Do Couples Bunch More? Evidence from Partnered and Single Taxpayers*

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Abstract

Recent papers hypothesise that estimates of the elasticity of taxable income (ETI) for individuals may be underestimated where those individuals are taxed separately but are part of a couple. This paper investigates that issue by applying the 'bunching at tax kinks' approach to estimate separate ETIs for partnered and single individuals. It shows that there are opportunities for, and constraints on, bunching specific to partnered individuals. Using administrative taxable income data for the New Zealand taxpayer population over the period, 2000 to 2017, taxpayers are matched to their partners using population census data. Results strongly support the hypotheses that ETIs are larger for partnered, than for single, individuals, and where both partners are located in the same income tax bracket. Couples where one (and especially where two) partners are self-employed reveal particularly large elasticities.

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Keywords: Elasticity of taxable income; bunching estimates; couples

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Disclaimer

The results presented in this study are the work of the authors, not Statistics NZ. They are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI), managed by Statistics New Zealand. The opinions, findings, recommendations, and conclusions expressed in this paper are those of the authors, not Statistics NZ, or Inland Revenue. Access to the anonymous data used in this study was provided by Statistics NZ under the security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation, and the results in this paper have been confidentialised to protect these groups from identification and to keep their data safe. Careful consideration has been given to the privacy, security, and confidentiality issues associated with using administrative and survey data in the IDI. Further details can be found in the Privacy impact assessment for the Integrated Data Infrastructure available from www.stats.govt.nz. The matching of different data sources on the IDI spine is done by Statistics NZ. These datasets are anonymised thereafter and made available to researchers. The results are based in part on tax data supplied by Inland Revenue to Statistics NZ under the Tax Administration Act 1994. The tax data must be used only for statistical purposes, and no individual information may be published or disclosed in any other form, or provided to Inland Revenue for administrative or regulatory purposes.

1 Introduction

The elasticity of taxable income, ETI, measures the responsiveness of taxable income to changes in the marginal net-of-tax rate. It is widely used in assessing behavioural responses to taxation because it summarises a range of different types of response in one measure. These include labour supply, various forms of income shifting, and evasion.[1] In defining the elasticity, a prerequisite is the choice of income unit and population group. In some countries, such as the US, Germany, and Denmark, married couples are taxed jointly, which means that 'income splitting' occurs and both partners face a common marginal tax rate. Empirical ETI studies of those countries therefore treat the family as a single taxpaying unit. In countries, such as Australia, Canada, the UK, and New Zealand, which tax on an individual basis, the individual is the natural income unit to use in ETI estimation.[2]

In cases where married or partnered individuals are taxed separately, the possibility that a joint decision process may be involved is generally ignored.[3] This is partly explained by the absence of taxable income data on partners within a family when tax is based on individual incomes. This can occur even where administrative data are available, since partner information is not normally required to calculate the tax liability of each individual.

Some ETI studies have distinguished between single individuals and members of a couple. Bastini and Selin (2014), using data for Sweden (where individual filing applies), found differences between single and married individuals. However, their sample decomposition cannot explore how a change in the tax rate facing one partner may affect the taxable income of both partners. Indeed, an increase in the tax rate facing a high-income partner may induce an increase in the taxable income of the lower-income partner who faces an unchanged lower marginal rate.[4]

A rare empirical study which does examine within-couple responses is Gelber (2014). He adds terms involving changes in a married partner's income and tax rate to the standard ETI regression specification, using Swedish data. However, this analysis excludes non-married and

[1] Saez *et al.* (2012) survey earlier empirical ETI literature; Kleven (2016) reviews the bunching approach.

[2] Seventeen OECD countries use pure individual taxation. Four (France, Luxembourg, Portugal and Switzerland) use pure joint earnings taxation. In the Czech Republic, Iceland, the Netherlands, Norway, Poland and Spain, the individual is the tax unit but joint taxation is possible for certain types of income: see OECD (2006) for details.

[3] Microsimulation models of labour supply invariably assume joint decision-making, but comparisons of different tax regimes are rare. Bach *et al.* (2013) compare effective tax rates in the UK and Germany, showing how incentives are affected by income splitting. Bick and Fuchs-Schündeln (2017) use behavioural microsimulation to compare 17 European Countries and the US, finding that tax treatment of couples plays an important role in explaining differences. Kleven *et al.* (2009) examine optimal income taxation of couples making joint labour supply decisions, which they test empirically via a microsimulation for the UK.

[4] Chetty *et al.* (2011) examine the effect of earned-income tax credits on taxable incomes of sole parents and married couples but do not investigate the types of intra-couple response discussed here.

single-person households. The possibility of different responses by individuals and couples is examined theoretically by Creedy and Gemmell (2020) who show that, where couples maximise a joint utility function, ETIs for individuals within couples can be expected to be underestimated if intra-couple relationships are ignored.

The present paper uses a unique dataset for the population of New Zealand taxpayers, and reports ETI estimates obtained by matching individuals' tax return data within families over three periods around New Zealand census years when family-related information is available. Following an extensive matching exercise, Inland Revenue data were combined with census data, using the Integrated Data Infrastructure (IDI) maintained by Statistics New Zealand.[5] This allows testing of the hypothesis that ETIs for individuals in couples are larger than those for single individuals, and provides estimates for different family types, depending on each partner's income source. In addition, the question is examined of whether incentives for income sharing can be expected to differ between members of couples where each partner is observed to earn income in a different tax bracket, compared with the case where partners are observed in the same bracket.

Estimation of the ETI gives rise to substantial challenges, because most estimation methods rely on longitudinal information on income changes of individuals over time. They need to separate 'treated' from 'non-treated' groups, and must find suitable 'instruments' to deal with endogeneity, arising because the marginal tax rate and taxable income are jointly determined. The estimation method adopted here is the 'bunching estimator' proposed by Saez (2010) and Chetty *et al.* (2011). This circumvents some of the estimation challenges facing regression methods applied to longitudinal data, by exploiting the fact that taxpayers are often observed to bunch at income thresholds, or 'tax kinks', above which the marginal tax rate increases.[6] An advantage of this approach is that there is a direct proportional relationship between the elasticity and the extent of observed bunching; see Kleven (2016). In addition, the bunching-based estimates can be obtained using cross-sectional data and for a variety of income thresholds and years, rather than relying on periods when tax reforms took place. Applications of bunching methods to ETI estimation include le Maire and Schjerning (2013), Bastani and Selin (2014), Paetzold (2019), Bertanha *et al.* (2019), Bosch *et al.* (2019), Gelber *et al.* (2020), and Alinaghi *et al.* (2021).

The results presented here provide strong support for the various couple-related hypotheses put forward. First, there is clear evidence that partnered individuals have markedly higher elasticities than equivalent single individuals. Second, this is especially pronounced

[5] Appendix B provides details.

[6] However, bunching need not necessarily be observed; for example due to optimising frictions; see Chetty *et al.* (2011). Further, Blomquist and Newey (2017) and Bertanha *et al.* (2019) discuss ETI identification issues using bunching methods.

where both partners earn income in the same tax bracket, and where at least one partner is self-employed. Third, for self-employed taxpayers who are part of a couple where both are self-employed, the ETI is significantly larger than when taxpayers are partnered with a wage-earner. Fourth, among wage-earners who are part of a couple, if the taxpayer is partnered with a self-employed individual, the estimated ETI for such wage-earners is larger. It is suggested that this may arise from a tendency for many self-employed taxpayers in couple families to employ their partner as a wage-earner, giving them considerable discretion over wage levels and tax responsiveness.

Section 2 begins by considering the special characteristics of bunching in the context of couples, paying attention to whether individuals in couples are in the same or different tax brackets. The New Zealand income tax structure and the matched dataset are described in Section 3. The empirical method and results are presented in Section 4. Robustness checks are reported in Section 5, and brief conclusions are in Section 6. Three appendices provide further details of the analysis and results.

2 Bunching by Couples

For partnered individuals, there are opportunities for, and constraints on, bunching that are not available to single individuals. In addition to the opportunities for labour supply and income shifting (across time and tax codes) available to all taxpayers, partners can often benefit from a lower joint tax liability via intra-couple income sharing where they would otherwise be in different tax brackets. This may represent additional tax evasion opportunities or simply increased legal tax planning options by ensuring that family income that can be allocated at the discretion of the taxpayer is earned by the lower-taxed partner. In addition, couples can make coordinated adjustments in their individual labour supplies in response to a higher tax rate for one of them, to compensate for any loss of earnings by the partner responding directly to the tax rate increase.

For couples, adjustment costs of responding to a kink are effectively lower than for equivalent individuals not in a partnership. As Gelber *et al.* (2020) demonstrate, lower adjustment costs generate greater bunching by taxpayers above, but close to, the kink compared to the case of higher adjustment costs. In the case considered here, if couples can more easily shift income due to lower adjustment costs, it implies greater bunching for partnered individuals close to the kink compared to equivalent singles.

The ETI and tax compliance literatures have recognised the ease with which self-employed, compared to wage earners, can respond to marginal tax rate changes, due to more limited third-party reporting for the self-employed.[7] Self-employment also provides low-cost bunching opportunities for couples, via joint ownership of family businesses, or the employment of family members within the business either as wage-earners or as business partners.

Joint labour supply decisions and income reallocation options provide enhanced opportunities to share income within couples that are not available to single wage-earning or self-employed taxpayers. It suggests that partnered individuals where at least one partner is self-employed might be expected to display higher ETIs. Further, where a self-employed individual employs a wage-earning partner, there are greater opportunities to share income between the two (since there is a high degree of discretion in wage-setting) and hence for larger bunching by those wage-earning partners compared with single wage-earners or those in a couple where both are employees of unrelated employers.

Furthermore, as Creedy and Gemmell (2020) show, if partnered individuals maximise a joint utility function and earn income in different tax brackets, when the higher tax rate changes, a higher ETI is expected for the more highly-taxed individual (than an equivalent single taxpayer), with a negative ETI for the lower-taxed partner.[8] The implications of joint utility maximisation for bunching behaviour are considered in the following subsection.

2.1 Joint Utility Maximisation and Bunching

With joint utility maximisation, greater bunching from above the kink by the higher-income taxpayer is expected, together with the possibility of bunching from below by the lower-income partner. These responses may be labour supply related with couples coordinating their joint earnings decisions, or may involve pure income shifting designed to reduce joint tax liabilities, or some combination. Based on the well-known diagram illustrating bunching by individual taxpayers at tax kinks used by, for example, Saez (2010), Chetty et al. (2011) and Kleven (2016), Figures 1 and 2 shows the case for two partnered individuals' choices over taxable income, z, and consumption (after-tax income), c.[9] The standard individual case is captured in Figure 1, which shows how a single 'marginal buncher', B, faced with an increased tax rate from t_1 to t_2 above the tax threshold z_T, would shift from an initial position at K with $z = z_{B_0} > z_T$, to the kink at M where $z_B = z_T$.

Suppose taxpayer B is partnered with taxpayer A, such that the couple maximise total utility associated with a joint utility function. Given differences in the partners' abilities and

[7] See Slemrod (2007), Kleven *et al.* (2011), Slemrod and Weber (2012), Pomeranz (2015), Gillitzer and Skov (2018).

[8] Creedy and Gemmell (2020) show that this joint effect for couples is greater, the larger are the couple's individual elasticities via a term involving $(\eta_1\eta_2)^2$ for individuals 1 and 2.

[9] This diagram is variously presented in consumption/hours-worked space (e.g. Chetty *et al.*, 2011) or, as here, in consumption/income space (Saez, 2010; Kleven, 2016).

consumption/work preferences, they can be expected to locate at different points in (c, z) space, thus yielding different individual contributions to the household's total consumption and work hours/taxable income.[10] Each partner's indifference curves in Figures 1 and 2 can therefore be thought of as being associated with joint optimisation, and thus a level of total utility of the couple. (The figures illustrate an outcome where $z_A < z_T < z_B$). As a result any change in the location by one partner in (c, z) space potentially affects the position and slope of the other partner's indifference curves.[11] If individual A were partnered with a different individual than B, their respective indifference maps would potentially be positioned differently, generating different optimal outcomes.

