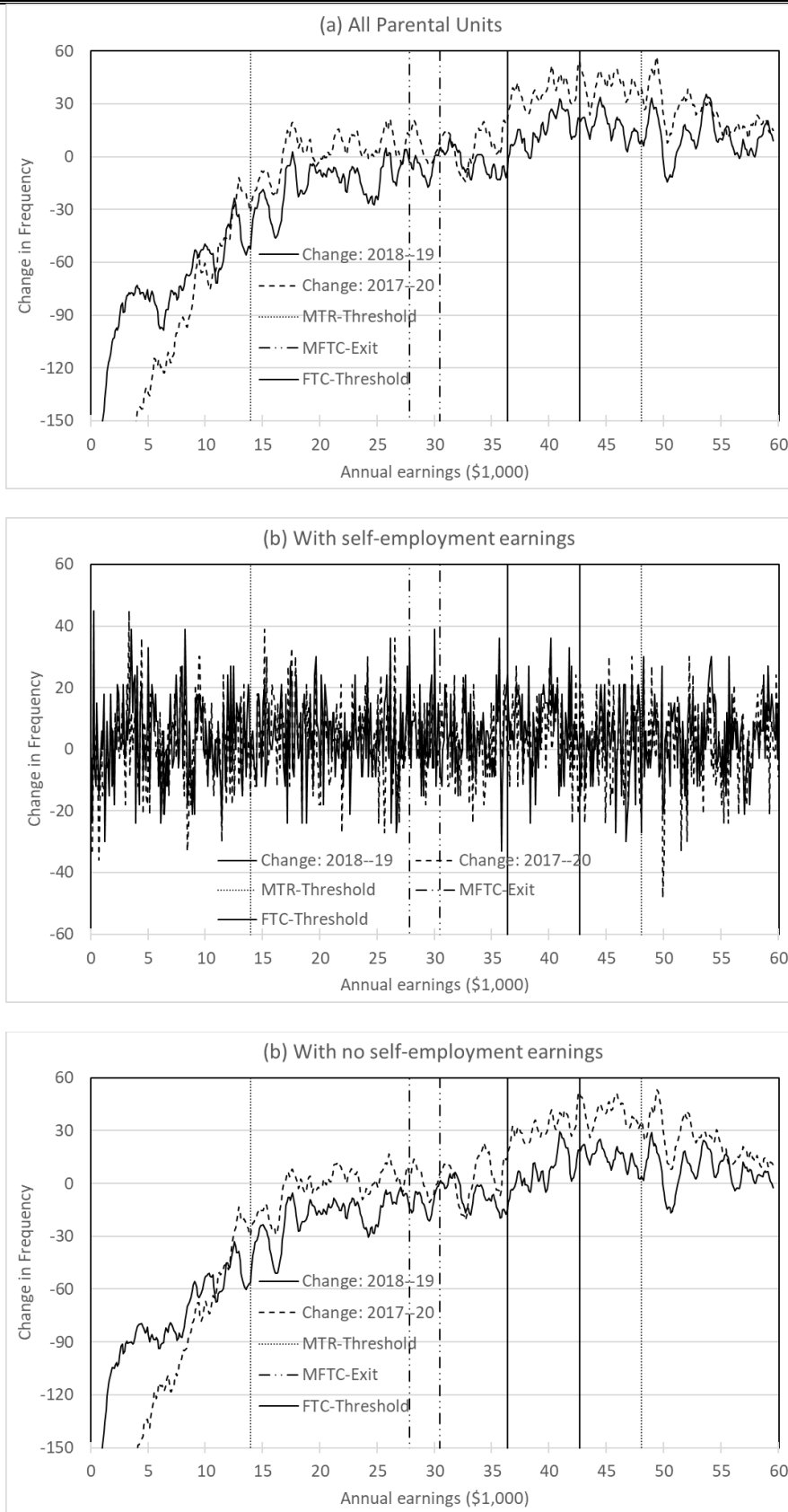


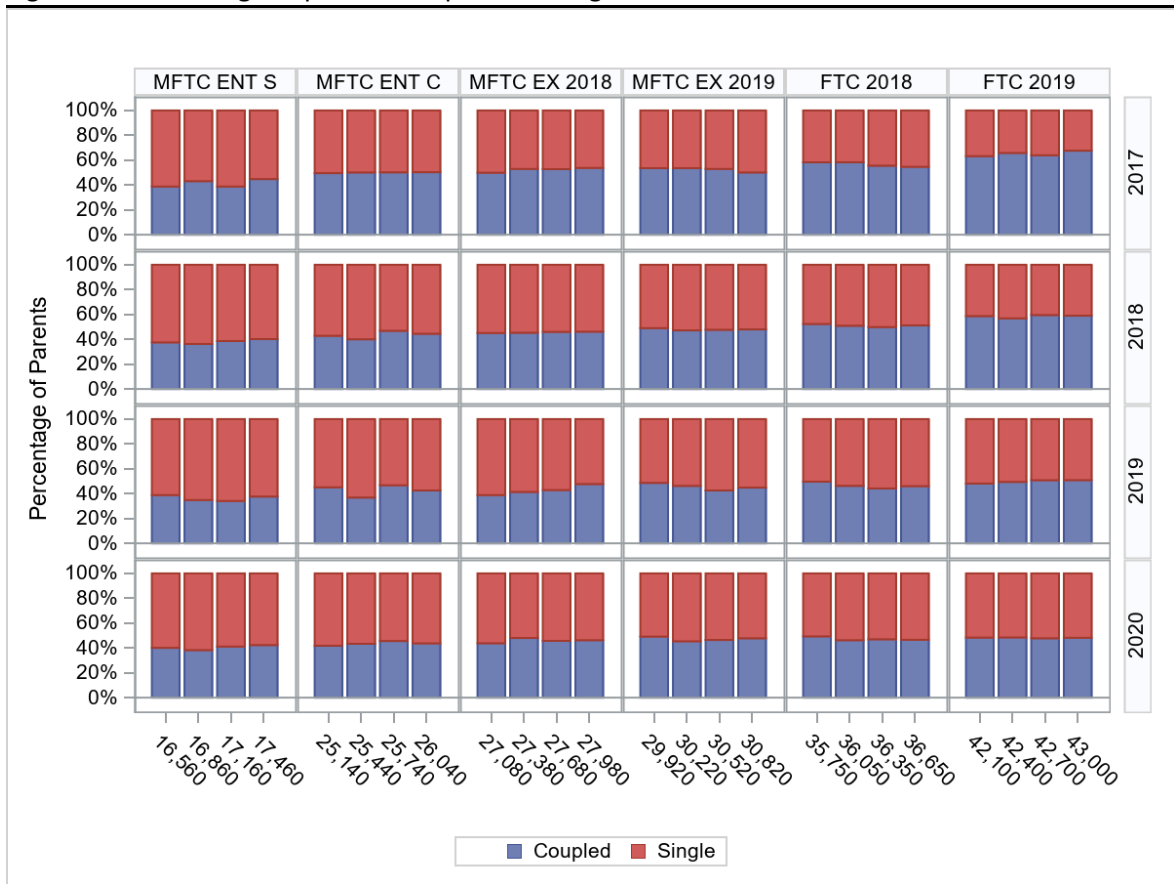


Figure 11: Changes in distribution of parental unit earnings



Notes: The MFTC exit thresholds are for TY2018 (\$27,680) and TY2019 (\$30,516); the levels for TY2017 and TY2020 are \$23,764 and \$30,994.

