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The Living Standards, Incomes and Accommodation Costs of Older New Zealanders Revisited

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The Living Standards, Incomes and Accommodation Costs of Older New Zealanders Revisited

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Ivan Tuckwell

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Regrettably our colleague Ivan Tuckwell passed away during the finalisation of this paper. We would like to record our appreciation of the skill and knowledge that Ivan brought to all his modelling work.

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D I S C L A I M E R

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Abstract

In 2001 the then Ministry of Social Policy published a comprehensive study of the living standards of older New Zealanders. The current paper revisits the estimated relationship between material well-being and the current income and accommodation costs of older people, and questions the extent to which income and accommodation costs directly affect well-being or proxy for other factors. We first extend the estimated relationship between material well-being and current income to include the source of the income as well as its level. We find that controlling for different income sources roughly halves the estimated associative effect of income on material well-being. Furthermore, for a given level of income, those with higher fractions of either employment earnings or capital investment income have significantly higher material well-being scores, while those with a higher fraction of income from benefit allowances have lower scores. One interpretation is that these factors may proxy for other causal factors, such as health and wealth effects, rather than reflecting a direct income effect. Next, we extend the original specification between material well-being and accommodation costs to, first, include property rates as an accommodation cost and, second, to control for the type of housing tenure (freehold homeowner, mortgaged, renter, and no accommodation costs). We find that, controlling for housing tenure, the estimated effect of accommodation costs (including rates) is, at most, half that originally estimated and, for some specifications, insignificantly different from zero. Furthermore, controlling for the level of accommodation costs, mortgage holders and renters have significantly lower material well-being scores than freehold homeowners. These findings suggest that understanding what influences the material well-being outcomes of older people is not as straightforward as might be suggested by the simple association of certain variables.

JEL CLASSIFICATION I32 – Measurement and Analysis of Poverty

KEYWORDS Living standards; material well-being; current income; accommodation costs

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The Living Standards, Incomes and Accommodation Costs of Older New Zealanders Revisited

1 Introduction

It is commonly assumed that a family's current income is a good proxy measure of its living standards. This assumption lies behind the widespread use in many countries of income, in various forms and in comparison with some benchmark standard, as a measure of whether a family unit is in poverty. One problem with using income itself as a component of a living standards measure is that it complicates the analysis of the relative importance of income as against various other factors that might influence living standards. Income can not then be included with other explanatory variables, since it is itself the 'living standard' variable whose determinants we seek to understand.

An alternative approach is to use standard of living indicators that do not include income. This approach uses information on the extent to which people exhibit symptoms of low living standards, such as an inability to access basic goods and services or to participate in desired social activities, together with self-assessments, to construct an index measure of living standards. It is then possible to explore empirically the strength and interaction of various factors, including income, on this index. Income can enter an explanatory model because it is not a direct component of the living standards measure one is seeking to explain.

This approach was adopted in a work programme to measure and evaluate the living standards of older New Zealanders, commissioned by the Super 2000 Taskforce and continued and extended in 2001 by the then Ministry of Social Policy. A survey of older people was conducted in 2000, and a new Material Well-being Scale was developed.¹ Regression analysis published at the time indicated that the material living standard that older New Zealanders are able to enjoy in their retirement depends on their current net

¹ The results of this study are contained in two published reports: a summary report (Fergusson, Hong, Horwood, Jensen and Travers, 2001a) for the lay-reader; and a companion full report (Fergusson *et al.* 2001b) that provides a detailed coverage of the technical details that underlie the analysis. Our subsequent references to this work will focus on the Fergusson *et al.* (2001b) technical report and will often refer to this as the "original report". Related studies of living standards published by the Ministry of Social Development include a study of the living standards of older Maori by Cunningham, Durie, Fergusson, Fitzgerald, Hong, Horwood, Jensen, Rochford, and Stevenson (2002), and a study to develop an "economic living standards index" by Jensen, Spittal, Crichton, Sathiyandra and Krishnan (2002).

income, albeit rather weakly, as well as a number of other socio-economic factors, such as accumulated assets and accommodation costs.²

In this paper we revisit the estimated relationships between the living standards of older people and their current income and accommodation costs. The objective of this work is to extend the previous analysis to better understand the source(s) of these observed relationships, and the extent to which they reflect direct effects of current income and accommodation costs on well-being as opposed to acting as proxies for other factors that determine living standards in retirement. For this purpose we focus specifically on testing the following two hypotheses implied by the previous analysis: first, that only current income, and not the source of income, is associated with well-being; and second, that only accommodation costs, and not the type of accommodation tenure, is associated with well-being.