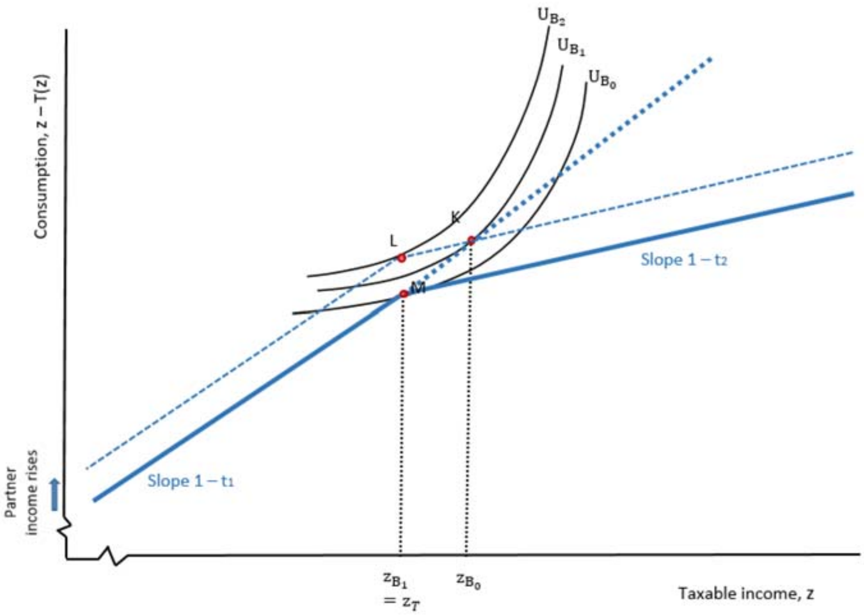

Figure 1: Income-Consumption Choices: Partner B

Creedy and Gemmell (2020) demonstrate that, for the case where the joint optimisation process involves two partners initially locating either side of the new tax threshold, an increase in the tax rate facing the higher earner can be expected to lead to a reduction in taxable income of this partner in standard fashion (that is, a positive elasticity of taxable income, ETI). However, there is an associated increase in taxable income of the lower earning

[10] Unlike the case of a single taxpayer maximising utility from c and z, those individual partner (c, z) contributions to total c and z do not necessarily imply either equal consumption sharing or that each partner consumes their respective contributions (c_A, c_B) to the household's total consumption possibilities. For example, partner A, who works h_A hours and earn c_A after-tax income need not be assumed to consume c_A of the household's total consumption, depending on sharing arrangements.

[11] If consumption enters a couple's utility function as total consumption, $c = c_A + c_B$, these two sets of indifference curves can be thought of as being the two-dimensional representations of (c, z) choices by each partner associated with a three-dimensional indifference map depicting (c, z_A, z_B).

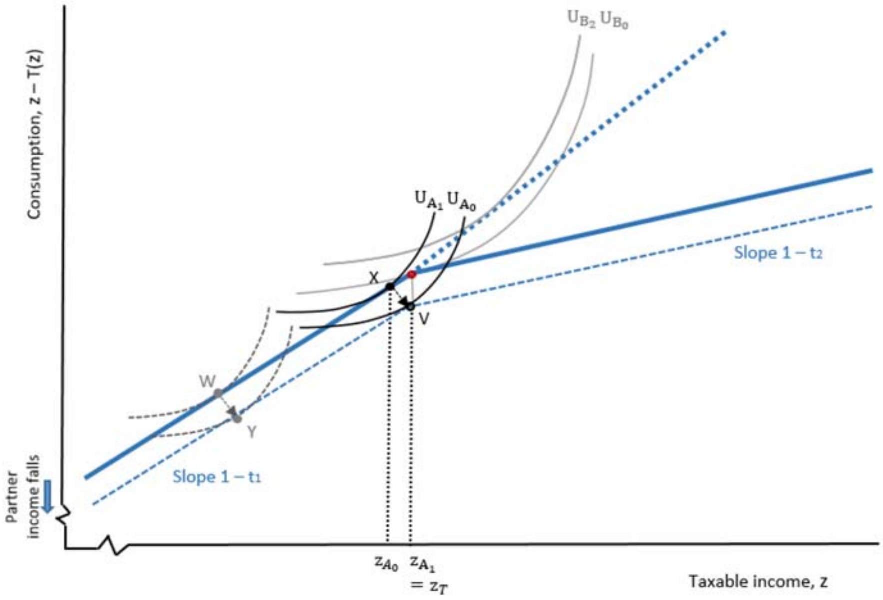

Figure 2: Income-Consumption Choices: Partner A

partner – a negative ETI – via a cross-price (income) effect from the partner's tax rate change. Of course, this need not necessarily imply bunching at the tax kink, z_T, by the lower earner. Whether this leads to bunching from below at z_T depends on the initial location of each partner, the position and slope of the respective indifference curves, and whether resulting income changes represent 'real' behavioural (such as labour supply) changes or simply income shifting between partners.

The relevant analysis of responses to a new higher tax rate when taxpayer B is partnered with A depends on whether those responses represent real income changes or pure income shifting between partners. Figures 1 and 2 illustrate the former and Figure 3 illustrates the latter. Two possible partnerships are depicted in Figures 1 and 2. This shows, in the absence of the higher tax rate, t_2, the joint optimisation process leads to partner A earning taxable income below z_T, either at position W or X, with partner B again assumed to locate at K. That is, prior to any tax change each partner is assumed, based on their ability levels and earning/consumption preferences, to locate above and below the new tax threshold. When t_2 is introduced on B's income, the usual budget constraint pivot takes place such that B, as the marginal buncher, moves down to the kink at M with $z_B = z_T$ (B's 'final' position is discussed below).

The income effect on partner A of a real reduction in B's taxable income implies a fall in A's unearned income and thus a downward shift in his or her budget constraint. Figure 2 depicts this case. There is thus a negative unearned income effect on A causing the budget constraint to shift downwards. If partner A were previously located at W, B's tax change induces a move by A to Y: A's income rises but not enough to move to the kink. But if A were previously at X, there is a new equilibrium at V, and income rises sufficiently for A to move to the kink, thus 'bunching from below'. This, of course, also has an impact on B via an analogous positive income effect, so B's budget constrain shifts upwards as shown, with a final position at L, not M.[12]

Consider an analogous case where B's reduction in taxable income, from K to M, is instead due to pure income shifting to partner A as an accounting devise to avoid the new higher tax rate. This case is illustrated in Figure 3. Taxable income in this case represents income declared to the tax authority; similarly 'consumption' is after-tax income for each partner net of their respective tax declarations. Since the shifted income is taxable in the hands of the recipient, but there are no real income changes for the couple, there is no unearned-income shift in either A's or B's budget constraints in this case.

As Figure 3 shows, with an unchanged budget constraint, partner B's optimum involves moving to position M and shifting taxable income of Δz_B to A. How this affects bunching by A again depends on A's initial position. Figure 3 illustrates a marginal bunching case where A is initially located at position X' with taxable income of z_{A_0} equal to $z_T + \Delta z_B$ (recall $\Delta z_B < 0$). Hence if B partners with A and shifts income of $|\Delta z_B|$, A also moves to position M, 'mimicking' a taxpayer with indifference curves given by U'_A , rather than U_A. In this case both A and B bunch at M, respectively from below and above.

If joint optimisation before the tax change were to lead B to partner with A at a position to the left of X', such as W, shifting taxable income of $|\Delta z_B|$ to A would increase A's taxable income by $\Delta z_A = -\Delta z_B$, but insufficiently for A to bunch at z_T. Alternatively, if B partners with A at a position between X' and M, shifting $|\Delta z_B|$ to A would increase A's taxable income above z_T, such that some of this income becomes taxable at rate t_2. Equivalently B may shift only Δz_A ($< |\Delta z_B|$) to A such that the higher tax rate on the retained portion is instead paid by B. In such a case, either A or B, but not both, would be observed to bunch at M.

Finally, if B partners with an individual initially located in the vicinity (left or right) of X', income shifting from B to A is expected to lead to either or both partners imprecisely bunching in the vicinity of M. In all those cases, the income shifts result in A and/or B mimicking the behaviour of a taxpayer with different preferences (and hence different contributions to total household c and z) such as those shown by U'_A. Although individual

[12]These two income effects shown in Figures 1 and 2 can be thought of, at least conceptually, as the outcome of convergence to two new equilibria at L and V as each location shift by A and B generates a succession of income responses by, and hence budget constraint movements for, the other partner.

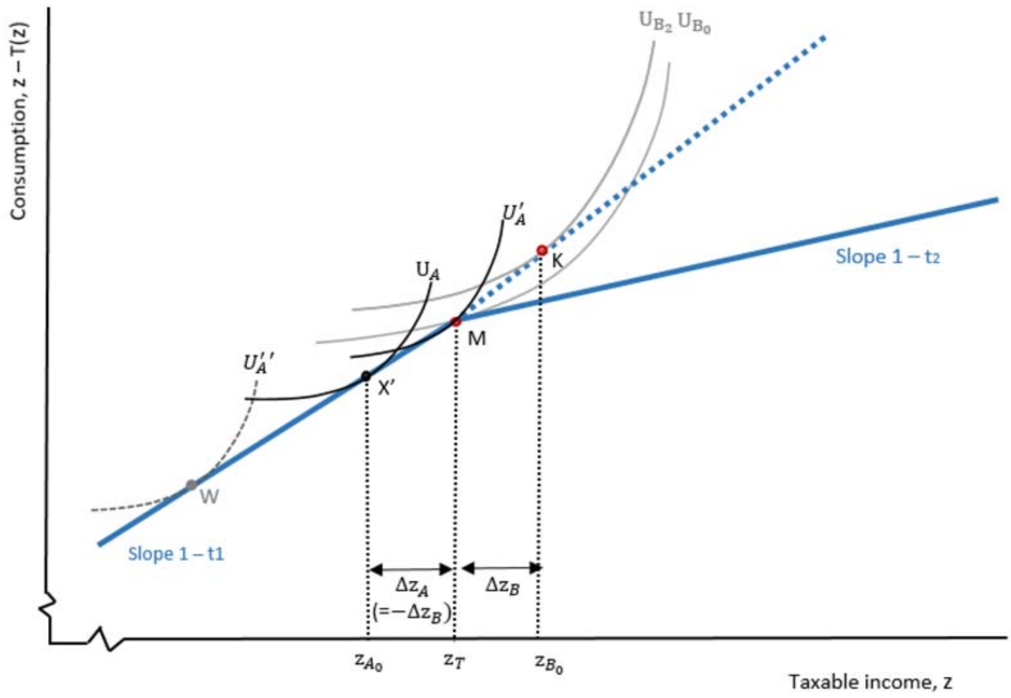

Figure 3: Income Shifting from Partner B to A

contributions by A and B to total household c and z may vary across those income-shifting cases, total c and z (and hence joint utility) remain unchanged so long as the income shifting ensures no household taxable income is taxed at t_2, and income shifting is costless.

2.2 Tax Minimisation by Couples

Opportunities for income sharing across partners may affect the location of the marginal buncher, facilitating more bunching by higher income individuals than equivalent singles. Consider, income shifting to minimise taxation in the case of a couple with incomes, in the absence of taxation, of y_A and y_B, where $y_B > y_A$. Suppose a two-rate income tax is introduced with tax rates τ_1 and τ_2 applying respectively above, and below, a tax threshold, z_T, such that $y_B > z_T > y_A$. There is an incentive for the couple to share taxable income, z, by some combination of changes in real income-earning and income-shifting responses, such that $z_B \leqslant z_T$. Their ability to achieve this by reallocating income within the couple is constrained by the size of the income gap, $z_T - y_A$.

In particular, if $y_B - z_T < z_T - y_A$, person B in the couple can shift taxable income to person A and locate exactly at $z_B = z_T$. Person A remains below z_T with taxable income of $y_A + y_B - z_T$. Alternatively, if $y_B - z_T > z_T - y_A$, the maximum reallocation, without person A shifting into the higher tax bracket, is $z_T - y_A$. Thus, person B has an incentive to move to $z_B = y_A + y_B - z_T$ instead of moving to z_T, while person A's income increases to the threshold at z_T. Hence the location of any excess mass associated with the response of person B is determined by the partner's income, y_A, in relation to the threshold. In each of these cases, the elasticity for person A is negative, while for person B it is positive. Appendix A provides further detail and graphical illustrations of these income-shifting cases, showing how the factors determining the location of the marginal buncher from below differ when responses involve real changes compared to pure income-shifting responses.

The ability of a couple to shift income between themselves, up to the maximum of $y_B - z_T$, may be limited by frictions such as the nature of the tax law on income sharing, the extent of compliance enforcement, and the costs of coordinating taxable income-earning. However, for couples, the potential size of the income change associated with the location of the marginal buncher is likely to be greater than for single individuals, due to the additional option to reallocate income to a lower income partner, while also generating an additional reason to bunch above but close to z_T for person B in the couple, giving rise to imprecise bunching.

For example, consider the case where, in the absence of a tax kink, $y_A = 0$ and $y_B = 2z_T$. When a kink is introduced, income sharing would enable both individuals to bunch precisely at z_T; that is, the marginal buncher (from above) could have income, in the absence of a kink, equal to twice the tax threshold. While such a large income relative to the tax threshold is possible for single taxpayers, the required adjustment to reach z_T when a kink is imposed is more readily achieved where there is a non-earning partner with whom income can be shared.