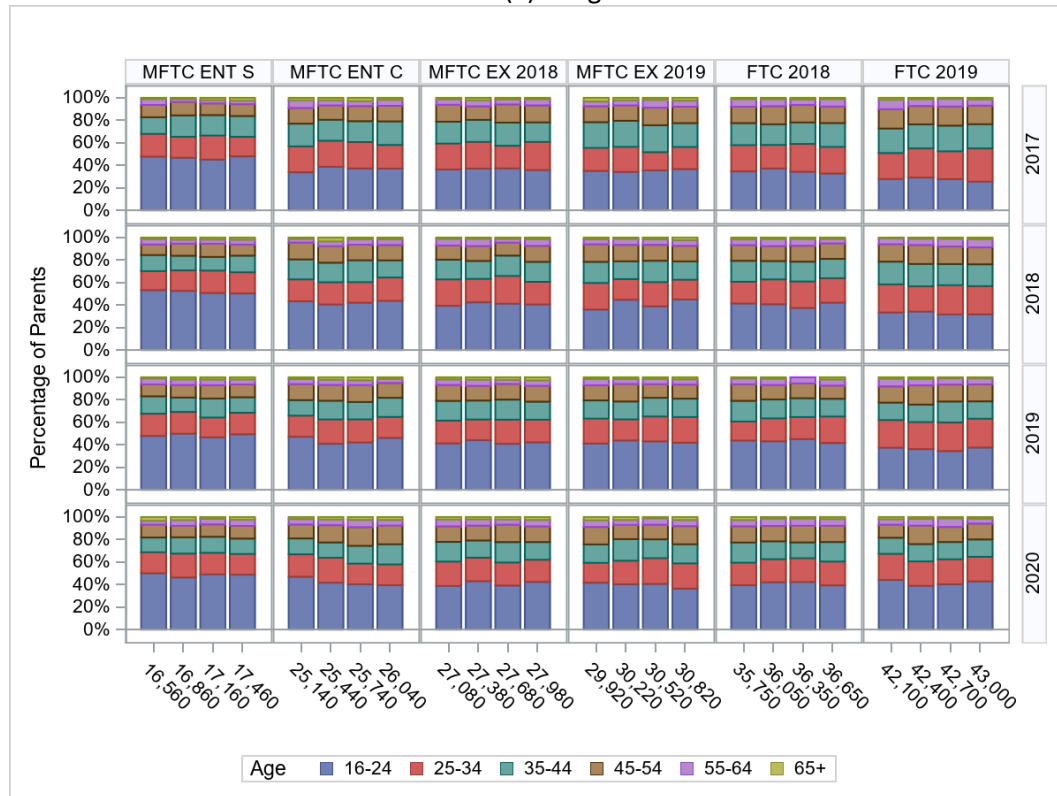
Figure 12: Percentage of parents coupled and single around select thresholds



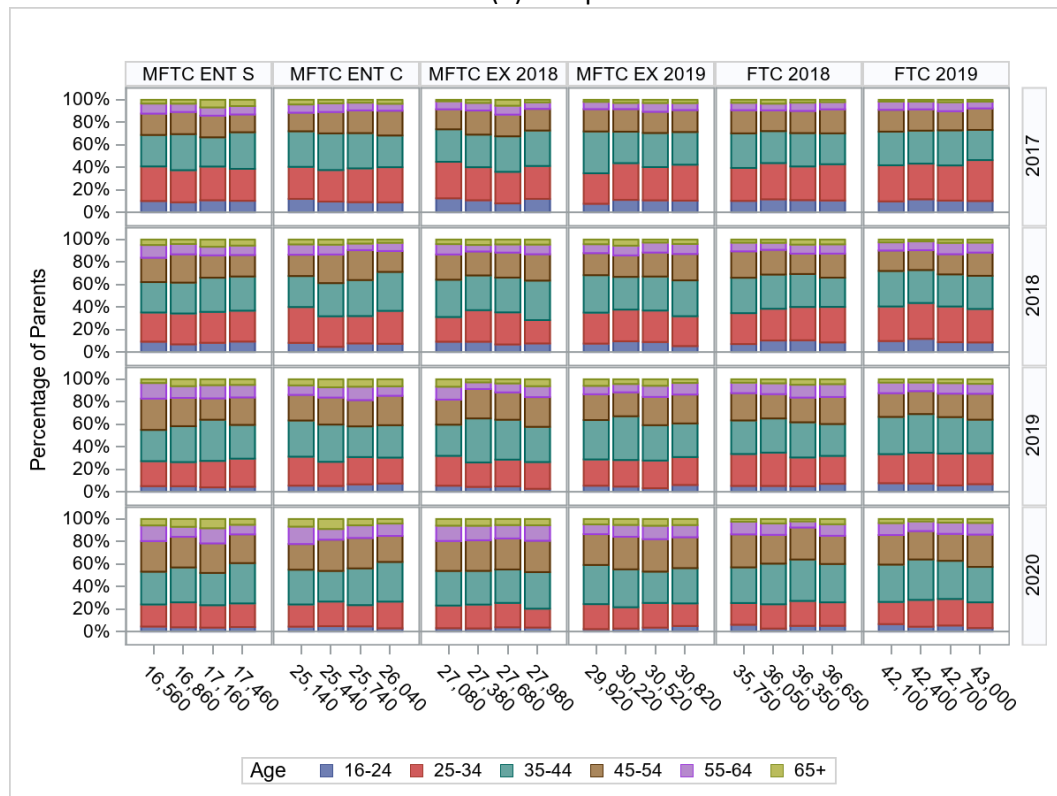
Notes: The percentage of parents in each \$300 household-earnings bin around select thresholds: MFTC minimum entry thresholds for single (MFTC ENT S) and coupled (MFTC ENT C), MFTC exit threshold in TY2018 (MFTC EX 2018) and in TY2019 (MFTC EX 2019), and the FTC abatement threshold in TY2018 (FTC 2018) and in TY2019 (FTC 2019). The determination of 'coupled' or 'single' is based on the 2018 Census data. The earnings data are based on the tax year.