It is important to emphasise that it is *not* the objective of this paper to provide a critique of the general methodology or findings of the original report. Thus, for instance, we remain silent on the broader issues concerning the validity of such methods of modelling living standards, and statistical implications of such issues as the opposite skewness of the well-being index and income distributions.³ We also accept the linear regression framework for modelling the influences on living standards. Rather, we take on face value the underlying basis for the reported analysis, and use the regression specification(s) adopted as the point of departure for a re-evaluation of these two specific issues.

The first focus of the paper is the relationship between material well-being and current income. The original analysis presented in Fergusson *et al* (2001b) maintained a simple linear specification between the living standards of older people and the logarithm of their total net income.⁴ The implication of this specification, which we focus on and relax in our re-analysis, is that the marginal dollar of income has the same (associative) effect on living standards irrespective of the source of that income. In particular, controlling for total net income, we examine whether the fraction of income derived from alternative sources matters for the estimated relationship.

We find that controlling for the fraction of income from different sources roughly halves the estimated associative effect of income on material well-being. Furthermore, for a given level of income, those with higher fractions of either employment earnings or capital investment income have significantly higher material well-being scores, while those with a higher fraction of income from benefit allowances have lower scores. These results demonstrate that the relationship between material well-being and current income of older people is more complicated than that specified in the original report. We suggest that, rather than reflecting a direct income effect, the estimated relationship may proxy for other factors, such as health and wealth, which are correlated with alternative sources of older people's income.

The second focus of the paper concerns the estimated relationship between older people's living standards and their accommodation costs. As with the treatment of income, the original analysis adopted a simple linear specification between living

² For example, it was estimated that income variation accounts for between 6% and 16% of the variation in the material well-being index (Fergusson *et al*, 2001a, p. 42), suggesting the correlation between income and well-being of between 0.25 and 0.4.

³ Note that the upper-end compression of the well-being index, together with the lower-end compression of the income distribution for older New Zealanders due to New Zealand Superannuation, may help explain some of the relatively low correlation between measured well-being and income. See, for example, Krishnan, Jensen and Ballantyne (2002) for more discussion of this issue and consideration of future work to explore reducing the compression at the upper-end of the well-being index distribution.

⁴ Fergusson *et al* (2001b) examined whether the relationship between living standards and income was better described using the *level* or the *logarithm* of total net income, and concluded the logarithm specification was preferred.

standards and the logarithm of accommodation costs. Also, property rates were excluded from the measure of accommodation costs. Our re-analysis of the accommodation costs relationship, first, considers the effect of including property rates to obtain a more complete measure of accommodation costs and, second, controlling for total accommodation costs, examines whether the type of accommodation tenure (freehold home owner, mortgage holder, renter, or no accommodation costs) matters for the estimated relationship.

We find that including property rates in accommodation costs, without controlling for housing tenure, tends to reduce the estimated effect of accommodation costs by about 20%. Also, when we control for housing tenure, the estimated effect of accommodation costs (including rates) is, at most, half that originally estimated and, for some specifications, much less and insignificantly different from zero. Furthermore, controlling for the level of accommodation costs, mortgage holders and renters have significantly lower material well-being scores than freehold homeowners. These findings again strongly suggest the original report's specifications are too simple, and draw into question whether there is a direct effect of accommodation costs levels on the material well-being of older people, or whether the estimated correlation between these reflects other factors.

The paper is organised as follows. In section 2, we briefly summarise the methods and main findings of the original report on the living standards of older New Zealanders, and discuss the nature of our concerns and proposed analysis. In Section 3, we present and discuss our empirical analysis. We first replicate the results from the original report, and then investigate the robustness of this specification for understanding the relationship between material living standards and, in turn, current income, and accommodation costs. The paper concludes with a summary discussion in section 4.

2 The Living Standards Survey

The 2000 Survey of New Zealanders aged 65 and over was designed to help develop a measure of material living standards using a deprivation approach. In this section we provide a brief review of the background to the Fergusson *et al* (2001a&b) report on the living standards of older New Zealanders, and the results from that report. Our discussion here is obviously not intended to provide either a detailed or complete coverage of the issues considered in this report, and the interested reader is encouraged to read the original source for such discussion. Following this, we turn to the issues that are the focus of the current analysis.

2.1 The original survey analysis

The research defined the living standards of an older New Zealander or couple⁵ as their material conditions and consumption. More particularly from a deprivation point of view “material well-being” was taken to be adversely impacted by material conditions and consumption that are wanted but not able to be met because of economic restrictions.⁶ Despite the inclusion of many deprivation-type questions, the intention behind the survey

⁵ The unit of analysis used in the survey was the Core Economic Unit (CEU), namely a couple (living alone or with others) if the respondent was partnered (regardless of age or sex), or a single older person (living by themselves or with others) if the respondent was not partnered.