It is also possible to observe partners in a couple where $z_i > z_T$, for $i = A, B$, who nevertheless benefit from the tax advantages of income shifting across partners. For example where $y_B > z_T > y_A$ such that, when the kink is introduced, there is a tax advantage to shifting $y_B - z_T$ to person A, legal constraints on the shifting process may mean that this is achievable only by shifting more than $y_B - z_T$ to person A. Thus, after a kink is introduced, both partners are in the same tax bracket facing the higher marginal rate, τ_1. Consider the example of a couple whose labour earnings alone would place them in different tax brackets, but who also earn rental income. A common requirement is that rental income must either be shared equally among partners (if the rental property is owned jointly) or by one partner only (if that partner is assigned sole ownership). In order to reduce the couple's total tax liability, some rental income should be allocated to the otherwise lower-income person A (who would face τ_2 in the absence of any rental income). However, abiding by the tax code ensures that either $z_B > z_A$ or $z_A > z_B$ may be observed, with more rental income allocated to person A than is strictly necessary to minimise their joint tax liability.

Hence, with a joint tax minimisation objective, individuals in couples may seek to bunch, but are constrained in their ability to bunch precisely. They may be observed to bunch imprecisely, locating either in the same, or different, tax brackets, with taxable income movements involving both decreases and increases within the couple. Table 1 shows that, for the case of two individuals discussed above, where $y_B > z_T > y_A$, imprecise bunching by both members of the couple in the same tax bracket is either a sufficient, or a necessary and sufficient, condition to achieve joint tax minimisation, depending on the size of both incomes, y_i, with respect to the threshold, z_T.[13]

Table 1: Conditions for Tax Minimisation

Income range	Tax minimising condition	z_i: in same bracket?
$z_T < y_A + y_B < 2z_T$	$z_A < z_T$; $z_A \leqslant z_B$	necessary and sufficient
$y_A + y_B = 2z_T$	$z_B = z_A = z_T$	necessary and sufficient
$y_A + y_B > 2z_T$	$z_A \geqslant z_T$; $z_B \geqslant z_A$	sufficient

Table 1 shows that, as long as a couple's joint incomes are such that $y_A + y_B \leqslant 2z_T$, allocating individual taxable incomes, z_i, such that both individuals are located in the same tax bracket, is a necessary and sufficient condition for tax minimisation by the couple. If $y_A + y_B > 2z_T$, being in the same bracket is sufficient but not necessary. However, in this latter case there is an incentive for the individual with lower income, y_A, to shift taxable income towards $z_A = z_T$ from below. Increasing z_A further such that $z_A > z_T$ may also be tax-minimising but is not necessary; see Appendix A for further discussion.

Empirical analysis of bunching by couples who are in the same or different tax brackets cannot, of course, identify 'no tax counterfactual' income choices. Whether observed couples are in the same or different tax brackets is endogenous to the tax regime. Nevertheless, bunching that generates an excess mass in the income distribution at a kink is, by definition, a response to the tax imposition, even if it cannot be known whether any partners who are not observed to bunch, would have chosen a different tax bracket in the absence of the tax (or tax change). If, as demonstrated above, there is a potential tax gain for bunching individuals in a couple family to have a partner in the same, rather than different, tax bracket, *ceteris paribus* this might be expected to generate greater bunching by the former.

To the extent that there are constraints on income reallocation between partners (such as the legality, and monitoring, of income shifting, and different earning abilities) this limits the ability of couples to engage in sufficient income shifting to put them in the same tax bracket. If those constraints are weak, greater observed bunching by couples where both

[13] As Creedy and Gemmell (2020) show, joint utility maximisation need not imply tax-minimisation. However, where income shifting within the family is the least costly means of adjusting to a higher tax rate, tax-minimisation provides a convenient approach to maximising post-tax incomes.

individuals are in the same bracket may be expected, and *vice versa* when these constraints become binding such that only limited amounts of income shifting are feasible.

3 The NZ Income Tax and Administrative Data

This section provides information about the New Zealand income tax structure in subsection 3.1, with the construction of the matched dataset outlined in subsection 3.2.

3.1 The Income Tax Structure

The New Zealand personal income tax system has few deductions or allowances and no tax-free threshold. Individuals in couples are taxed separately. Taxable income includes wages and salaries, self-employment income (shareholder salary, partnership), dividends, interest and rental income. Pensions (including New Zealand Superannuation) and other transfer payments are taxable. Table 2 shows pre- and post-reform tax rates and income thresholds.

Table 2: Marginal Tax Rates and Income Thresholds (in NZ dollars)

Income range ($)	Marginal tax rate (%)	Income range ($)	Marginal tax rate (%)
2000 Tax Structure		2001 Tax Structure	
1–9,500	15	1–9,500	15
9,501–38,000	21	9,501–38,000	21
>38,000	33	38,001–60,000	33
		>60,000	39
2010 Tax Structure		2012 Tax Structure	
1–14,000	12.5	1–14,000	10.5
14,001–48,000	21	14,001–48,000	17.5
48,001–70,000	33	48,001–70,000	30
>70,000	38	>70,000	33

Over the period of this study, 2000 to 2017, two significant reforms took effect, in 2001 and 2011, with a smaller reform in 2009. The 2001 reform mainly involved the introduction of a top marginal rate of 39 per cent applied to income above $60,000. It was announced in December 1999, and the tax rate changes took effect in the 2001 tax year (April 2000 to March 2001). Hence, taxpayers had some time between the announcement and implementation of the reform to adjust their incomes; see Claus *et al.* (2012). A feature of the NZ tax system is the relative ease with which income taxpayers can legally shift income between the personal tax code, trusts, and the corporate income tax code. Since tax rates applicable to income earned in trusts or companies did not change with the 2001 reform (their top rates remained at 33 per cent), this reform generated an incentive for higher-income earners to shift income out of the personal income tax code.

The potential impact of those reforms on tax sheltering and on bunching at income tax kinks have been examined by Gemmell (2020) and Alinaghi *et al.* (2021) respectively, and hence are not the focus of the present paper. The 2011 reform, effective from October 2010 (mid-way through the 2011 tax year), reduced all income tax rates and the company tax rate, raised the GST rate, and made numerous other small changes. The 2011 tax rates were therefore composite rates reflecting the two income tax structures during that year. Tax rates and thresholds remained unchanged thereafter. A feature of the 2011 reform was that the top personal income tax rate and the rate applied to income received through trusts became aligned again at 33 per cent, but the company income tax rate was cut to 28 per cent. Hence, there remained tax advantages for income earned through companies and via intra-couple personal income sharing.[14]

3.2 The Matched Dataset

The data used here include tax register data for all New Zealand taxpayers from 2000 to 2017, extracted from the Integrated Data Infrastructure (IDI), containing several administrative datasets. The primary database covers the Inland Revenue (IR) individual taxpayer population, containing detailed tax return information such as wages and salaries, self-employment income, pensions and capital income. Socioeconomic variables including gender, age and ethnicity were then added. Without joint taxation, IR income data are collected only for individuals, requiring an extensive exercise to match individuals within families; see Appendix B.

The annual analyses use each census (2001, 2006, 2013) to match individuals to families, with comprehensive matching for 2013 (the only census available within the IDI). For other years the nearest census is used. While this probably imparts some inaccuracy for those non-census years, the results below do not suggest values obtained for census years are systematically different from those obtained for non-census years. Robustness checks also considered the effect of using different census years (for example, using 2001 census relationship status to estimate ETIs for couples in 2004 and 2005, where previously the nearest census, 2006, was used). There are over 8 million observations for the period 2001-2008, and 15 million for 2012-2017, representing a large fraction of the total NZ income taxpayers, which rose from around 3 million to 3.8 million over 2001-2017. The analyses reported below are restricted to individuals aged from 15 to 70.

[14] For 2009 and 2011, the close proximity and mid-year tax rate changes, make the period 2009-2011 unreliable for bunching estimates. They are omitted from the analysis below.

4 ETI Estimation: Method and Results

The estimation method is described briefly in subsection 4.1. Subsection 4.2 reports the ETI results for all taxpayers, with self-employed decompositions examined separately in subsection 4.3. Further details of estimates are provided in Appendix C.

4.1 Applying the Bunching Method

The foundation of the bunching approach is the result that the elasticity of taxable income is proportional to the excess mass of the income density function around the income threshold, or kink point. Numerous derivations are available, so only a brief description is given here: for formal analyses see Saez (2010), Chetty *et al.* (2011), and Kleven (2016). Suppose the marginal rate over a given taxable income range is τ, and a new higher rate of τ_1 is introduced at the income threshold of z_T, initially associated with a density of h_T. The proportion, b, of people moving to z_T is denoted by the excess mass, B, measured as a proportion of the initial density, h_T; that is, $b = B/h_T$. The ETI, η, is obtained using:

$$\eta = \frac{b}{z_T \log\left(\frac{1-\tau_1}{1-\tau}\right)} \tag{1}$$

Individuals for whom it is optimal to move to z_T cannot all be expected to locate precisely at the kink, given uncertainties, adjustment frictions and optimisation errors. Spikes in the distribution of taxable income are therefore expected to be spread over a range of incomes around each tax threshold. The choice of range or 'window' is in practice selected visually. Individuals are grouped into income classes of equal size, and the relative frequency in each class, along with the associated arithmetic mean taxable incomes, are calculated. Income values are transformed by subtracting the threshold income and dividing by the income-group width. Based on the resulting histogram, the 'window' defining the base of the spike is chosen.

The counterfactual density function is obtained by fitting an n^{th}-order polynomial to the observations, using a dummy variable to distinguish the base of the spike. The counterfactual densities are obtained from the polynomial, by omitting the dummies, with an additional step to allow for the fact that the excess density in the spike has to come from the range of incomes to the right of the income threshold.[15] To achieve this last requirement, the predicted densities are adjusted such that the area contained by the counterfactual distribution is the same as that of the observed distribution. Finally, the excess density, b, is obtained as

[15] For some individuals in couples who would otherwise be in a different bracket from their partner, this is not necessarily the case, as argued earlier. However, this should not substantially affect the counterfactual density over the specified window.

the difference between the counterfactual distribution and the actual distribution, over the chosen 'window'. Appendix C provides further details.[16]

The unit of analysis for all the bunching and elasticity estimates below is the individual taxpayer. For partnered taxpayers the relevant samples are of individuals who are members of a couple household. Thus, for example, when a sub-sample of self-employed taxpayers is the focus, individuals are included in the couples sample if they have a partner who may, or may not, also be included depending on whether they are also self-employed.

4.2 ETIs for All Taxpayers

Estimates for all single individuals and individuals in couples are shown in Figure 4, along with 95 per cent confidence intervals. For couples, results are also shown separately for taxpayers whose partner is observed in the same tax bracket, and in a different tax bracket, in the relevant year. Figure 4 reveals a tendency for the ETI to rise soon after the two major reforms and decline in subsequent years. The sources of these temporal patterns are not of primary interest here; they are also observed for individual taxpayers, and discussed in more detail, by Alinaghi *et al.* (2021) where it is argued that they arise both from initially lagged responses to the 2001 reform, such as the expansion in the registration of tax-favoured trusts during 2001-2003, and the likelihood that early post-reform years capture short-run responses before full adjustment to the new tax structures.

Considering differences across taxpayer types in annual or pooled-year periods, results strongly confirm the *a priori* suggestion of higher elasticity values for coupled individuals compared to singles, and for couples with both partners in the same tax bracket. Also, following the introduction of the higher top tax rate in 2001, ETI estimates increased over the next two to three years, reaching 0.368 for couples, and 0.274 for singles, in 2004. This increase probably reflects the relative ease with which personal income can legally be recharacterised in New Zealand, and the impact of the 2001 reform that is known to have led to a large diversion of income via an increase in incorporation by small firms and the self-employed, and increasing use of family trusts after 2001.[17] Companies and trusts were taxed at 33 per cent in this period, while the top personal rate was set at 39 per cent from 2001 to 2008.

[16] Results are obtained using adaptations of the Stata code provided by Chetty *et al.* (2011) at http://www.rajchetty.com/papers-categorized/. Except for later robustness tests, a 7^{th}-order polynomial and a [-5,+5], or [-$2,500, +$2,500], bunching window are used for all results. Figure 8 in Appendix C provides an illustration.

[17] See Buckle (2010), Gemmell (2020) for discussion.