Figure 13: Percentage of parents by age group and partnered status

(a) Single



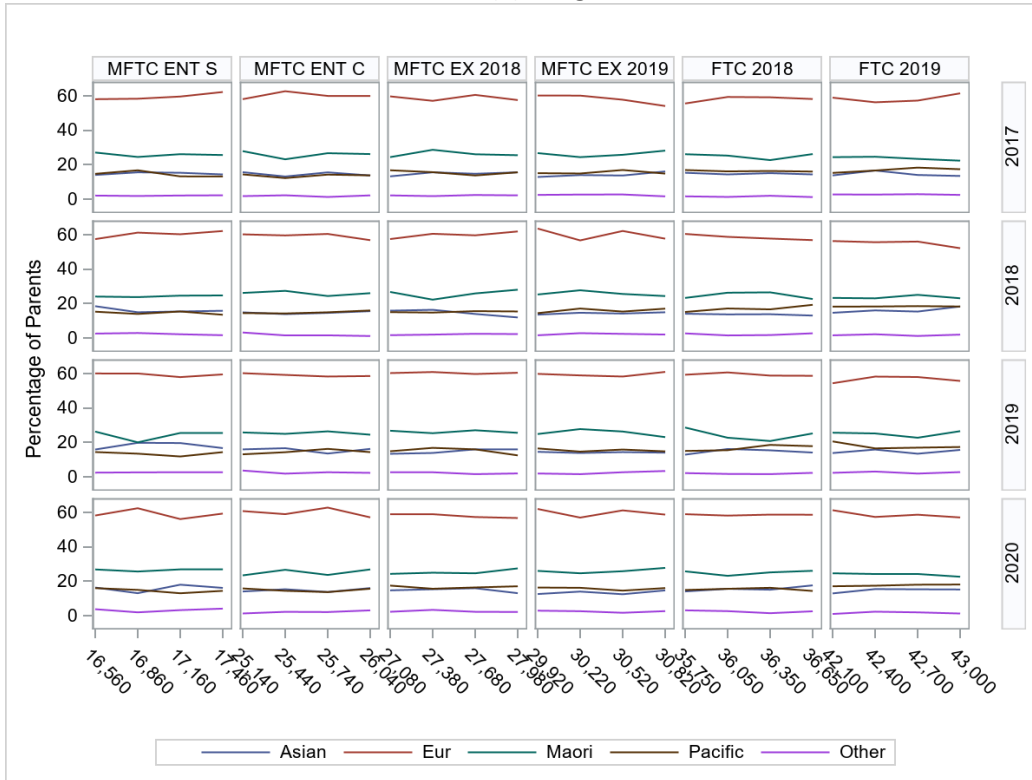
(b) Coupled



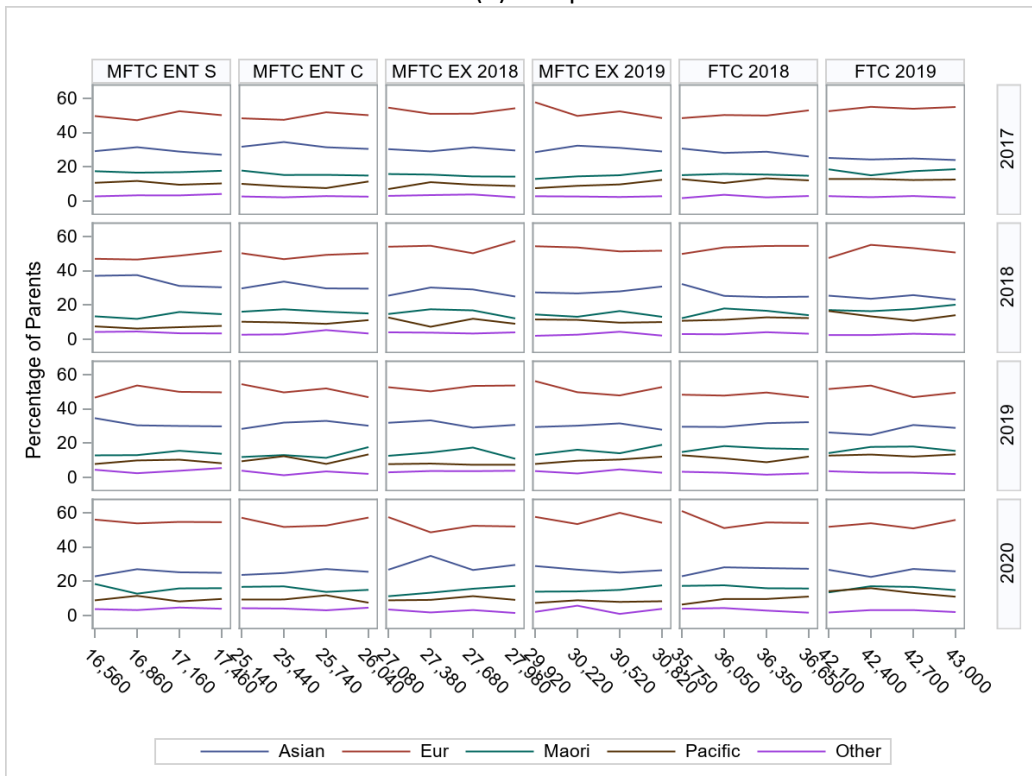
Notes: The percentage of parents in each \$300 household-earnings bin around select thresholds: MFTC minimum entry thresholds for single (MFTC ENT S) and coupled (MFTC ENT C), MFTC exit threshold in TY2018 (MFTC EX 2018) and in TY2019 (MFTC EX 2019), and the FTC abatement threshold in TY2018 (FTC 2018) and in TY2019 (FTC 2019). Age is based on the 2018 Census data but adjusted to correspond to the tax year. The earnings data are based on the tax year.

Figure 14: Percentage of parents by ethnicity and partnered status

(a) Single



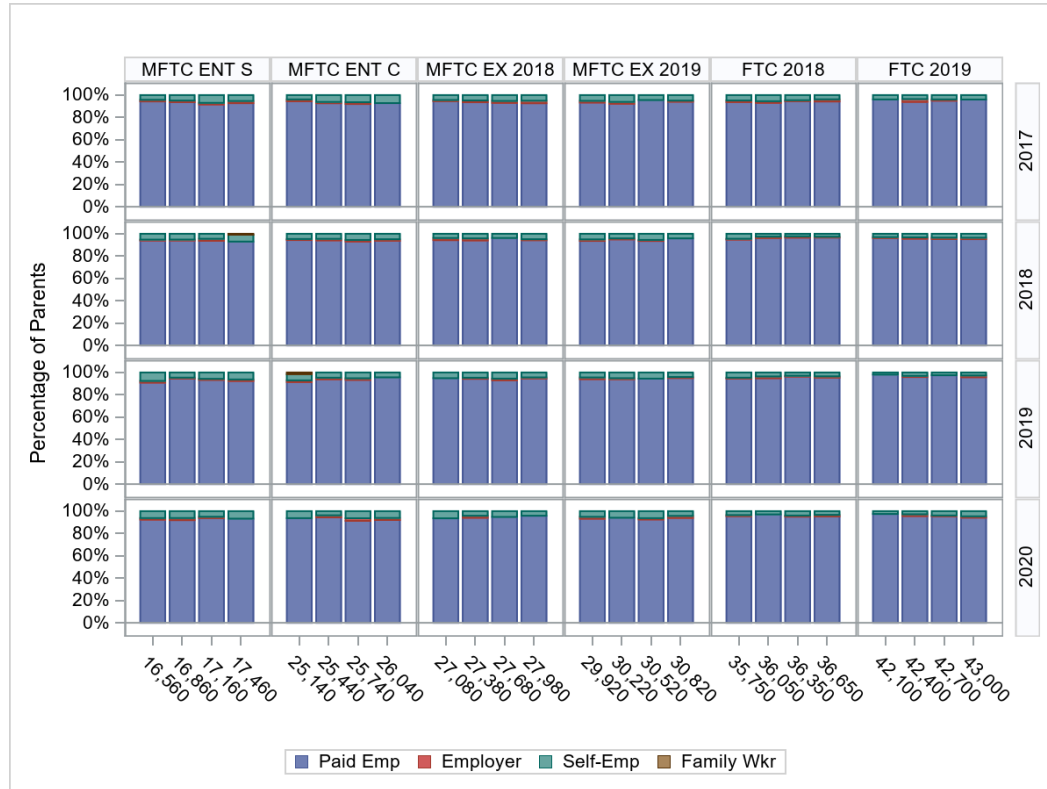
(b) Coupled



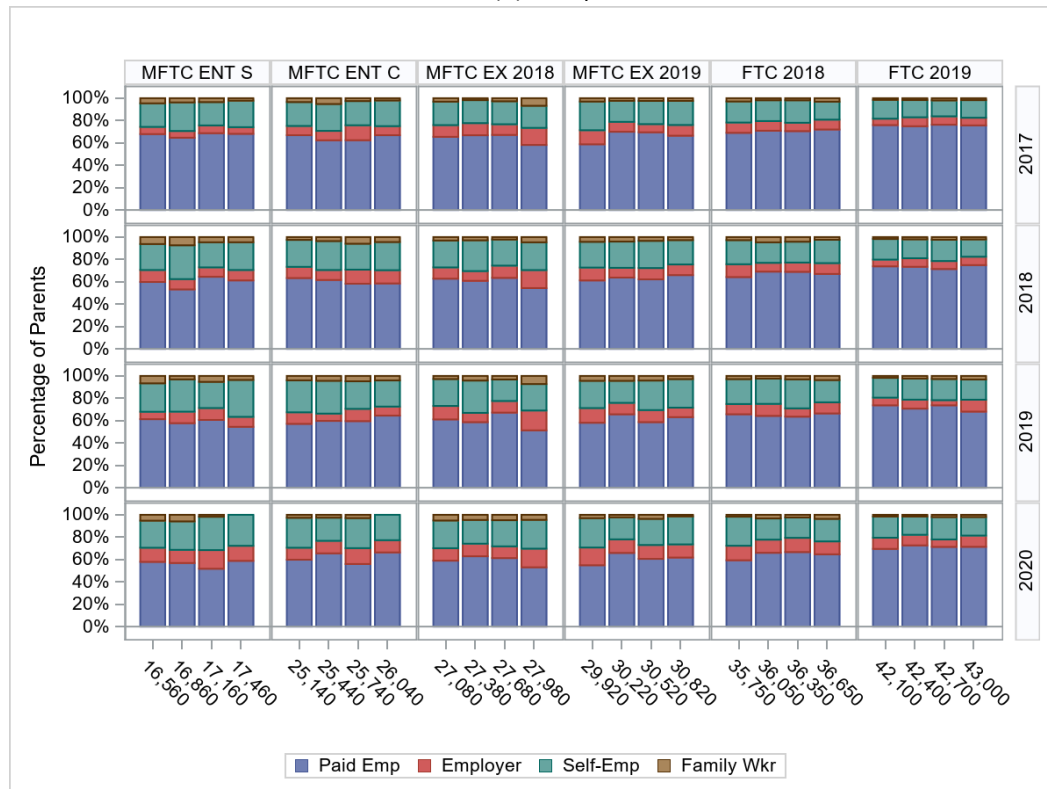
Notes: The percentage of parents in each \$300 household-earnings bin around select thresholds: MFTC minimum entry thresholds for single (MFTC ENT S) and coupled (MFTC ENT C), MFTC exit threshold in TY2018 (MFTC EX 2018) and in TY2019 (MFTC EX 2019), and the FTC abatement threshold in TY2018 (FTC 2018) and in TY2019 (FTC 2019). Ethnicity is based on the 2018 Census data. The earnings data are based on the tax year.