⁶ Fergusson *et al* (2001b, p21).

was to measure living standards outcomes for older people across a continuum from hardship to comfort and not to focus solely on the poverty end of the scale.

Living standards were measured by construction of a “Material Well-being Scale” (MWBS), estimated using confirmatory factor analysis, which assumes that material well-being is a latent variable that is reflected in a set of observable sub-scales or aggregate indicator variables. The subscales selected by the researchers comprised: *ownership restrictions* – items respondents wanted to own but could not because they could not afford them; *social participation restrictions* – social activities that respondents wanted to do but could not because of a lack of money; *economising behaviours* – the extent to which respondents reported making economies in key areas; *severe financial problems* – the extent to which respondents had faced severe financial problems in the last 12 months; and *self-assessments* – respondents’ self-ratings of living standards and the adequacy of their income.

The material wellbeing scores were scaled to have a mean value of 100 and a standard deviation of 10. However, the questionnaire’s focus on the hardship end of living standards resulted in a distribution of scores that is quite skewed. For example, the maximum material well-being score was 115, 63% of respondents had material well-being scores at or above the mean of 100, and 9% of respondents had scores of at-least 109, while 5% had scores less than 80 (see Figure 6.1, page 86). Thus, the scale is not very effective in discriminating among living standards that are above average and, more accurately, may be considered to be primarily a “deprivation index”⁷.

Information was also collected on a range of variables that might be important correlates or predictors of variation in the material well-being scores. These variables included demographic characteristics (such as age, ethnicity and educational qualifications), health status, income, accommodation costs, whether people had experienced certain adverse life events, and so on. The report used regression methods to assess the correlation or predictive content of these factors for the material well-being index.⁸

2.2 Why the correlation between income and material well-being is so low

The original researchers reported that the correlation between an older person’s current income and their material well-being score,⁹ while clearly statistically significant, was not particularly strong. For example, among single people, the simple correlation was 0.24, while in a more complete regression model, variation in their income explained only 6% of the variation in their material well-being scores. This modest association may not be particularly surprising for this population when one considers that there are many factors in addition to income, such as financial assets, housing tenure or health status, which can influence people’s ability to experience a comfortable lifestyle in retirement.

⁷ Respondents with scores above the mean tend to report no ownership or social participation restrictions, no severe financial problems and very few economising behaviours. Differences in material well-being among this group are therefore based almost entirely on how they assess their own standard of living (on a 5-point scale) and the adequacy of their income to meet everyday needs (on a 4-point scale).

⁸ It is not clear from the report, whether a distinction is drawn between “correlation” and “predictive” ability of these variables. That is, whether any measured correlations between material well-being and these variables is interpreted as representing a direct, or causal, effect of the variable on material well-being?

⁹ The results reported here refer to a specification of the (base-10) logarithm of annual income.

Another reason for the apparently low correlation between income and material well-being may be that the almost universal¹⁰, guaranteed income at standard rates provided by New Zealand Superannuation (NZS) has resulted in a much more concentrated distribution of total retirement incomes than one observes in other countries. For example, almost all survey respondents report receiving NZS, and this source accounts for three-quarters of total income on average (see Table 1).

Figure 1 contrasts the distribution of material well-being scores with the distribution of current incomes. As noted above, well-being scores show a long tail to the left and have an upper bound. Incomes, by contrast are substantially bounded from below, but have a tail that extends to the right.