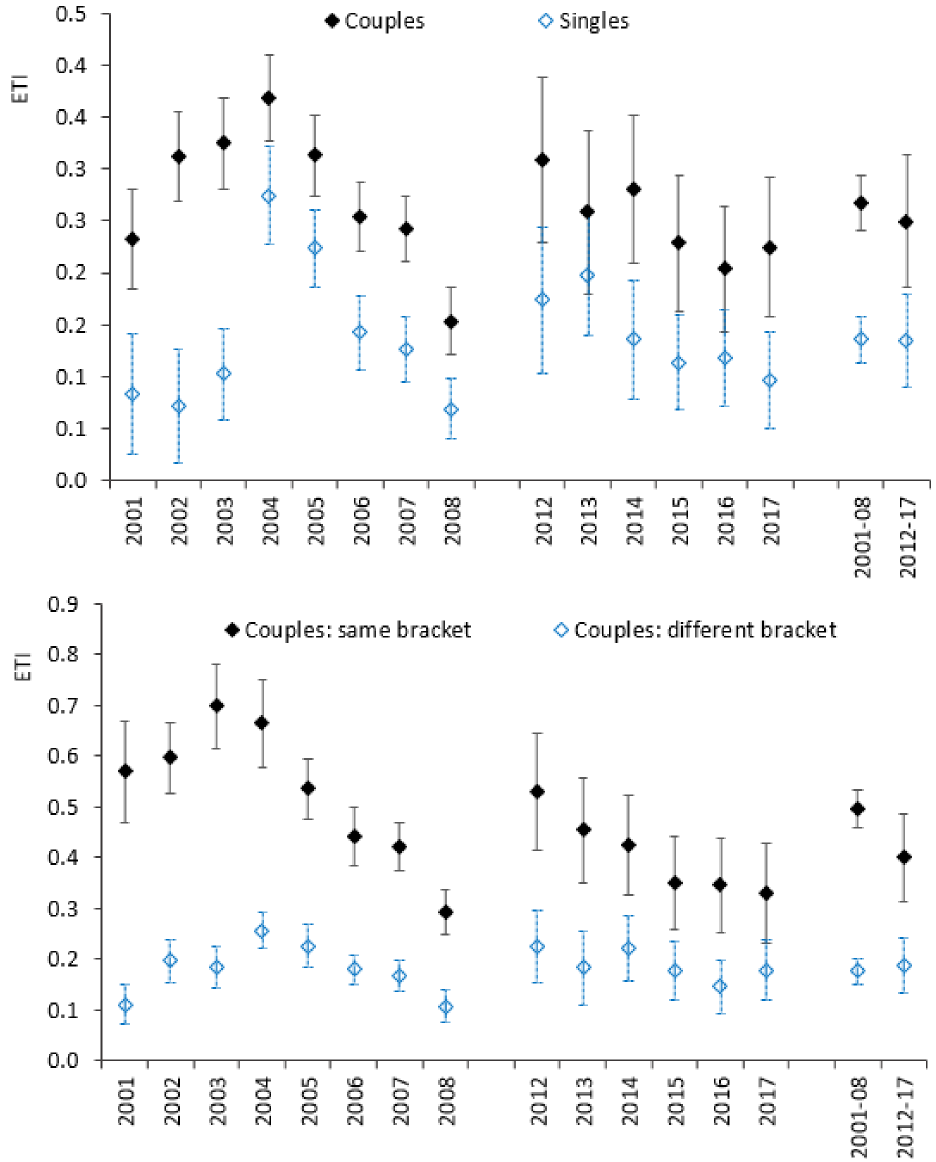

Figure 4: Elasticities of Taxable Income by Taxpayer Type: 2001-2008 and 2012-2017

4.3 ETIs for the Self-Employed

Figure 5 shows annual and pooled ETI estimates over 2001-2017, including 95 per cent confidence intervals, for those taxpayers who are self-employed, defined as personal income taxpayers with non-zero business income.[18] As expected, ETIs are substantially higher for the self-employed, compared with all individuals.[19] For example, pooled 2012-2017 values for single and partnered individuals are 0.801 and 1.083 respectively for the self-employed, but are 0.135 and 0.249 respectively for all individuals.[20]

ETI patterns over the period 2001-2008 for both groups are similar to those found above for all taxpayers, rising to peaks around 2003, followed by declines to 2008. Furthermore, the ETI estimates for 2012-2017 are higher than for the period 2001-2008, though annual values over 2012 to 2017 are mostly declining. This suggests that the longer-term ETI value following the major reduction in the top marginal rate in 2011 may be lower than the initial response, as the reduced tax incentive towards bunching progressively took effect.

This is particularly the case for partnered individuals, where tax incentives to locate in different tax brackets were reduced from 6 to 3 percentage points after 2011. Nevertheless, by 2017 all ETI values generally remain above their 2008 equivalents, suggesting that if the limited reduction in bunching after 2011 arose from inertia, or some form of friction, it persisted to at least 2017. Alinaghi *et al.* (2021) find evidence of such persistent adjustment costs while examining ETIs for individual taxpayers, but without any single/couple distinctions.

These results provide strong support for the two hypotheses that, first, ETIs are larger for individuals in couples compared with single individuals and, second, that elasticities are larger for couples where both partners are in the same income tax bracket. Furthermore, self-employed individuals in couple families, who can be expected to face fewer constraints on sharing income, reveal especially large elasticities.

Results for the self-employed are consistent with evidence from the broader tax compliance literature that has tended to find higher elasticities where there are higher incentives and opportunities to evade or avoid tax; see, for example, Slemrod (2007), Kleven *et al.*

[18] This includes taxpayers with negative business income. Self-employed taxpayers in a couple include only the self-employed individual; they may be partnered with an (excluded) wage-earner, or another (included) self-employed person.

[19] ETI estimates for wage-earners, not reported here, are small and not significantly different from zero, especially during 2001-2003 and from 2008 onwards. This is consistent with evidence elsewhere suggesting third-party reporting, tax withholding by employers, and other constraints on employees' ability to misreport income, limit their behavioural responses; see, for example, Kleven *et al.* (2011), le Maire and Schjerning (2013), Kleven and Schultz (2014) and Kleven (2016).

[20] Results from t-tests for differences in excess mass estimates between singles and couples, and between couples in the same and different brackets in Appendix Table 4, confirm that all differences are statistically significant at 5% except for the single-couple excess mass difference in 2005.

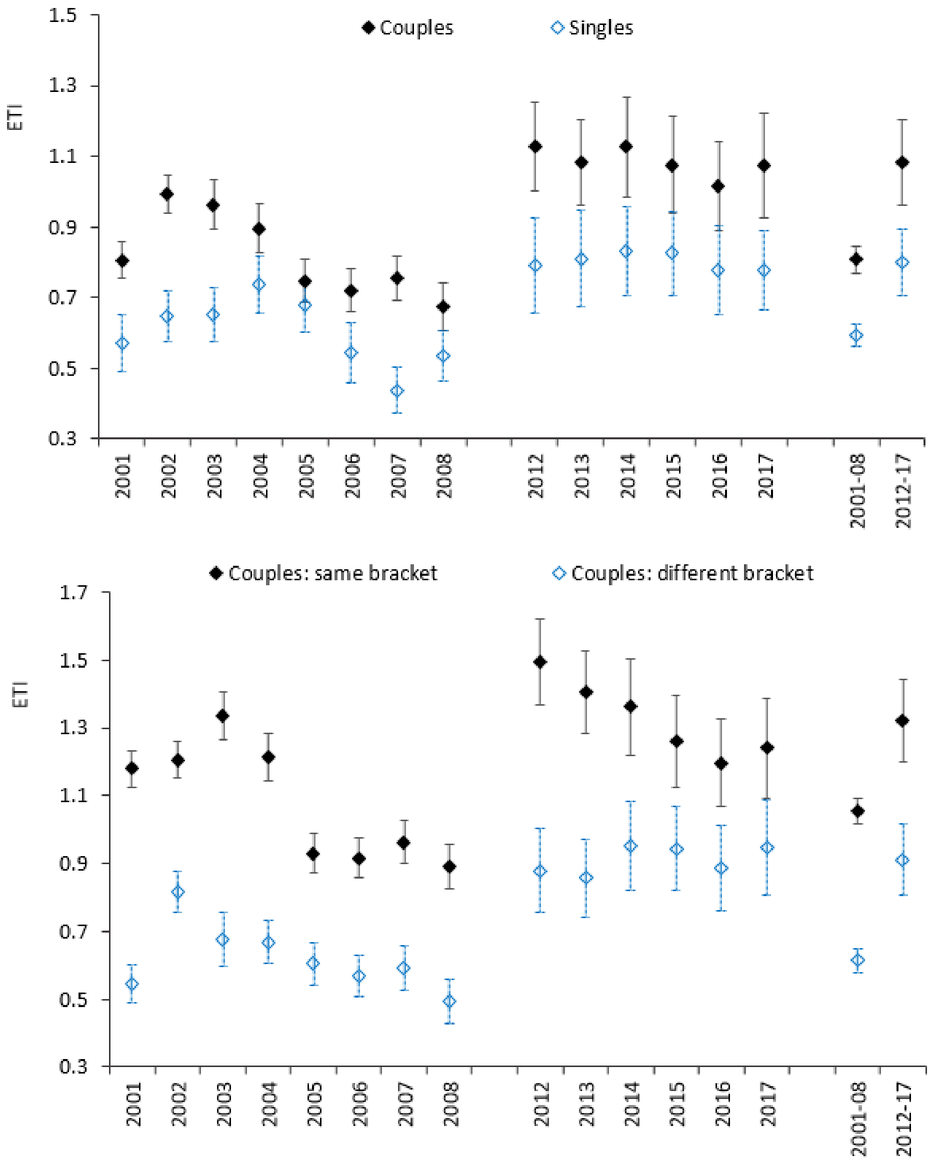

Figure 5: Elasticities of Taxable Income: Self-Employed Taxpayers 2001-2008 and 2012-2017

(2011). They are also compatible with the known income shifting opportunities within the New Zealand tax system, and where small, self-employment businesses form a large fraction of personal taxpayers; see, for example, Cabral *et al.* (2020), Gemmell (2020) and Alinaghi *et al.* (2021).

Thus, the relatively high ETI estimates are plausible here, especially for couples given the known intra-couple income shifting mechanisms. These include the relative ease with which non-wage income can be allocated within a couple, and the high degree of discretion over wage levels and dividend allocations for partners working in small family businesses.

Further results reported in Appendix C show that, for the self-employed, the 2001-2008 average ETI estimates for singles and partnered individuals in different brackets are close (0.594 and 0.613 respectively), but are less close on average during 2012-2017 (0.801 versus 0.912), albeit with relatively wide confidence intervals. These results suggest that the responsiveness of partnered taxpayers observed in different tax brackets is not much different from single taxpayers. This could arise for at least two reasons.

First, observing some couples in different tax brackets may be indicative that they choose to earn quite different amounts for non-tax reasons and are genuinely unresponsive to the tax rate differences in labour supply terms (as with similar single taxpayers), but are also unwilling to engage in intra-family income shifting. Second, the observation that the two partners are in different tax brackets may indicate that adjustment costs, pecuniary and non-pecuniary, of income shifting are perceived as exceeding the expected tax gains. Thus, as argued above, the most responsive observed couples may be those who successfully minimise tax by earning taxable income in the same tax bracket, while those observed in different brackets are either unwilling or unable to do so. Without more finely-grained data, and without data on 'no tax' counterfactual incomes, it is not possible to distinguish between those two possibilities.

However, two further couple decompositions can offer additional insights. First, self-employed taxpayers who are partnered with other self-employed taxpayers can be expected to have greater opportunities to share income (and hence display higher ETIs) compared with self-employed taxpayers who are partnered with a wage-earner. Second, among wage-earning individuals, around 11 per cent are known to be partnered with a self-employed taxpayer. Although the dataset does not identify how many of the latter are wage-earners employed in their partner's own business, this groups is likely to contain a substantial fraction of such wage-earners. If so, the tax responsiveness of the sub-group of 'wage earners partnered with a self-employed taxpayer' could be expected to display a higher ETI on average than the ETI for two wage-earning partners.