Figure 15: Percentage of parents by employment status and partnered status

(a) Single



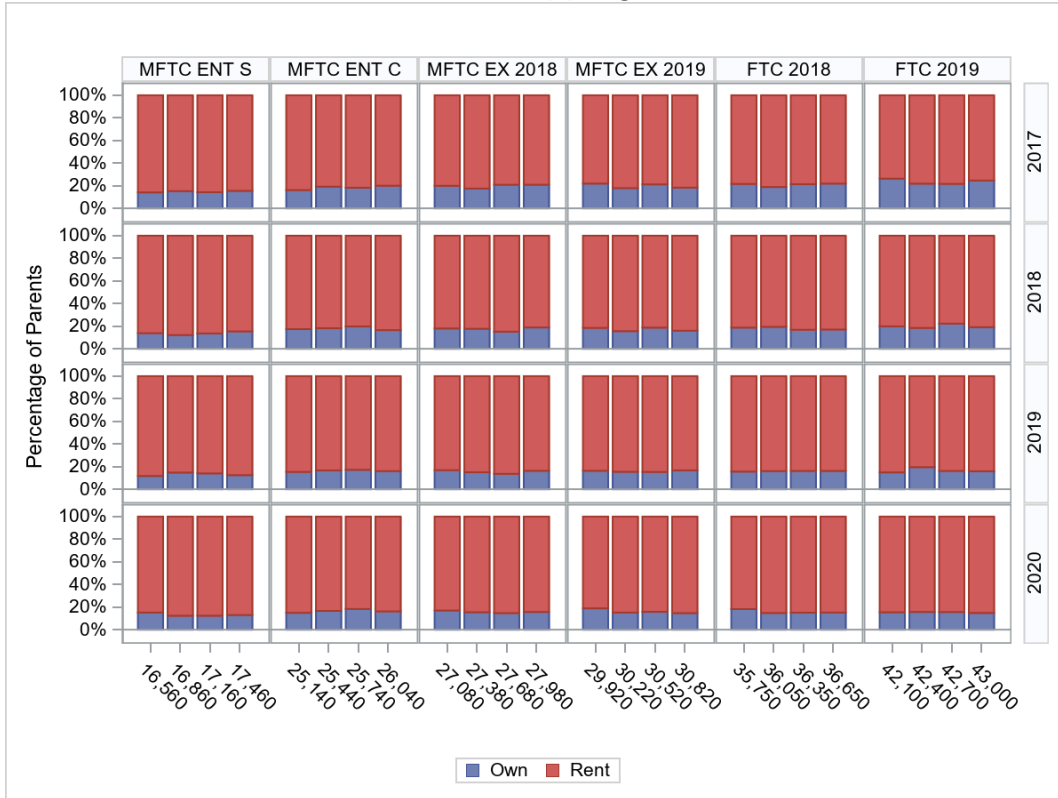
(b) Coupled



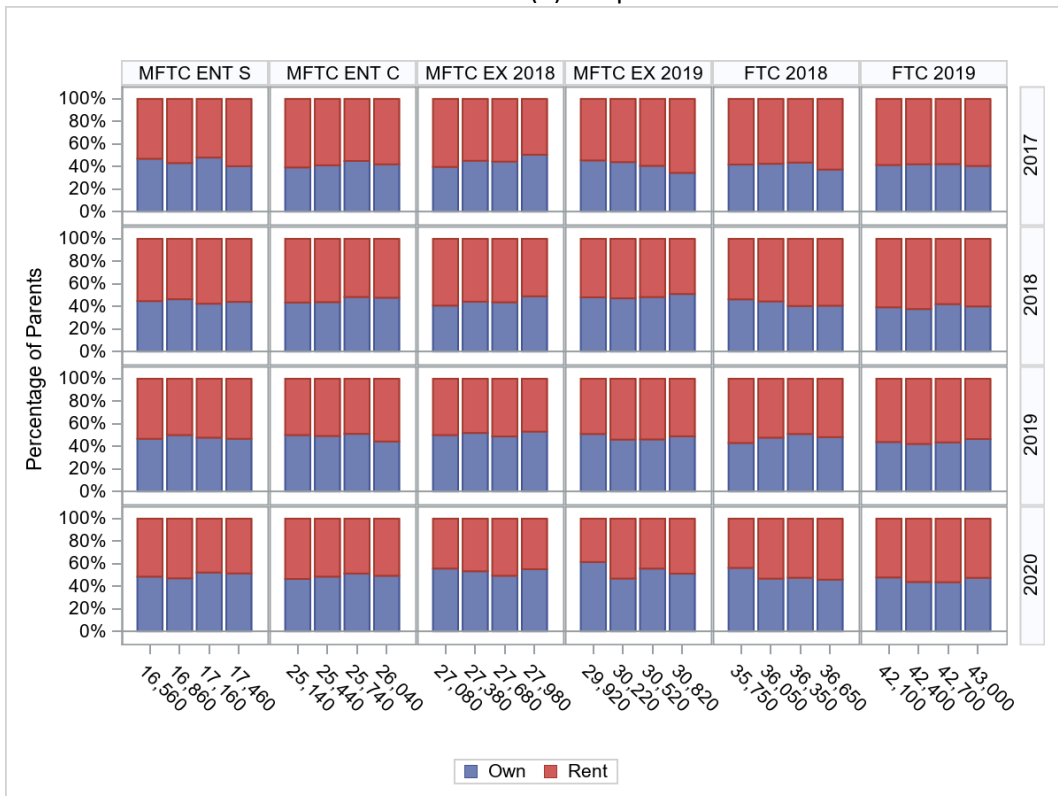
Notes: The percentage of parents in each \$300 household-earnings bin around select thresholds: MFTC minimum entry thresholds for single (MFTC ENT S) and coupled (MFTC ENT C), MFTC exit threshold in TY2018 (MFTC EX 2018) and in TY2019 (MFTC EX 2019), and the FTC abatement threshold in TY2018 (FTC 2018) and in TY2019 (FTC 2019). Employment status is based on the 2018 Census data. The earnings data are based on the tax year.

Figure 16: Percentage of parents by housing tenure and partnered status

(a) Single



(b) Coupled



Notes: The figure shows the percentage of parents in each \$300 household-earnings bin around select thresholds: MFTC minimum entry thresholds for single (MFTC ENT S) and coupled (MFTC ENT C), MFTC exit threshold in TY2018 (MFTC EX 2018) and in TY2019 (MFTC EX 2019), and the FTC abatement threshold in TY2018 (FTC 2018) and in TY2019 (FTC 2019). Housing tenure is based on the 2018 Census data. The earnings data are based on the tax year.