Results from these two exercises are reported in Table 3, with t-ratios in parentheses

Table 3: ETI Estimates for Different Partner Decompositions

Taxpayer type:	Taxpayer's partner type			SE-only
Self-employed (SE)	All	SE-only	WE-only	share (%)
Pooled: 2001-2008[a]	0.807	0.926	0.483	69
	(35.4)	(35.1)	(22.3)	
Pooled: 2012-2017[a]	1.083	1.281	0.657	62
	(14.5)	(14.1)	(12.7)	
				SE-only
Wage-Earner (WE)	All	SE only	WE only	share (%)
Pooled: 2001-2008[a]	0.069	0.114	0.061	11
	(4.2)	(4.7)	(3.8)	
Pooled: 2012-2017	0.063	0.081	0.055	11
	(1.9)	(1.8)	(1.7)	

[a] t-tests of SE-only and WE-only excess mass differences significant at 5 per cent

below estimates. To save space here, this shows ETIs only for the pooled 2001-2008 and 2012-2017 samples, but results obtained for individual years are consistent with the pooled results, as shown in Appendix C. The top half of Table 3 reports ETIs for all self-employed taxpayers who are in a couple (All) and for the decomposition into those with self-employed partners (SE-only) and those with wage-earning partners (WE-only). The former represent 69 per cent of the 2001-2008 sample and 62 per cent of the 2012-2017 pooled sample; that is, self-employed taxpayers in a couple have a strong tendency to partner with another self-employed taxpayer. The lower half of the table shows a similar decomposition for the group of all wage-earning taxpayers who are in a couple – those with a self-employed (SE-only), or wage-earning (WE-only), partner. Unsurprisingly, in this case wage-earners in a couple tend to be partnered with another wage-earner (89 per cent). Nevertheless, a substantial minority (11 per cent) of partnered wage-earners are in a couple with a self-employed person.[21]

Both hypotheses discussed above are supported by these results. First, among self-employed taxpayers in a couple, the ETI estimate is statistically significantly higher when that taxpayer is partnered with another self-employed person rather than a wage-earner: 0.926 versus 0.483 in 2001-2008 and 1.281 versus 0.657 in 2012-2017. Second, when a wage-earning taxpayer is in a couple with a self-employed partner, the ETI estimate is larger (significantly for 2001-2008) compared to couples consisting of two wage-earners: 0.114 versus 0.061 in 2001-2008 and 0.081 versus 0.055 in 2012-2017. While this does not establish whether the result is driven by wage-earners employed by their self-employed partners, this seems a

[21]For the pooled 2012-2017 results, for example, of approximately 5.4 million observations for all wage-earners in couples, around 580,000 were partnered with self-employed taxpayers.

plausible contributor to the higher average ETI values estimated for this group.

4.4 Imprecise Bunching

Section 2 proposed that bunching in the vicinity of, rather than precisely at, the kink might be greater for partnered individuals than for singles due to the ability of the former potentially to shift large amounts of income between partners, and possible indivisibilities inherent in that sharing process. This could be evident in a wider 'bunching window' being observed for individuals in couples compared with singles. Previous estimates presented here used a common window across couples and singles to assist comparability. This seems the best default assumption when comparing groups, rather than attempting visually to select different year- and group-specific bunching windows.

This subsection investigates whether there is empirical support for a wider window for partnered individuals compared with singles, by increasing and decreasing the window around the benchmark of [-5,+5]. This exercise is conducted for the self-employed (who bunch more in general) and for the pooled 2001-2008 years when bunching was most responsive to the top tax kink.

Figure 6 shows the excess masses, with 95 percent confidence intervals, for partnered and single individuals when the bunching window is increased from [-2,+2] to [-9,+9], where each ± 1 represents $\pm\$500$. Though [-2,+2] is too narrow to capture all the excess mass for either group, exactly how wide the relevant bunching window should be is a matter of judgement. Nevertheless, Figure 6 reveals that excess mass estimates increase for both groups as the window is increased from [-2,+2] towards the benchmark [-5,+5] case. However, when increasing the window above this benchmark, excess mass values for singles quickly become stable and remain well within relevant 95 per cent confidence intervals. By contract, excess mass estimates for couples continue to increase as the bunching window is widened to [-9,+9] around the kink.[22] These results point to the possibility that using a wider bunching window that allows for more imprecise bunching by partnered individuals compared to singles, captures bunching more comprehensively.

5 Robustness Testing

This section reports a number of robustness checks. First, tests are reported of whether estimates, and differences among single and couple groups, are sensitive to the use of census relationship data for taxpayers based on a neighbouring year when same-year census infor-

[22] Further widening of the bunching window is constrained by the presence of round number bunching at [-10,+10] as discussed in Appendix D.

Figure 6: Bunching Windows for Couples and Singles

mation is not available. Second, sensitivity to the size of the bunching window are examined. Finally, the question is examined of whether some observed top-threshold bunching reflects round-number bunching unrelated to the presence of a kink.

5.1 Census Year Sensitivity

With only three census years during the period of investigation, namely 2001, 2006 and 2013, it was necessary to identify coupled individuals in each year during 2001-2017 using the nearest available census. To test sensitivity to this assumption, equivalent bunching estimates were obtained using the nearest previous census to identify partnered individuals. That is, the 2001 census is used for ETI estimates in 2001-2005; the 2006 census is used for 2006-2012 and the 2013 census is used for 2013-2017. The tax years affected by this change are 2004, 2005 and 2012, and consequently the multi-year pooled estimate for 2001-2008 and 2012-2017.

Table 4 shows both sets of estimates for the four single and couple groups. It is clear that these are not sensitive to the choice of census year: the alternative estimates are almost always within 0.05 of previous estimates. Similar results (not shown) are obtained when the samples are restricted to self-employed taxpayers. Importantly, these alternative estimates do not change conclusions regarding the relative sizes of ETIs for singles versus couples, or among couple types.

Table 4: Testing Sensitivity to Census Years

Year	Singles	Individuals in couples		
		All	Same bracket	Different brackets
Previous ETI estimates (Table 3):				
2004	0.274	0.368	0.665	0.257
2005	0.223	0.313	0.535	0.226
2012	0.174	0.308	0.530	0.225
Pooled (2001-2008)	0.136	0.267	0.496	0.176
Pooled (2012-2017)	0.135	0.249	0.400	0.188
Alternative ETI estimates:				
2004	0.253	0.407	0.705	0.292
2005	0.216	0.359	0.605	0.259
2012	0.188	0.334	0.549	0.253
Pooled (2001-2008)	0.131	0.270	0.500	0.177
Pooled (2012-2017)	0.133	0.245	0.389	0.186

5.2 Bunching Specification Sensitivity

The sensitivity of the results to three aspects of the excess mass calculation are reported here: these conceern the size of income class width chosen, the size of the bunching window adopted around the tax kink, and the degree of the polynomial selected to specify the counterfactual income distribution.

Table 5 considers the effects of reducing the width of the income groups from \$500 to \$250, thereby doubling the number of discrete observations of the actual and counterfactual income distributions. To save space only estimates for the pooled datasets, 2001-2008 and 2012-2017 are reported; results for annual estimates are similar. The change in the income group size, which doubles the number of income groups, is shown to have a negligible impact on ETI estimates.

Table 5 reports the effect of changing the bunching window to $[\pm 4; \pm 6]$. Again, ETIs appear to be robust to the changes in parameter size. Unsurprisingly, point estimates are slightly lower when a narrower bunching window is used, and slightly higher for a larger window; for example, ETI = 0.122 for 2012-2017 using the $[\pm 4]$ window, while ETI = 0.141 when $[\pm 6]$ window is used (ETI = 0.135 in the baseline case). Furthermore, using a potentially less flexible 6^{th}-order polynomial instead of 7^{th} has almost no effect on the ETI estimates. The table also confirms that reducing the order further, to five, leads to slightly lower estimates.

Table 5: Testing Sensitivity to Bunching Specifications

	Singles	Individuals in couples		
		All	Same bracket	Different brackets
2001-2008				
Baseline§	0.136	0.267	0.496	0.176
Income class width: $250	0.138	0.272	0.499	0.181
Bunching window: [-4,+4]	0.129	0.260	0.483	0.170
Bunching window: [-6,+6]	0.142	0.273	0.503	0.181
Order of polynomial: 5	0.126	0.263	0.493	0.171
Order of polynomial: 6	0.135	0.267	0.497	0.175
2012-2017				
Baseline§	0.135	0.249	0.400	0.188
Income class width: $250	0.142	0.262	0.421	0.197
Bunching window: [-4,+4]	0.122	0.234	0.378	0.175
Bunching window: [-6,+6]	0.141	0.257	0.403	0.197
Order of polynomial: 5	0.109	0.203	0.398	0.150
Order of polynomial: 6	0.134	0.248	0.333	0.187

§Baseline: income class width: $500; bunching window: [-5,+5]; polynomial degree: 7.

5.3 Round Number Bunching

A characteristic of bunching at the top kink, shown in Figure 2, is a slight tendency towards some positive excess mass at $5,000 taxable income differences from the $70,000 tax kink. This seems likely to be associated with the round-number bunching phenomenon stressed by Kleven and Waseem (2013), particularly for the self-employed. In their developing country context, they suggest that this may be 'a side-effect of poor record keeping' (2013, p. 693). In New Zealand's case this record-keeping explanation seems less likely to be important compared to Pakistan.

To quantify the impact of round number bunching, the present exercise focuses on the 2013 tax year. Excess mass at $5,000 intervals around the top kink are obtained using the actual and counterfactual distributions illustrated in Figure 2. This shows that, away from the kink, excess mass is essentially only evident for the round number group itself; that is within ±$250. Round number bunching is therefore obtained for the narrower interval ±$250 around each $5,000 taxable income round number, as distinct from the larger ±$2,500 window within which excess mass associated with tax-kink bunching was estimated above.[23]

The results are illustrated in Figure 7. This shows excess mass values on the vertical axis

[23]Kleven and Waseem (2013, pp. 698-701) adopt a more sophisticated method to separate round-number bunching from tax-notch bunching, using polynomial regressions that include dummies for each round number. This is more relevant in their tax notch case where there is considerable systematic fluctuation at numerous data points in the actual taxable income distribution associated with many tax notches.

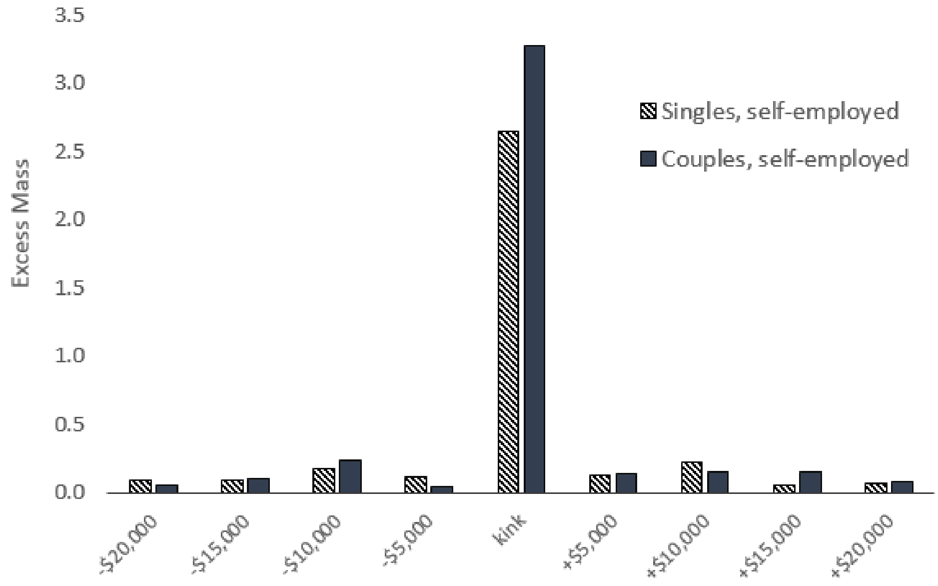

Figure 7: Excess Mass: Round Number Bunching

and nine taxable income round number values, from $-\$20,000$ to $+\$20,000$ below/above the \$70,000 tax kink on the horizontal axis. The excess masses shown at zero capture the portion, within the tax-kink group between \$69,750 and \$70,250, of the total excess mass previously estimated at the tax kink. For example, Figure 7 shows excess mass at zero for coupled, self-employed taxpayers of 3.27, which is around half of the total tax-kink excess mass of 6.632. Compared to either of these tax-kink excess mass values, Figure 7 shows that bunching by the self-employed at round numbers away from the kink is very small: all values lie in the range 0.05 to 0.24. It therefore seems that the modest round number bunching could account for no more than a tiny fraction of the observed excess mass at the \$70,000 kink.

6 Conclusions

Recent papers hypothesise that estimates of the elasticity of taxable income (ETI) for individuals may be underestimated where those individuals are taxed separately but some taxpayers are part of couple families. This was investigated here by applying the 'bunching at tax kinks' approach to estimate separate elasticities for partnered and single individuals, in association with the top marginal income tax rate. There are opportunities for, and constraints on, bunching that are specific to individuals in couples. To test these hypotheses, administrative taxable income records for New Zealand taxpayers were matched to their partners using population census data. Excess mass and elasticity estimates were then obtained for various decompositions of single and coupled taxpayers.

The results provide strong evidence that ETIs are larger for partnered individuals compared with single individuals. It was also suggested that where constraints on income sharing among partners are relatively weak, larger elasticities can be expected for couples where both partners are observed in the same income tax bracket. The evidence strongly supports this argument and is consistent with known characteristics of the New Zealand income tax system that imposes relatively weak constraints on intra-family income sharing. Self-employed individuals in couples, who generally face fewer constraints on sharing income than partnered employees, reveal especially large elasticities.

When considering all taxpayers combined, ETI estimates are within the range of values commonly found for other countries, of around 0.1 to 0.4. Estimates here for self-employed individuals suggest high elasticities at around 0.80 and 1.08 for single and coupled individuals respectively. Furthermore, as hypothesised, these are high for self-employed individuals where partners are observed to earn income in the same tax bracket, with a point estimate as high as 1.32 for 2012-2017. Nevertheless, estimates for couples where partners earn income in different tax brackets are only slightly higher than similar single individuals (0.912 compared with 0.801 in 2012-2017).

Results also provided strong support for the hypothesis that, when a self-employed taxpayer is part of a couple where both are self-employed, the ETI is larger than when that taxpayer is partnered with a wage-earner. In addition, for the sample of wage-earners who are part of a couple, if the wage-earning taxpayer is partnered with a self-employed individual, the elasticity for such wage-earners is also larger. Though data are not available on the extent of family wage-earners within a self-employed business, this result may arise in part from a tendency for self-employed taxpayers in couples to employ their partner as a wage-earner, giving them discretion over the choice of wage and hence tax responsiveness.

These results for the self-employed are consistent with, and augment, previous evidence from the broader tax compliance literature that has tended to find higher elasticities where there are both higher incentives and opportunities to evade or avoid tax. The relatively high estimated values for the self-employed reported here are plausible, especially for couples given the known income sharing mechanisms available to them.

The large differences in estimated ETI values for singles and couples suggest that tax authorities and policy advisers in a given country setting need to understand the mechanisms, opportunities for, and constraints on, taxpayers' behavioural responses to tax kinks arising from family structures. In particular, it is important to consider the extent to which incomes of family members are jointly determined, the ease of shifting taxable income within the family, and how far tax responsiveness may differ for partnerships involving one versus two self-employed taxpayers. Tax policy involves tax parameter and tax administration settings, including the size and allocation of compliance enforcement resources.[24] Results here highlight that the design of such administrative rules around income sharing within couples and among self-employed partners is one aspect that can substantially affect tax-kink bunching for given tax rate settings.

[24] See Keen and Slemrod (2017), Creedy (2019).

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Appendix A: Bunching and Tax Minimisation by Individuals in Couples

This Appendix provides analysis and illustrations of bunching by couples, discussed in section 2. Section 2 considered a number of bunching cases arising from tax-minimisation strategies within couples in the same or different tax brackets. These are illustrated in Figure 1, in which there is a single threshold or tax kink at $z_T = \$70,000$, with marginal tax rates of 0.2 and 0.4 below and above the kink respectively. A combined income range, $y_A + y_B$, from \$100,000 to \$200,000, is shown.

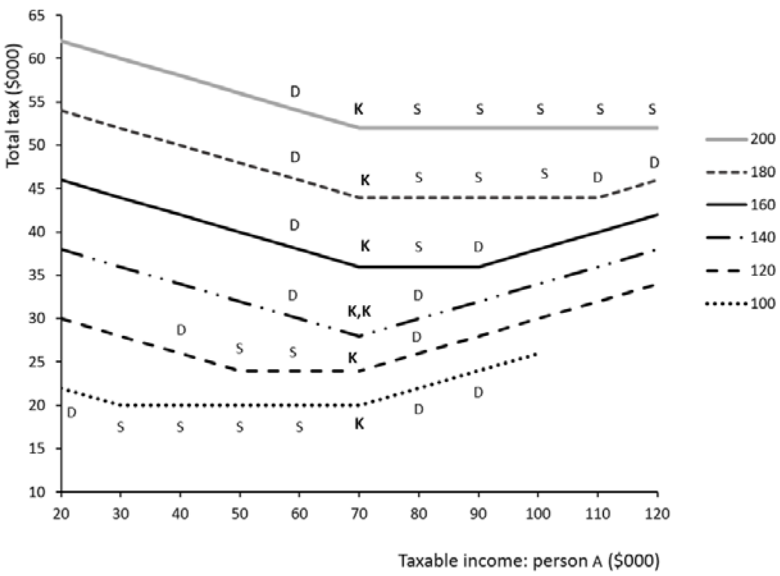

Figure 1: Tax-Minimising Taxable Income Allocation by Couples

Each profile in the figure represents a fixed combined income, with taxable income of the lower earner, A, shown on the horizontal axis and total tax paid by the couple on the vertical axis. Labels 'S' and 'D' indicate whether the two individuals are in the same (S), or different (D), tax brackets; label 'K' indicates the kink at \$70,000. Unlabeled points in the figure to the left or right involve incomes located in different tax brackets.

Figure 1 shows that only precise bunching at the kink by both partners is tax-minimising when combined income is $2z_T = \$140,000$ (labelled 'K,K'). For combined incomes less than \$140,000, tax minimisation requires both members of the couple to be in the same, lower taxable income bracket. Thus taxpayers who are observed to bunch imprecisely have an incentive to do so via locating in the same bracket. If combined income exceeds \$140,000, tax minimisation, achieved by imprecise bunching around \$70,000, involves locating in the same, higher tax bracket.

These arguments suggest that, in addition to incentives for couples to bunch at the tax kink by suitable allocation of taxable income within the family, individuals in couples who attempt to bunch, but cannot bunch precisely at z_T, are most likely to bunch close to z_T within the same tax bracket to the extent that, for a given joint income, they are able to reallocate their taxable incomes. As a result, a tax-minimising strategy is consistent with observing imprecise bunching by one or more partners either below or above the kink.

Appendix B: The New Zealand Couples Dataset

The database used for this study is the Integrated Data Infrastructure (IDI), maintained by Statistics New Zealand (SNZ). The IDI is a collection of national and regional data sources systematically and securely linked. It contains a wide range of administrative data sources from government agencies, the 2013 Census, SNZ surveys, and non-government organizations linked at the individual level. These datasets are linked through a spine which aims to include all people who have ever been a resident in New Zealand.[25] The IDI spine is constructed by linking tax records (from 1999 onwards), New Zealand birth records (from 1920), and long-term visas (from 1997) probabilistically. Datasets within the IDI are deterministically linked where common unique identifiers are available. Otherwise, personal variables such as full name, date of birth, and address are used for probabilistic matching; see Statistics New Zealand (2014) for further details.

To examine the ETI for individuals who are part of a couple, relationship information is required. However, income tax liabilities in New Zealand are individually based and therefore, household and family-level variables are not collected for tax purposes.[26] On the other hand, all main benefits are income-tested at the family level, for which family relationship information is required and collected.[27] While this can be useful, the proportion of the working-age population receiving main benefits is about 9 to 10 per cent, and is obviously not representative of the overall national population. The IDI also includes several linked survey data sources such as the Household Labour Force Survey (HLFS) and the

[25]This includes individuals who were born in New Zealand, permanent residents, people with a visa which allows them to reside, work or study in New Zealand, and those who can live and work in New Zealand without requiring a formal visa.

[26]Some survey and administrative data in New Zealand, such as the 5-yearly census or annual Household Economic Survey, distinguish between families and households. The former involve familial relationships, such as parents and children, living in the same private dwelling; the latter involve independent individuals living at the same address, such as students or single professionals sharing accommodation. Thus a household may contain more than one family.

[27]The main benefits in New Zealand include, but not limited to, Jobseeker Support (JS), Sole Parent Support (SPS), and Supported Living Payment (SLP). New Zealand Superannuation is the only benefit that is neither income-tested, nor asset tested. However, if a superannuitant chooses to include a partner aged under 65 in the payment, incomes of both partners are tested.

Survey of Families, Income, and Employment (SoFIE).[28] These datasets can be used to construct longitudinal family and household level variables but cover small samples of the New Zealand population over relatively short time periods.

Some information on the relationships between individuals within households can be found in the administrative data sources including New Zealand registrations of births, marriages, and civil unions from the Department of Internal Affairs; benefits information from the Ministry of Social Development; tax credit information from Working for Families; visa information from the Ministry of Business, Innovation and Employment; and Summary tables compiled from various administrative sources. However, these data sources provide either formal relationships or at best a fraction of informal relationships.[29] According to a NZ government report, about one in five New Zealanders who are living in a relationship have chosen not to marry: 336,591 people identified themselves as having a partner but not legally married in Census 2001.[30]

The national population censuses contain a wealth of demographic information about individuals and their families.[31] However, the only full census linked to the IDI (at the time of data collection) is 2013. This means that any change in household or family composition cannot be traced over time. Since income data in the IDI is available from 1999, the only two censuses which can be used to add more information on individuals' relationships prior to 2013 are 2001 and 2006, none of which is linked to the IDI. In order to link them to the IDI, linking variables are used. These datasets are anonymised, and therefore the main linking variables are date of birth (including year and month of birth), gender, and usual residence (meshblock code).[32] The main problem in linking these two stand-alone datasets to the IDI is that instead of date of birth, an age variable is reported. This makes the linking process difficult, if not impossible. To address this difficulty, two shortened versions of these datasets, including the date of birth, were subsequently provided by Statistics NZ.[33] The dates of birth are then derived from these shortened versions and added to the existing

[28] The Household Economic Survey (HES) also includes family/household level information but it is cross-sectional.

[29] Formal relationships include legally registered marriages or civil unions; informal relationships consist of *de facto* partnerships and cohabitation.

[30] For the full report see: https://www.beehive.govt.nz/release/questions-and-answers-civil-union-and-relationships-statutory-references-bills.

[31] In New Zealand, censuses are usually held every five years but the census scheduled for March 2011 was postponed for two years due to the Christchurch earthquakes in 2010 and 2011.

[32] Meshblocks are the smallest geographical areas in NZ standard geographical classification, representing roughly 30 to 60 dwellings and/or 60 to 120 residents.

[33] Statistics NZ agreed to provide a shortened version of censuses including the date of birth (to protect privacy, day in the date of birth is dropped and not reported) along with 17 other requested variables such as sex, ethnicity, family role, legal and social marital status, qualification, income and occupation, among others.

stand-alone censuses.

The number of individuals in censuses 2001 and 2006, after dropping duplicate records, are 3,769,257 and 4,083,147, respectively. The records with missing values for the main linking variables also needed to be excluded from these datasets. This includes records with missing dates of birth (year and month of birth) and records without residential information. Therefore, the number of records for the censuses 2001 and 2006 decrease to 3,547,311 and 3,916,803, accordingly. The final step before linking is to check whether these records are unique with respect to the linking variables. After the completion of this step, the numbers of records are slightly decreased, 3,230,085 and 3,525,789 for the 2001 and 2006 censuses, respectively.

Information about where people live is collected by various government agencies. As a result, address information in the IDI can be found in several data sources, including Ministry of Health (PHO and NHI registers), Ministry of Social Development, Ministry of Education, ACC (Accident Compensation Corporation), and Inland Revenue, among others.[34] The data recorded in the address table include a range of geographical information such as meshblock, area units, territorial authorities (TA), District Health Board areas (DHBs), and regions. It is possible that an individual appears several times in the address table if the residential address is recorded differently on different sources or a change of address is notified.[35] To be able to compare the area classification over time, a meshblock concordance table is used for mapping. Finally, personal details such as date of birth and gender are added to the residential address.

The census data derived from the earlier steps are then linked to the administrative data (IDI spine) using the linking variables. However, it is possible that one census record is linked to more than one IDI record due to the similarity in linking variables such as sex, date of birth and address.[36] These records are therefore excluded from the final datasets and the number of linked individuals for census 2001 and 2006 become 1,920,474 and 2,296,980.

The next step is to identify couples with both spouses linked to the administrative data. To be able to compare the elasticity of taxable income for this group of individuals with their single counterparts, the identification of both groups are required. To do so, a variable containing information on the role within the family group is used. These roles (and codes) are as follows: Not in a Family Group (00); Parent or Partner/Spouse (01); Child (02); Grandparent in Parent Role (03); Other Person in Parent Role (11); Child not with Real

[34] PHO and NHI refer to Primary Health Organisation and National Health Index, accordingly.

[35] For the 2001 Census, the residential addresses with notification date prior to 1st January 2006 are collected. The date corresponding to 2006 Census is 1st January 2007.

[36] The inclusion of the name and day in the date of birth could improve the linking substantially but these are not provided due to the confidentiality concerns.

Parent (12); Unable to Code (50). There are 305,688 couples (611,376 individuals) and 1,044,969 singles, based on the 2001 Census, who are successfully linked to the administrative data. According to the 2006 Census, the number of couples is 384,330 (786,660 individuals) and 1,259,556 singles in 2006.

Table 1: Summary Statistics for the New Zealand Taxpayer Population

		2001–2008			2012–2017	
Taxpayer type:	All	Partnered	Single	All	Partnered	Single
Average taxable income ($)	31,846	39,317	24,955	45,584	55,555	36,954
Average age	41.8	46.7	37.3	42.2	46.0	38.9
Percentage of females	52.0	50.1	53.8	50.0	50.1	49.9
Total observations[a] (millions)	8.348	4.006	4.343	15.027	6.971	8.055

a: Totals may not add exactly due to Statistics NZ confidentiality rounding rules.