Table 1: Summary of Families Package policy changes

Policy	Entitlements	Abatement
<b>Changes effective 1 April 2018:</b>		
Minimum Family Tax Credit (MFTC) <sup>(1)</sup>	\$45/week increase to \$503/week for families (w/ dependent children) in FT work	100% abatement
Accommodation Supplement (AS) <sup>(2)</sup>	Reallocated AS-areas, and increased AS-max in areas. (Also up to \$20 increase in SA AB max)	25% abatement above benefit cut-out or other points for non-beneficiaries. Also abated \$1/\$100 for cash-assets above \$2,700 (\$5,400 couples)
<b>Changes effective 1 July 2018:</b>		
Family Tax Credit (FTC) increases <sup>(3)</sup>	First child \$113.04/week (up \$11-\$20); second child \$91.25/week (up \$0-\$27)	Abatement 25% above \$42,700 (from 22.5% above \$36,350)
Best Start (BS) (replaced Parental Tax Credit) <sup>(4)</sup>	First year: \$60/week per child (due/born after 1 July 2018); second/third years: means tested	Universal entitlement in first year; 21% abatement above \$79,000 in 2nd & 3rd years (expires @ \$93,900 1 child; \$108,800 2 children)
Winter Energy Payment (WEP) <sup>(5)</sup>	\$20.46/week singles (\$31.82 others); NZS/VP & working age Main benefit recipients. Rates doubled in 2020	No abatement: just benefit-tested
Paid Parental Leave (PPL) <sup>(6)</sup>	Max \$564.38/week (from \$538.55); 22 weeks (from 18 weeks); 26 weeks from 1 July 2020	

Notes: <sup>(1)</sup> MFTC provides an income top-up to guaranteed minimum level, often replacing benefit – e.g. at 20 hours work.

<sup>(2)</sup> See AS-changes table for details across areas and by family size. AS abates at 25% above some allowable level of income: for Beneficiaries AS doesn't abate until the benefit is fully abated, so their abatement begins from benefit cut-out levels; for others, income thresholds for abatement vary by family type.

<sup>(3)</sup> Pre-FP, FTC varied by age (0-15, 16-18 first; 0-12, 13-15, 16-18 subsequent) as well as number of children.

<sup>(4)</sup> For families receiving PPL, BS is paid after PPL ends; BS payments are treated as income for TAS assessment and abatement. Pre-FP, PTC paid up to \$220/week per child for first 10 weeks after birth. Benefit, Student Allowance, and PPL recipients were ineligible: typically, eligible families had 1 partner in FT-work and the other not working, or with insufficient employment to qualify for PPL.

<sup>(5)</sup> WEP monthly rates (\$450/single; \$700/couples and sole parents) applied for 13 weeks (3 months) in 2018 (from 1 July), and 22 weeks (5 months) in subsequent years (from 1 May); rates were doubled in 2020 as part of Covid-19 recovery package. Automatic entitlement with a little-used opt-out option. WEP not treated as income for TAS determination/abatement, so pure cash windfall. Incentives to enter benefit, and not-exit benefit, during WEP period.

<sup>(6)</sup> PPL minimum payments for self-employed increased to \$165/week (from \$157.50), corresponding to 10 hours @ minimum wages.

TAS entitlement is non-discretionary, determined as min (30% of main benefit rate, Income deficit), where Income deficit=Standard costs-Disposable income, Standard costs=70% of main benefit plus Fam Support, and Disposable income=Chargeable income-Allowable costs. TAS abates at 100% from first-\$ income.

Table 2: Sample descriptive statistics – 2018 Census parental units

	All parental units			Census individual form		
	All	Single	Coupled	All	Single	Coupled
No. PUs	748,662	337,479	411,183	605,694	230,232	375,459
No. Individuals	1,159,644	337,479	822,165	981,006	230,232	750,771
C. Ind. form	0.846	0.682	0.913	1	1	1
<b>Individuals:</b>						
Age	40.50 (12.4)	36.51 (16.1)	42.14 (10.2)	40.69 (12.0)	36.32 (16.1)	42.03 (10.0)
Female	0.535	0.615	0.501	0.538	0.655	0.501
European	0.643	0.557	0.678	0.676	0.603	0.698
Māori	0.156	0.246	0.119	0.144	0.242	0.114
Pacific	0.093	0.149	0.071	0.077	0.129	0.061
Asian	0.188	0.178	0.192	0.181	0.164	0.186
Other eth.	0.029	0.026	0.030	0.028	0.024	0.030
No Qual	0.125	0.158	0.111	0.127	0.187	0.108
School Quals	0.283	0.324	0.266	0.299	0.400	0.269
Post-sch. Quals	0.251	0.224	0.262	0.255	0.235	0.262
Univ. Quals	0.287	0.141	0.346	0.312	0.166	0.356
Missing Quals	0.054	0.294	0.015	0.007	0.012	0.005
No. people	4.59 (1.7)	4.81 (2.1)	4.51 (1.5)	4.43 (1.5)	4.47 (1.9)	4.41 (1.4)
No. children	1.88 (1.0)	1.81 (1.1)	1.93 (1.0)	1.86 (1.0)	1.75 (1.0)	1.92 (1.0)
<b>Parental units:</b>						
Has income	0.889	0.787	0.974	0.943	0.891	0.974
Total income	\$73,832 (82,416)	\$27,040 (35,482)	\$112,236 (88,609)	\$82,048 (83,717)	\$30,216 (33,309)	\$113,832 (88,575)
Has work hours	0.767	0.570	0.929	0.810	0.606	0.935
Total hours	42.4 (25.4)	19.6 (14.5)	61.2 (23.0)	46.1 (25.3)	20.6 (14.5)	61.8 (22.7)
Has earnings	0.799	0.622	0.944	0.854	0.702	0.947
Total earnings	\$70,254 (84,666)	\$22,410 (38,069)	\$109,522 (90,261)	\$78,389 (85,951)	\$24,820 (36,062)	\$111,239 (90,131)
Has self-empl.	0.265	0.121	0.344	0.275	0.118	0.346

Notes: All characteristics are from the 2018 Census, except income and earnings which are derived from IRD Incomes tables in the IDI; standard deviations are in parentheses. The samples in the final three columns are restricted to those individuals and PUs that had both dwelling and individual 2018 Census responses. The number of Coupled PUs is slightly more than half the number of individuals in those units because a small number of individuals are in more than one PU. Ethnicity is based on any ethnicity (i.e., individuals reported as European and Māori will be counted as both European and Māori); hence, ethnicities do not sum to 1. Total income, total hours, and total earnings are conditional on having income, hours, or earnings respectively. Also, the proportion of parental units with self-employment earnings is conditional on having earnings.



Table 3: Maximum tax credit and gross benefit amounts by parent type and number of children

Parent type	Number of children	Policy date	MFTC (Net)	IWTC	FTC	Main benefit (Gross)
Sole	1	1-Apr-16	9,699	3,770	4,822	19,359
		1-Apr-17	9,322	3,770	4,822	19,585
		1-Jul-18	11,019	3,770	5,878	19,868
		1-Apr-19	10,405	3,770	5,878	20,223
	4	1-Apr-16	9,699	4,550	14,875	19,868
		1-Apr-17	9,322	4,550	14,875	20,223
		1-Jul-18	11,019	4,550	20,113	19,359
		1-Apr-19	10,405	4,550	20,113	19,585
Coupled	1	1-Apr-16	3,157	3,770	4,822	22,461
		1-Apr-17	2,566	3,770	4,822	22,040
		1-Jul-18	3,941	3,770	5,878	22,339
		1-Apr-19	2,812	3,770	5,878	23,457
	4	1-Apr-16	3,157	4,550	14,875	22,461
		1-Apr-17	2,566	4,550	14,875	22,040
		1-Jul-18	3,941	4,550	20,113	22,339
		1-Apr-19	2,812	4,550	20,113	23,457

Notes: The maximum MFTC amounts are based on the difference between the net MFTC minimum entry threshold (calculated using the minimum wage on the policy date and the in-work hours requirement for MFTC and IWTC eligibility for 52 weeks) and the net MFTC exit threshold for the corresponding tax year. Children are assumed to be aged 0-12yo for the purpose of calculating the FTC prior to the FP.