Table 1 presents some summary statistics for the two pooled samples (2001-2008 and 2012-2017) of all individuals, and partnered and single individuals. Average taxable income is generally substantially higher for individuals with partners compared to single individuals. For example, in 2012-2017, partnered individuals report around 50 per cent higher taxable incomes than singles. They are also around 6 to 7 years older on average than singles, and both groups are almost equally divided between males and females.

Appendix C: Further Details of Excess Mass and ETIs

This Appendix provides details of annual and pooled estimates of the extent of bunching by various taxpayer groups over the 2001 to 2017 period, for which it is possible to match individual taxpayers within the same family. Excess mass estimates are reported, along with ETI values used to produce the diagrammatic presentations.

2013 Excess Mass Estimates

The excess mass values, used in obtaining ETI estimates, display somewhat different patterns between the two periods, 2001-2008 and 2012-2017. An illustration of the extent of bunching across different groups is shown in Figure 2 for 2013, the most recent year where census family relationship data yield an exact match with taxpayer data for the same year. The top part of the figure shows bunching by all single individuals and those in couples; the lower part shows bunching by self-employed equivalents. Two features stand out: there is relatively larger bunching by individuals in couples compared with singles, and larger bunching by the self-employed compared to all taxpayers combined. A third feature is evidence of some round-number bunching, as discussed by Kleven and Waseem (2013). That is, there is some evidence of small positive excess mass at ±10 (±\$5,000) intervals around the \$70,000 top kink.[37] This aspect, and its relevance for ETI estimates, is examined further in Section 5.

Pooled Excess Mass Estimates

The excess mass values, used in obtaining ETI estimates, display somewhat different patterns between the two periods, 2001-2008 and 2012-2017. Figure 3 summarises excess mass estimates for singles and couples for the two periods, 2001-2008 and 2012-2017. The diagram plots average b values for all singles/couples, for the tax bracket-based couple decompositions, and equivalent values for the self-employed sub-samples. In each case, 95 per cent confidence intervals, based on bootstrap standard errors, are also shown. Unsurprisingly, given the large sample sizes involved, confidence intervals are generally small.

Recall that the values of b on the vertical axis represent the area (mass) of the observed distribution (in excess of the counterfactual distribution in the relevant window), as a ratio of the average mass of the counterfactual distribution within the window (±\$2,500) around the kink. For example, for all single individuals in 2001-2008 and 2012-2017, Figure 3 and Appendix Table 1 indicate values of b of 1.530 and 0.827; both are significantly different from zero. That is, excess mass is around 153 per cent and 83 per cent in the two periods respectively of the average counterfactual density around the kink.

Several bunching features are apparent in Figure 3. First, b is significantly higher for coupled individuals compared to singles, and also for coupled individuals in the same tax bracket compared to those in different tax brackets.[38] Second, as expected the self-employed display larger excess mass values than those for all taxpayers, and the excess mass for self-employed individuals in a couple is significantly greater than the excess mass for self-employed singles. Third, estimates of b are all smaller in 2012-2017 compared to 2001-2008. As shown below, this is a markedly different pattern from that observed with ETI values. It is consistent with the reduced tax incentive to bunch following the substantial reduction in the top marginal tax rate from 38 per cent to 33 per cent in 2011: bunching by all groups was much less than bunching prior to the 2011 reforms. Fourth, excess mass estimates for coupled

[37] With \$500 income groups used here, the round-number bunching observed at \$5,000 intervals (multiples of 10 on the horizontal axis) include reported taxable incomes within a ±\$250 range, such as from \$79,750 to \$80,250.

[38] Since these excess mass estimates relate to the top tax kink, coupled individuals in the same tax bracket who are both observed within the bunching region could either both be bunching just below the tax threshold or just above it. Couples in different tax brackets could also both be bunching, but each partner is observed just above, and just below, the kink. In either case (same or different brackets), only one member of the couple may be observed to bunch around the top kink while the other partner could be bunching at a lower kink or not bunching at all.

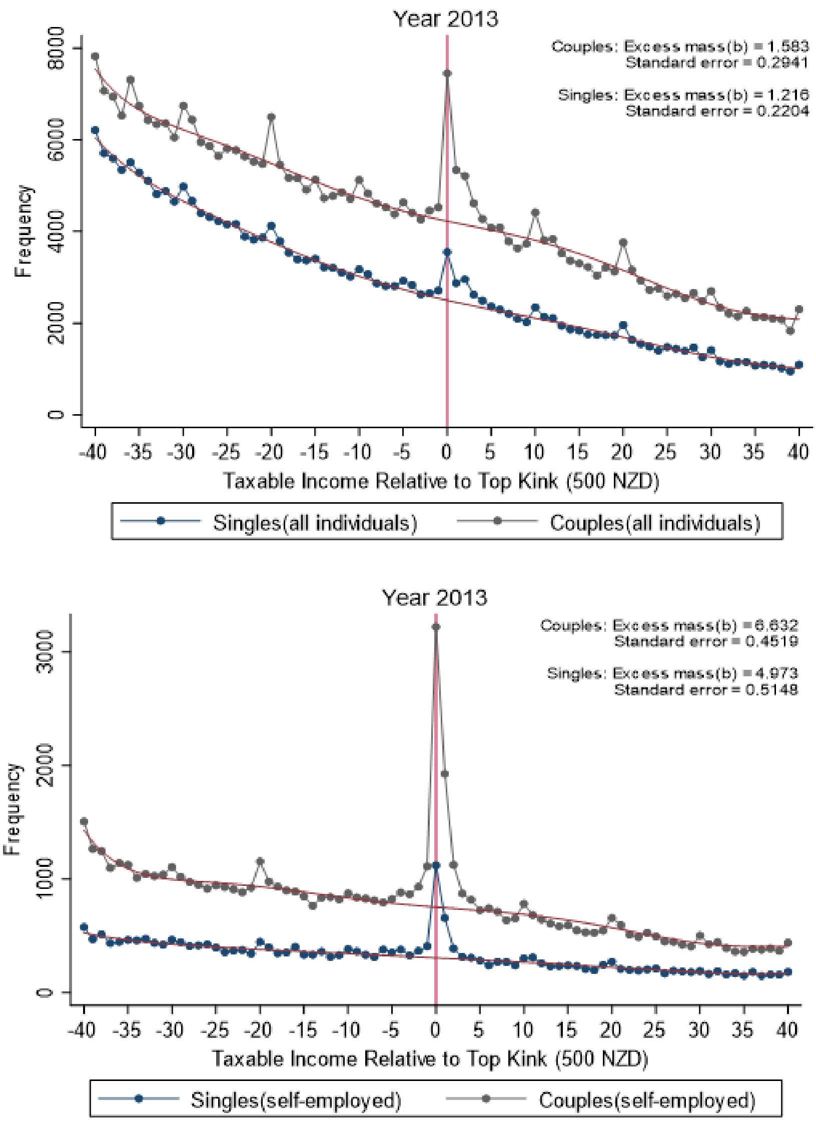

Figure 2: Bunching by Taxpayer Type: 2013

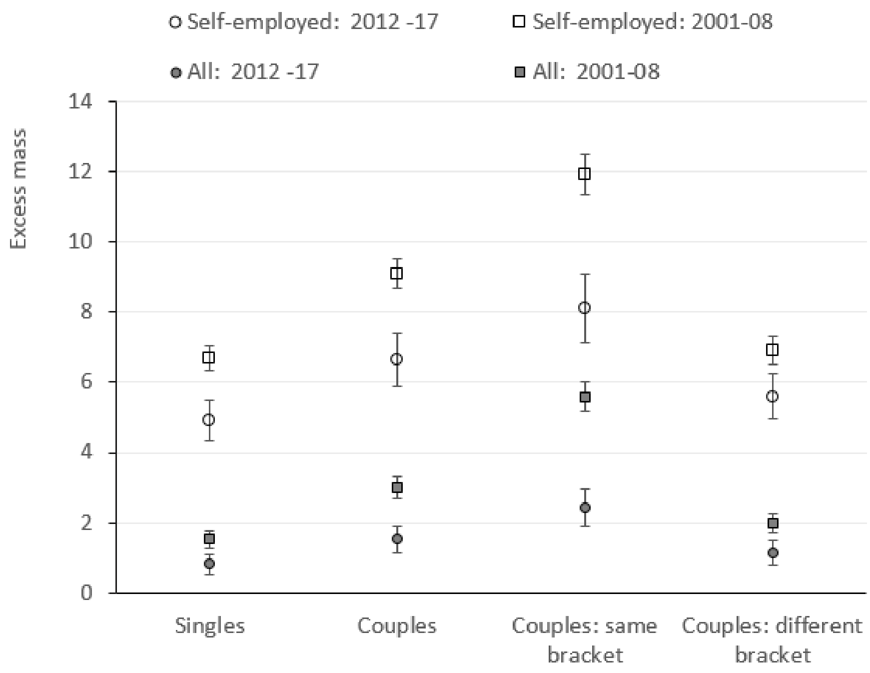

Figure 3: Excess Mass by Taxpayer Type: 2001-2008 and 2012-2017

individuals in different tax brackets are generally slightly higher than for equivalent singles, though t-tests suggest this is only statistically significant (at 5 per cent) for 'all taxpayers' (self employed plus wage-earners) during 2001-2008. This aspect is discussed further below when considering ETIs.

Annual Excess Mass Estimates

Annual estimates of excess mass for all taxpayers combined, together with associated standard errors, are reported in Table 1 (all taxpayers) and in Table 2 (self-employed taxpayers). These estimates provide more detail than those shown in Figure 3 for the two pooled subsamples for 2001-2008 and 2012-2017.

These results suggest consistently that excess mass estimates for coupled individuals are greater than for single individuals, and for both taxpayer types excess mass values for the self-employed are much larger than for all taxpayers combined. Following the introduction of the higher top tax rate in 2001, excess mass estimates generally increased over the next three to four years. For self-employed coupled individuals, this seems to have occurred relatively quickly with the highest excess mass value, 11.2, in 2002 before a gradual decline to 7.6 in 2008.

For singles, however, whether self-employed or all singles combined, excess mass values

Table 1: Excess Mass Estimates for All Individuals

Year	Singles		Individuals in couples					
			All		Same bracket		Different brackets	
	Excess mass	s.e.	Excess mass	s.e.	Excess mass	s.e.	Excess mass	s.e.
2001	0.944	0.398	2.612	0.328	6.406	0.679	1.246	0.273
2002	0.802	0.376	3.515	0.297	6.715	0.475	2.207	0.280
2003	1.152	0.299	3.656	0.300	7.859	0.573	2.059	0.280
2004	3.090	0.326	4.139	0.285	7.487	0.591	2.888	0.239
2005	2.514	0.260	3.529	0.267	6.026	0.405	2.539	0.290
2006	1.605	0.247	2.862	0.229	4.975	0.397	2.016	0.205
2007	1.422	0.212	2.728	0.221	4.754	0.323	1.890	0.216
2008	0.772	0.198	1.724	0.221	3.296	0.306	1.024	0.219
Pooled 2001-2008	1.530	0.155	3.011	0.185	5.583	0.256	1.978	0.166
2012	1.066	0.264	1.891	0.297	3.250	0.432	1.380	0.266
2013	1.216	0.220	1.583	0.294	2.782	0.389	1.121	0.269
2014	0.832	0.216	1.719	0.265	2.603	0.367	1.360	0.245
2015	0.697	0.173	1.402	0.244	2.146	0.347	1.092	0.215
2016	0.723	0.172	1.249	0.227	2.117	0.345	0.892	0.198
2017	0.590	0.173	1.379	0.249	2.029	0.365	1.092	0.219
Pooled 2012-2017	0.827	0.167	1.529	0.237	2.454	0.323	1.153	0.205

Note: t-ratios for all excess mass estimates exceed 2.

Table 2: Excess Mass Estimates for Self-employed

Year	Singles		Individuals in Couples					
			All		Same bracket		Different brackets	
	Excess mass	s.e.	Excess mass	s.e.	Excess mass	s.e.	Excess mass	s.e.
2001	6.413	0.558	9.077	0.362	13.270	0.694	6.140	0.381
2002	7.277	0.492	11.180	0.371	13.580	0.806	9.189	0.408
2003	7.329	0.532	10.840	0.480	15.040	0.906	7.612	0.545
2004	8.309	0.558	10.090	0.482	13.680	0.823	7.512	0.433
2005	7.618	0.518	8.414	0.412	10.470	0.571	6.799	0.443
2006	6.107	0.584	8.119	0.402	10.300	0.649	6.416	0.413
2007	4.935	0.439	8.512	0.425	10.840	0.625	6.675	0.455
2008	6.010	0.488	7.594	0.451	10.020	0.579	5.558	0.461
Pooled 2001-2008	6.692	0.215	9.089	0.256	11.890	0.351	6.905	0.232
2012	4.846	0.509	6.914	0.477	9.169	0.735	5.385	0.460
2013	4.973	0.515	6.632	0.452	8.626	0.659	5.251	0.434
2014	5.100	0.475	6.904	0.531	8.353	0.675	5.843	0.493
2015	5.057	0.450	6.596	0.510	7.723	0.678	5.791	0.458
2016	4.763	0.473	6.226	0.476	7.340	0.626	5.427	0.471
2017	4.763	0.415	6.588	0.550	7.602	0.786	5.811	0.525
Pooled 2012-2017	4.915	0.354	6.641	0.458	8.104	0.585	5.591	0.394

Note: t-ratios for all excess mass estimates exceed 2.

reach a peak in 2004 before declining similarly to 2008. This may reflect greater difficulties experienced by singles, and especially single employees, setting up suitable income-shifting arrangements from 2001, compared to self-employed couples for whom income sharing within the household was relatively low cost following the top marginal rate rise.