Table 4: Gross annual income and abatement thresholds, 2016-2019

Parent type	Number of children	Policy date	MFTC minimum entry threshold	MFTC exit threshold	FTC abatement threshold	IWTC abatement threshold
Sole	1	1-Apr-16	15,860	27,617	36,350	57,315
		1-Apr-17	16,380	27,680	36,350	57,781
		1-Jul-18	17,160	30,516	42,700	66,212
		1-Apr-19	18,408	31,020	42,700	66,212
	4	1-Apr-16	15,860	27,617	36,350	101,022
		1-Apr-17	16,380	27,680	36,350	102,459
		1-Jul-18	17,160	30,516	42,700	123,152
		1-Apr-19	18,408	31,020	42,700	123,152
Coupled	1	1-Apr-16	23,790	27,617	36,350	57,315
		1-Apr-17	24,570	27,680	36,350	57,781
		1-Jul-18	25,740	30,516	42,700	66,212
		1-Apr-19	27,612	31,020	42,700	66,212
	4	1-Apr-16	23,790	27,617	36,350	101,022
		1-Apr-17	24,570	27,680	36,350	102,459
		1-Jul-18	25,740	30,516	42,700	123,152
		1-Apr-19	27,612	31,020	42,700	123,152

Notes: The MFTC minimum entry threshold is calculated using the minimum wage on the policy date and the in-work hours requirement for MFTC eligibility for 52 weeks.

Table 5: Change in annual income, before and after implementation of Families Package

Wage	Parent type	Number of children	1-Apr-17				1-Jul-18			
			Gross change (WEP)	Net change (WEP)	Gross change	Net change	Gross change (WEP)	Net change (WEP)	Gross change	Net change
Min. wage	Sole	1	2,447	2,679	2,447	2,679	4,973	4,274	5,387	4,688
		4	3,227	3,459	3,227	3,459	5,753	5,054	6,167	5,468
	Coupled	1	1,065	1,538	1,065	1,538	3,452	3,020	3,865	3,433
		4	1,845	2,318	1,845	2,318	4,232	3,800	4,645	4,213
No MFTC wage	Sole	1	1,073	1,545	1,073	1,545	3,023	3,082	3,437	3,495
		4	1,853	2,325	1,853	2,325	3,803	3,862	4,217	4,275
	Coupled	1	745	1,274	745	1,274	2,512	2,660	2,926	3,073
		4	1,525	2,054	1,525	2,054	3,292	3,440	3,706	3,853

Notes: These calculations represent the gross change in annual income if a family switched from receiving a main benefit to receiving in-work tax credits as soon as they are eligible. The top set of figures provides the income changes for families earning the minimum wage, and the bottom set of figures provides the income changes for families earning a wage such that their annual income at the in-work hours requirement is just above the MFTC income level so that no MFTC is received. The results are also presented with and without WEP.

Table 6: EMTRs for different net income calculations

Parent type	Policy date	Net income calculation	EMTR			
			1 child		4 children	
			Min	Max	Min	Max
Sole	1-Apr-16	Income envelope	-2,878	1.01	-3,658	1.01
		Income envelope w/WEP	-2,878	1.01	-3,658	1.01
		Main benefit, earnings, and FTC	0.19	0.89	0.19	0.89
		Main benefit, earnings, FTC, & WEP	0.19	0.89	0.19	0.89
		Earnings and tax credits	-13,469	1.01	-14,249	1.01
	1-Apr-17	Income envelope	-2,678	1.01	-3,458	1.01
		Income envelope w/WEP	-2,678	1.01	-3,458	1.01
		Main benefit, earnings, and FTC	0.19	0.89	0.19	0.89
		Main benefit, earnings, FTC, & WEP	0.19	0.89	0.19	0.89
		Earnings and tax credits	-13,092	1.01	-13,872	1.01
	1-Jul-18	Income envelope	-4,687	1.01	-5,467	1.01
		Income envelope w/WEP	-4,273	1.01	-5,053	1.01
		Main benefit, earnings, and FTC	0.19	0.89	0.19	0.89
		Main benefit, earnings, FTC, & WEP	0.19	414	0.19	414
		Earnings and tax credits	-14,789	1.01	-15,569	1.01
	1-Apr-19	Income envelope	-4,654	1.01	-5,434	1.01
		Income envelope w/WEP	-3,954	1.01	-4,734	1.01
		Main benefit, earnings, and FTC	0.19	0.89	0.19	0.89
		Main benefit, earnings, FTC, & WEP	0.19	700	0.19	700
		Earnings and tax credits	-14,175	1.01	-14,955	1.01
Coupled	1-Apr-16	Income envelope	-1,270	1.01	-2,050	1.01
		Income envelope w/WEP	-1,270	1.01	-2,050	1.01
		Main benefit, earnings, and FTC	0.19	0.84	0.19	0.84
		Main benefit, earnings, FTC, & WEP	0.19	0.84	0.19	0.84
		Earnings and tax credits	-6,927	1.01	-7,707	1.01
	1-Apr-17	Income envelope	-1,537	1.01	-2,317	1.01
		Income envelope w/WEP	-1,537	1.01	-2,317	1.01
		Main benefit, earnings, and FTC	0.19	0.84	0.19	0.84
		Main benefit, earnings, FTC, & WEP	0.19	0.84	0.19	0.84
		Earnings and tax credits	-6,336	1.01	-7,116	1.01
	1-Jul-18	Income envelope	-3,432	1.01	-4,212	1.01
		Income envelope w/WEP	-3,019	1.01	-3,799	1.01
		Main benefit, earnings, and FTC	0.19	0.84	0.19	0.84
		Main benefit, earnings, FTC, & WEP	0.19	414	0.19	414
		Earnings and tax credits	-7,710	1.01	-8,490	1.01
	1-Apr-19	Income envelope	-2,609	1.01	-3,389	1.01
		Income envelope w/WEP	-1,909	1.01	-2,689	1.01
		Main benefit, earnings, and FTC	0.19	0.84	0.19	0.84
		Main benefit, earnings, FTC, & WEP	0.19	701	0.19	701
		Earnings and tax credits	-6,582	1.01	-7,362	1.01

Table 7: Distribution of tax credit amounts by tax credit recipient and parent type, tax years 2017-2020

Sample	Parent Type	Tax Year	MFTC						IWTC						FTC					
			N	P10	P25	P50	P75	P90	N	P10	P25	P50	P75	P90	N	P10	P25	P50	P75	P90
MFTC	Single	2017	3,087	670	1,532	3,223	5,466	7,538	3,087	653	1,595	3,045	3,770	3,770	3,087	4,670	4,822	5,028	8,173	11,524
		2018	2,889	621	1,288	2,917	5,107	7,200	2,889	580	1,450	3,045	3,770	3,770	2,889	4,604	4,822	5,102	8,173	11,524
		2019	2,811	777	1,703	3,658	6,442	8,934	2,802	580	1,668	3,263	3,770	3,770	2,811	5,615	5,615	5,735	10,012	14,410
		2020	3,450	513	1,254	2,965	5,556	8,348	3,381	508	1,404	2,900	3,843	3,843	3,450	4,992	5,894	6,170	10,857	15,706
	Coupled	2017	273	302	878	1,931	3,185	4,667	273	705	1,533	2,828	3,770	3,770	273	2,827	4,364	5,664	8,599	13,158
		2018	219	305	905	1,848	2,772	4,499	219	870	1,740	2,900	3,770	3,770	219	1,968	3,910	5,717	8,420	11,636
		2019	210	512	1,038	2,462	4,075	5,821	210	943	1,813	3,118	3,770	3,770	210	3,027	5,615	8,336	11,778	18,807
		2020	363	348	777	2,160	4,679	8,755	342	508	1,378	2,956	3,770	3,843	363	2,754	5,894	8,716	12,260	19,863
IWTC	Single	2017							84,087	653	1,813	3,408	3,770	3,770	73,941	996	2,452	4,822	7,069	9,139
		2018							85,017	653	1,783	3,408	3,770	3,770	74,106	954	2,411	4,766	7,071	9,317
		2019							76,677	870	2,248	3,706	3,770	3,770	70,644	1,337	3,180	5,615	9,195	12,201
		2020							75,672	813	2,116	3,770	3,843	3,843	68,559	1,364	3,183	5,894	9,609	12,855
	Coupled	2017							127,164	798	2,021	3,770	3,770	4,010	93,441	697	1,967	4,500	7,738	11,207
		2018							117,378	752	1,958	3,738	3,770	4,113	84,582	670	1,926	4,434	7,689	11,107
		2019							119,643	897	2,263	3,638	3,770	4,113	94,368	822	2,232	5,333	9,457	13,792
		2020							101,505	969	2,481	3,770	3,843	4,490	79,521	1,008	2,744	5,894	10,652	15,410
FTC	Single	2017							73,941	798	2,103	3,698	3,770	3,770	132,171	1,245	3,090	4,822	8,173	11,190
		2018							74,106	798	2,068	3,698	3,770	3,770	130,032	1,228	3,037	4,822	8,173	11,304
		2019							70,644	1,015	2,595	3,770	3,770	3,770	108,228	1,659	3,873	5,615	10,012	14,204
		2020							68,559	943	2,393	3,770	3,843	3,843	109,848	1,643	3,833	6,007	10,652	15,308
	Coupled	2017							93,441	1,595	3,383	3,770	3,770	4,550	109,104	746	2,126	4,822	8,134	11,524
		2018							84,582	1,640	3,400	3,770	3,770	4,550	99,321	718	2,082	4,804	8,078	11,524
		2019							94,368	2,109	3,324	3,770	3,770	4,550	110,883	831	2,335	5,538	9,746	14,193
		2020							79,521	2,069	3,770	3,770	3,843	4,550	98,070	1,018	2,866	5,894	10,652	15,410

Notes: The number of observations (N) is the number of parental units. These have been randomly rounded to base 3 to meet confidentiality requirements. Each sample represents the group of parental units which had positive tax credit amounts in the tax year. For example, the MFTC sample for each tax year includes all the parental units who had a positive tax credit in that tax year.

Table 8: Total weekly hours worked by sole parents in WFF

Tax year	Sample	N	Total weekly hours worked						
			MEAN	STD DEV	P10	P25	P50	P75	P90
2019	MFTC	1,566	23.3	7.62	18	20	21	25	30
	IWTC	49,113	35.6	11.38	20	30	40	40	45
	FTC	52,830	33.6	12.74	17	25	36	40	45

Notes: The weekly hours of work from the 2018 Census were matched to sole parents in the WFF FRD table. We then examined the distribution of total hours worked for each subsample of recipients.

## Appendix: Data description

The data used in the analysis is derived from various sources and tables in Statistics New Zealand’s Integrated Data Infrastructure (IDI). In particular, we used the 2018 Census data as the basis for our family types. To do this, we start with the adults in a household to find partnered adults (adults who live with their partner) and single adults. We then determine if there are children under 18 in the household and flag the adults in those households who are the likely parents.

The first step in this process is to merge the administrative partner information (from the `data.person_relationship` table) to the 2018 Census individual records using unique `snz_uids`. We do this as a first step because of the large number of potential partner records – this process allows us to capture the most relevant partner records for the 2018 population. This merge does produce duplicate observations for some individuals since there can be multiple partner records associated with the same individual. These duplicate observations will be dropped in later stages. We did find that one partner identifier (`snz_associated_uid`) was associated with an extraordinarily large number of administrative partner records over the same time period, so these records were not included in the matching. Moreover, we found the partners with this ID generally had their own records with other associated partner IDs.

To classify households by family types, we start with all adults, which gives us almost 3.8 million unique individuals but, in general, we drop the records that are derived from ‘administrative enumeration’ (admin cases) by Stats NZ. This is approximately 10% of all adult records; however, of records considered ‘NZ Adults’, 11% were administratively enumerated, and no overseas or ‘absentee’ adults were administratively enumerated.

Table A1: Record type by admin case (no duplicates)

Census adult type	Administratively enumerated		
	No	Yes	Total
NZ adult	3,208,443	387,072	3,595,515
Overseas adult	87,378	0	87,378
Absentee adult (elsewhere in NZ or away < 12 months)	91,989	0	91,989
Absentee away >= 12 months	3,165	0	3,165
<b>Total</b>	<b>3,390,975</b>	<b>387,072</b>	<b>3,778,047</b>

We used the dwelling ID as a proxy for the household, so we also dropped all records where the dwelling ID is missing (7% of all adult records); however, the vast majority of these were admin cases. Only 0.02% of non-admin cases were missing dwelling IDs.

Table A2: Missing dwell ID by admin case (no dupes)

Dwelling ID	Administratively enumerated	
	No (%)	Yes (%)
Missing	0.02	7.17
Not missing	89.70	3.08

There is a flag for the mode by which the information was submitted to Stats – 13.5% were submitted via paper form and 86.5% were submitted online. However, all the admin cases are flagged as ‘online’ as shown in Table A2.

Table A3: Mode by admin case

Census form type	Administratively enumerated	
	No (%)	Yes (%)
Paper	13.48	0.00
Online	76.28	10.25

Another key variable that we use to determine who is partnered and who lives with their children is ‘cen\_ind\_living\_arrangments\_code’ which lists the relationship of the other household members to the individual (e.g., parent, child, flatmate, partner). We use this variable to determine if the individual indicated that they live with their partner and if they live with a child. We also use this variable to determine to which generation in the household the person belongs (e.g., if adults indicate that they live with a parent and a child, we put them in the middle generation). Approximately 17% of cases are missing living arrangements information, 13% of these records had null values and 87% had values of ‘9999’. Of those with missing living arrangements, slightly less than half (45%) are also admin cases. However, the majority of ‘9999’ records (approximately 43%) are those enumerated from the household listing.

In the 2018 Census, a substantial number of adult records (5%) have snz\_uids that do not link to any other data (only linked ID is the Census ID)<sup>65</sup>.

After dropping all admin cases and records with no dwelling ID<sup>66</sup>, we have approximately 3.4 million unique adult records. Of these, approximately 11% are missing living arrangements.

<sup>65</sup> We discovered these when looking at households with three adults recorded as living with a partner. In many of these cases, records with these IDs often appeared to be a potential duplicate for one of the other adults in the household.

<sup>66</sup> Each individual Census record has two dwelling IDs – a dwelling ID for the individuals’ usual residence and a dwelling ID for the census night residence. For an individual’s dwelling ID, we first use the usual residence, and if that is missing, we use the census night dwelling ID.



## FINDING PARTNERS

After merging the administrative partner records with the Census data, we had 1.9 million unique adult records which matched to an administrative partner record.<sup>67</sup> Merging Census information for the partners in these matches allowed us to compare the dwelling IDs (census night, usual residence, and derived dwelling<sup>68</sup>) for individuals and their associated partners. We retained only those records where at least two dwelling IDs<sup>69</sup> matched between the individual and the partner; however, almost all of the records matched on all 3 dwelling IDs. After dropping duplicate records, records with no matching dwelling IDs for the individual and the associated partner, and records where the individual and the associated partner had the same ID, we were left with 1.03 million adult records which were matched to a couple using the administrative partner data. For approximately 850,000 of adult census records which matched to the administrative partner data, we did not find a corresponding partner using our matching criteria. However, the administrative partner data included all historical records and was not limited by time period.

Of the census records which were coupled using the administrative partner data ('admin couples'), 95% were identified as living with a partner<sup>70</sup>, 4.9% were identified as not living with a partner, and 0.1% were missing living arrangements.

In the second stage of the partner matching process, we excluded all individuals who were already matched to a partner using the administrative partner records and selected only those remaining individuals who were identified as living with a partner. In this set of individuals living with partners, we excluded admin cases and those with no dwelling ID (approximately 500,000 individuals). From this group of unmatched partners, we determined the remaining number of individuals in the household who identified as living with a partner to help with matching. As shown in Table A4, the vast majority of these unmatched individuals were in households with two unmatched individuals (84%). These individuals were matched to each other as a couple. There were also a fair number of unmatched partners in households with four unmatched

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<sup>67</sup> As mentioned previously, some individuals had multiple partner records, which created multiple records for these individuals – some of which may be for different partners (e.g., if someone was married twice to different partners, that individual would have two records, each with a different partner) and some of which may be for the same partners (e.g., the WFF and MSD partner records appear to be based on spells which means multiple records for multiple spells). We also had some records where the individual's ID matched the partner's ID, and these records were dropped.

<sup>68</sup> For each individual in the census data, the derived dwelling ID was initially assigned as the usual residence unless the usual residence was missing. Then it was assigned as the census night dwelling.