During 2012-2017, following the minor (2009) and major (2011) marginal tax rate reductions, annual excess mass values for all taxpayer types remain lower and relatively stable. For the self-employed, all excess mass values appear lower than their values during 2001-2008. This provides some vindication for the 2011 reforms, which were designed in part to improve tax compliance by top rate taxpayers via reductions in the top personal marginal rate, and alignment of that rate with the rate applicable to family trusts, which had been a common destination for diverted income; see Buckle (2010).

Tables 1 and 2 distinguish bunching estimates for partners who are observed in the same, or different, tax brackets. As with the distinction between singles and couples in general, within couple families there are big differences in each year between those with partners in the same or different brackets. Like the pooled evidence in Figure 3, there is strong support for the hypothesis that excess mass values are higher where partners both earn income in the same bracket. Indeed, for all taxpayers, values for coupled individuals in different tax brackets are similar to those for equivalent single individuals.

Furthermore, the large differences which emerge soon after the 2001 top tax rate increase, tend to diminish during 2003-08, and after the 2011 reform excess mass values are more similar between the two couple types, though differences in annual excess mass estimates remain statistically different. The value of the excess mass is much larger for self-employed couples, almost certainly reflecting the relative ease with which such coupled individuals can reallocate taxable income within the family in response to tax rate differences.

Annual and Pooled ETI Estimates

Numerical values of ETI estimates are presented in Table 3 for all individuals, and in Table 4 for the self-employed.[39] Results for individuals in different tax brackets are shown in Figure 4, for self-employed taxpayers and also when combined with wage earners ('All taxpayers'), with 95 per cent confidence intervals around each estimate. While ETI point estimates for couples in different tax brackets are generally above those for singles, this is not always the case and confidence intervals can be seen to substantially overlap. Indeed t-tests of differences between these point estimates suggest no statistical differences except for the

[39] Results from t-tests for differences in excess mass estimates between singles and couples and between couples in the same and different brackets in Table 3, confirm that all differences are statistically significant at 5 per cent except for the single-couple excess mass difference in 2013.

'All taxpayers' groups in 2002, 2003, 2017 and (pooled) 2001-2008, and for self-employed taxpayer differences in 2002 and 2007.

Table 3: ETI Estimates for All Individuals

Year	Singles	Individuals in couples		
		All	Same bracket	Different brackets
2001	0.084	0.232	0.569	0.111
2002	0.071	0.312	0.596	0.196
2003	0.102	0.325	0.698	0.183
2004	0.274	0.368	0.665	0.257
2005	0.223	0.313	0.535	0.226
2006	0.143	0.254	0.442	0.179
2007	0.126	0.242	0.422	0.168
2008	0.069	0.153	0.293	0.091
Pooled 2001-2008	0.136	0.267	0.496	0.176
2012	0.174	0.308	0.530	0.225
2013	0.198	0.258	0.454	0.183
2014	0.136	0.280	0.424	0.222
2015	0.114	0.229	0.350	0.178
2016	0.118	0.204	0.345	0.145
2017	0.096	0.225	0.331	0.178
Pooled 2012-2017	0.135	0.249	0.400	0.188

Section 4.3 and Table 3 summarised results from pooled samples for decompositions of the self-employed according to the employment status of their partners. More details on annual and pooled samples are given in Tables 5 and 6, including results from t-tests of the hypothesis that excess mass values differ across the two sub-samples of self-employed and wage-earning partners. This confirms that excess mass and ETI values are larger for self-employed taxpayers partnered with other self-employed taxpayers compared to those partnered with wage-earners. For the wage-earning taxpayers in Table 6, t-tests are less clear-cut (in large part due to the low values of the ETI for most wage-earners). However, there are a number of cases where the ETI for wage-earners partnered with a self-employed taxpayer significantly exceeds (at 5 per cent) the equivalent ETI for two partnered wage-earners.

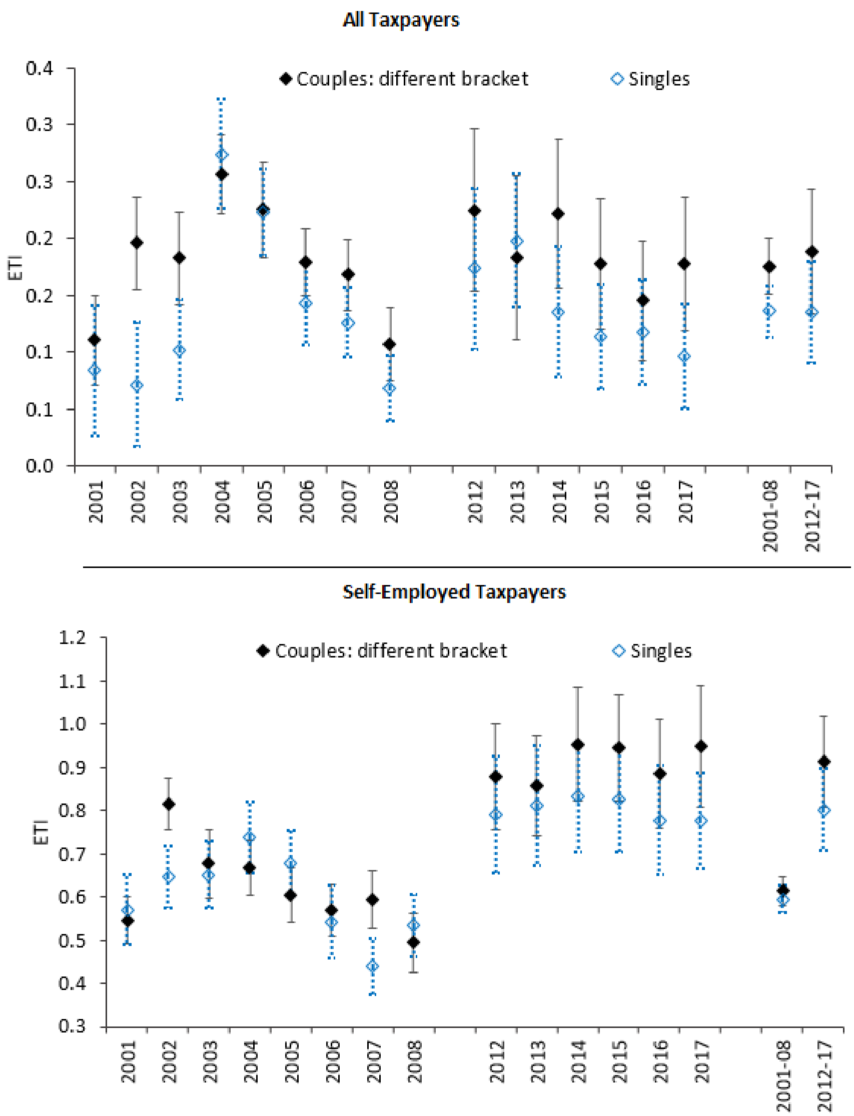

Figure 4: ETIs for Singles versus Couples in Different Brackets

Table 4: ETI Estimates for Self-employed

Year	Singles	Individuals in couples		
		All	Same bracket	Different brackets
2001	0.570	0.806	1.179	0.545
2002	0.646	0.993	1.206	0.816
2003	0.651	0.963	1.336	0.676
2004	0.738	0.896	1.215	0.667
2005	0.677	0.747	0.930	0.604
2006	0.542	0.721	0.915	0.570
2007	0.438	0.756	0.963	0.593
2008	0.534	0.675	0.890	0.494
Pooled 2001-2008	0.594	0.807	1.056	0.613
2012	0.790	1.127	1.495	0.878
2013	0.811	1.081	1.407	0.856
2014	0.832	1.126	1.362	0.953
2015	0.825	1.076	1.259	0.944
2016	0.777	1.015	1.197	0.885
2017	0.777	1.074	1.240	0.948
Pooled 2012-2017	0.801	1.083	1.322	0.912

Table 5: ETI Estimates for Different Self-employed Partner Decompositions

Taxpayer: self-employed	All	(t-ratio)	SE-only	(t-ratio)	WE-only	(t-ratio)	EM t-test SE=WE[b]
	Taxpayer's partner type[a]						
2001	0.806	(25.1)	0.938	(22.7)	0.411	(7.6)	(7.7)
2002	0.993	(30.1)	1.090	(24.1)	0.672	(11.4)	(5.6)
2003	0.963	(22.6)	1.085	(20.7)	0.582	(11.3)	(6.8)
2004	0.896	(20.9)	1.010	(20.6)	0.596	(9.7)	(5.2)
2005	0.747	(20.4)	0.886	(19.0)	0.401	(8.80)	(7.5)
2006	0.721	(20.2)	0.846	(20.0)	0.416	(9.4)	(7.0)
2007	0.756	(20.0)	0.842	(18.9)	0.524	(9.8)	(4.6)
2008	0.675	(16.8)	0.794	(16.3)	0.361	(7.30)	(6.2)
Pooled 2001-2008	0.807	(35.4)	0.926	(35.0)	0.483	(22.3)	(12.8)
2012	1.127	(14.5)	1.300	(14.7)	0.741	(8.8)	(4.6)
2013	1.081	(14.8)	1.307	(15.1)	0.589	(7.9)	(6.3)
2014	1.126	(13.0)	1.282	(12.4)	0.752	(9.4)	(4.1)
2015	1.076	(12.9)	1.268	(11.7)	0.674	(10.8)	(4.8)
2016	1.015	(13.1)	1.225	(12.4)	0.602	(8.5)	(5.2)
2017	1.074	(12.0)	1.300	(11.1)	0.597	(9.2)	(5.3)
Pooled 2012-2017	1.083	(14.5)	1.281	(14.1)	0.657	(12.7)	(6.0)

Notes: [a] t-ratios in columns 3, 5 and 7 test excess mass (EM) values different from zero.
[b] t-ratio for EM differences between SE-only and WE-only sub-samples.

Table 6: ETI Estimates for Different Wage-earner Partner Decompositions

Taxpayer:		Taxpayer's partner type[a]					EM t-test
Wage-earner	All	(t-ratio)	SE-only	(t-ratio)	WE-only	(t-ratio)	SE=WE[b]
2001	-0.060	(-1.82)	0.058	(0.88)	-0.078	(-2.35)	(1.84)
2002	-0.015	(-0.49)	-0.054	(-0.97)	-0.008	(-0.27)	(-0.73)
2003	0.043	(1.48)	0.085	(1.77)	0.036	(1.27)	(0.87)
2004	0.158	(6.71)	0.234	(5.59)	0.147	(6.068)	(1.79)
2005	0.151	(6.08)	0.201	(4.05)	0.143	(6.045)	(1.05)
2006	0.100	(4.78)	0.131	(2.96)	0.096	(4.865)	(0.72)
2007	0.085	(4.38)	0.151	(4.07)	0.076	(3.972)	(1.80)
2008	0.001	(0.03)	0.030	(0.83)	-0.003	(-0.19)	(0.83)
Pooled							
2001-2008	0.069	(4.21)	0.114	(4.69)	0.061	(3.77)	(1.78)
2012	0.119	(2.60)	0.103	(1.63)	0.121	(2.69)	(-0.24)
2013	0.080	(1.75)	0.096	(1.52)	0.078	(1.70)	(0.24)
2014	0.089	(2.31)	0.096	(1.66)	0.088	(2.35)	(0.11)
2015	0.044	(1.27)	0.119	(2.20)	0.034	(1.02)	(1.32)
2016	0.025	(0.72)	0.029	(0.54)	0.024	(0.72)	(0.08)
2017	0.031	(0.87)	0.044	(0.76)	0.030	(0.86)	(0.21)
Pooled							
2012-2017	0.063	(1.89)	0.081	(1.79)	0.055	(1.73)	(0.35)

Notes: [a] t-ratios in columns 3, 5 and 7 test excess mass (EM) values different from zero.
[b] t-ratios for EM differences between SE-only and WE-only sub-samples.