<sup>69</sup> We originally included records where at least one dwelling ID matched; however, that led to a number of individuals being matched to different partners in different dwellings. Increasing the requirement to two matching dwelling IDs eliminated this problem and also dropped a relatively small number of partner matches. In addition, any unmatched partners at this stage will go back into the pool of individuals to be matched in the second stage.

<sup>70</sup> On the 2018 Census Individual Form, question 17 asks respondents about their relationship to the others living at their usual address, and one category is 'my wife or husband, partner or de facto'. We use this indicator to determine if respondents are living with a partner.

potential partners, so we matched these individuals based on age (i.e., the two oldest individuals were matched and the two youngest individuals were matched) and gender<sup>71</sup> (i.e., the oldest male was matched to the oldest female). Given the uncertainty involved with matching couples who were close in age, we then only selected couples where the age difference between the second and third oldest person in the household was at least 18 years (216 months).

Table A4: Uncoupled adults in dwelling living with partner

Number of adults in dwelling	Percentage of uncoupled adults
1	13.8%
2	83.6%
3	1.0%
4	1.4%
5+	0.1%

**FINDING SINGLES**

We next turned our attention to singles. We defined singles as all adults who were not identified as living with a partner. Using all adults in the census, approximately 1.7 million did not identify as living with a partner. After dropping those adults whose records were administratively enumerated or missing a dwelling ID, we had approximately 1.4 million who were identified as not living with a partner.

**IDENTIFYING HOUSEHOLDS WITH CHILDREN UNDER 18 YEARS**

For children, we started with all records in the census with the individual’s age reported as under 18 years and grouped them into three age categories based on the Working for Families age categories used prior to the 2018 Families Package implementation: ages 0-12, 13-15, and 16-17.<sup>72</sup> We then dropped records that were administratively enumerated or missing a dwelling ID. Counting all children in the 2018 Census, we had approximately 1.1 million records, but after dropping admin cases and records with no dwelling ID, we had approximately one million records. We then summed up the number of children in each age group in the household and determined the ages of the oldest and youngest child living in the household (child summary record).

<sup>71</sup> We originally only matched on age; however, this gave a much higher percentage of same-sex couples than we found for households with two unmatched potential partners. Including gender in the matching algorithm resulted in more similar percentage of same-sex couples compared to the households with two unmatched potential partners.

<sup>72</sup> Prior to the July 1, 2018 implementation of changes to the Family Tax Credit (FTC), the credit was based on the ages of the children in the household. For example, the FTC in 2017 started at \$5,303 if the eldest child was 16-18 years old but was \$4,822 if the child was aged between 0 and 15 years old. Credits for subsequent children were also based on children’s ages, starting at \$4,745 for children aged 16-18, \$3,822 for children aged 13-15, and \$3,351 for children aged up to 12. The Families Package eliminated these differences for the FTC, making it dependent only on the number of children.

Table A5: Number of children under 18 years old in the 2018 Census

Age (years)	All records	No admin cases or missing dwelling ID
0-12	827,703	722,745
13-15	185,646	167,112
16-17	129,510	115,128
<b>Total</b>	<b>1,142,859</b>	<b>1,004,985</b>

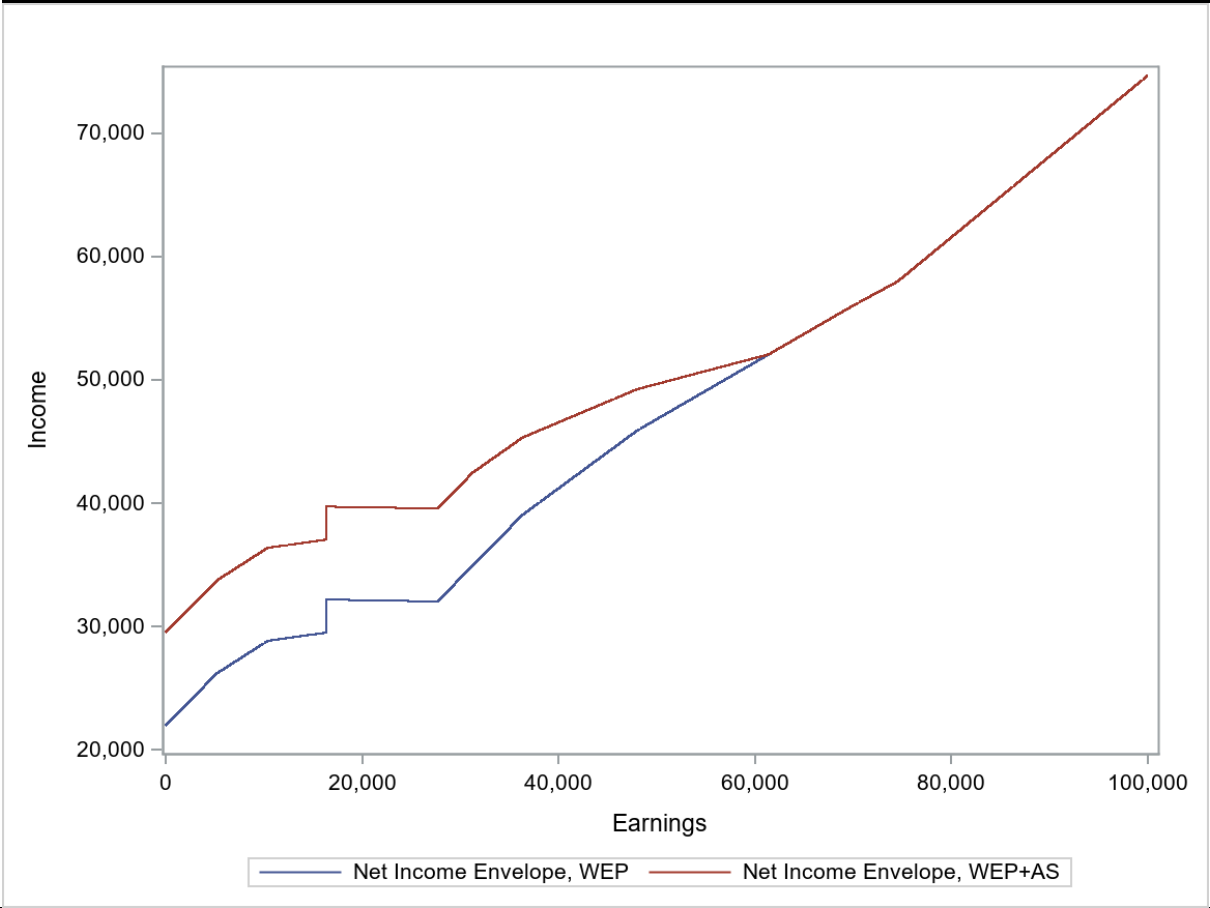
### POTENTIAL PARENTAL UNITS AND PARENTAL UNITS

We next combined our single adults with our coupled adults to determine all potential parental units in a household and merged these potential parental units with the household summaries of the children under 18 living in each household.<sup>73</sup> First, our potential parental units were separated into two categories: households which did not have a child summary record (i.e., children under 18) and households which did. For households which had children under 18 and only one potential parental unit, the parental unit was flagged as having children under 18 if there was an indicator that the parental unit lived with their child.

For households which had children under 18 and more than one potential parental unit, we sorted the potential parental units in the household by age and determined the difference in the age of the oldest person in each couple to determine if they were in the same generation (less than 18 years difference). Parental units in these households who were reported as not living with their children (i.e., neither individual in a couple reported as living with their children) were flagged as not having children under 18. If there were multiple parental units who were reported as living with their children and were in the same generation, we checked that there were more children than parental units, and if so, flagged all the parental units as having children under 18. If there were multiple parental units who were reported as living with their children and were not in the same generation, we checked if the difference in age between the next youngest parental unit and the oldest child under 18 was less than 18 (e.g., parents who live with their adult children but who also have other children under 18 in the household). In this scenario, we also flagged the older parental unit as also having children under 18.

<sup>73</sup> This was done after admin cases for those under 18 were dropped.

Figure A1: Net income envelope for sole parent with 1 child



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