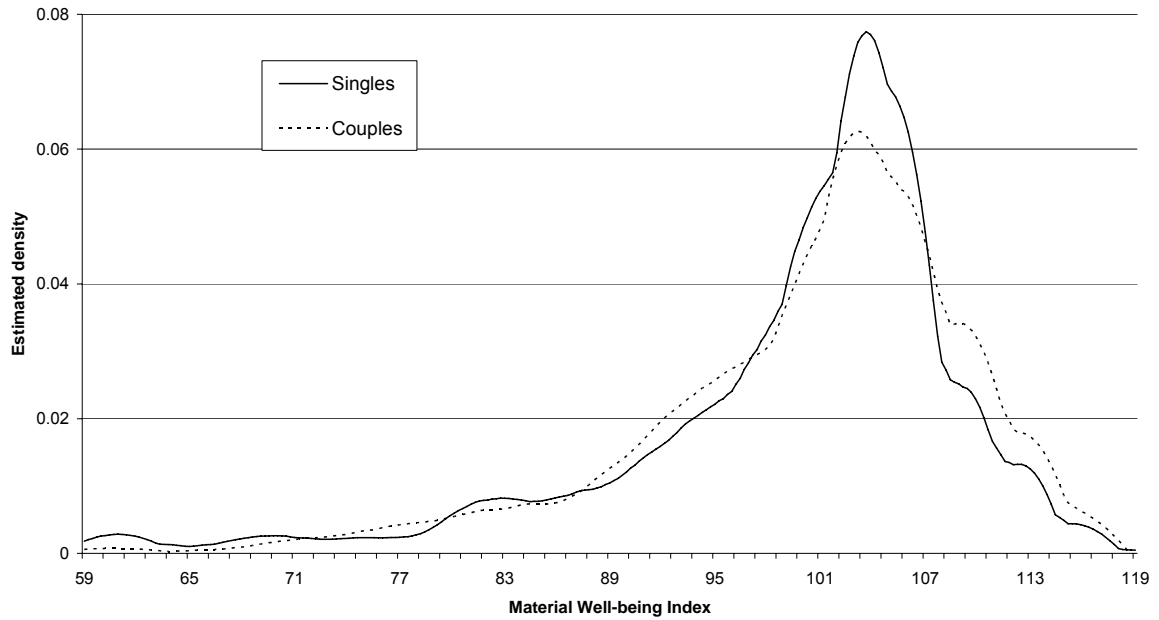
It is not surprising, therefore that two such differently shaped distributions should show a low degree of positive correlation. It is inevitable that many superannuitants on the modal income will show up spread across a considerable range of well-being scores. Similarly, those who are bunched near the top of the well-being scale will report a range of different incomes.

This point is illustrated in Figure 2, which shows scatterplots of current income against well-being score for single and couple core economic units.

¹⁰ All people aged 65 or over are eligible for NZS, except for a small percentage who have not yet met the 10-year New Zealand residency requirement, 5 years of which must be since age 50.

Figure 1 – Distribution of Material Well-being and Income

(a) Distributions of Material Well-being Scores



(b) Distributions of log(Income)

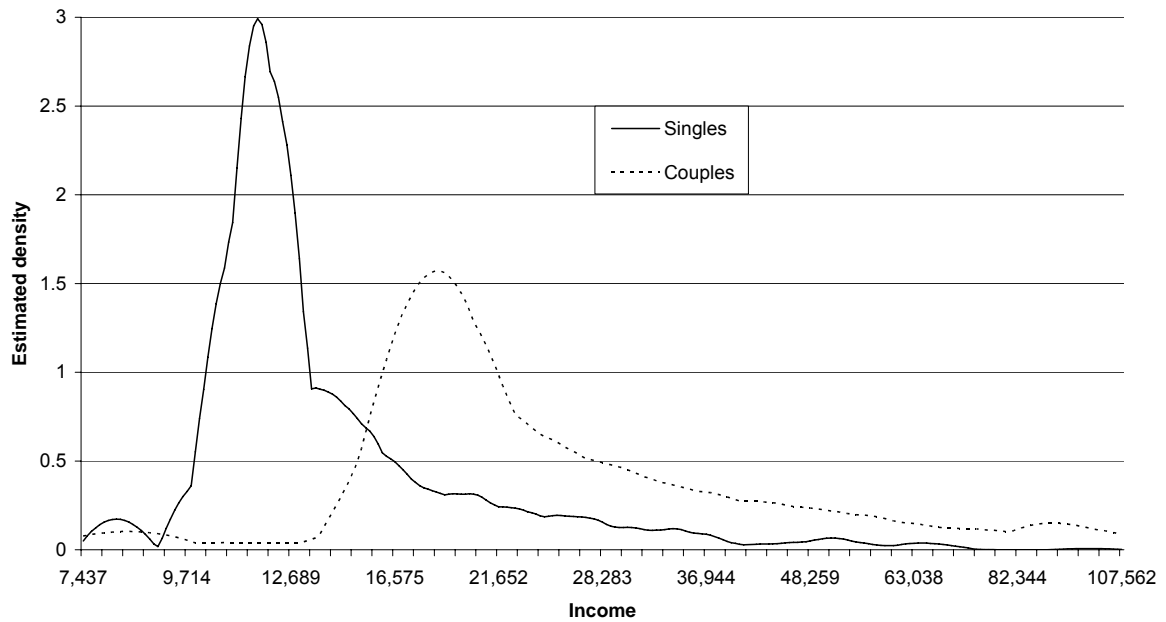
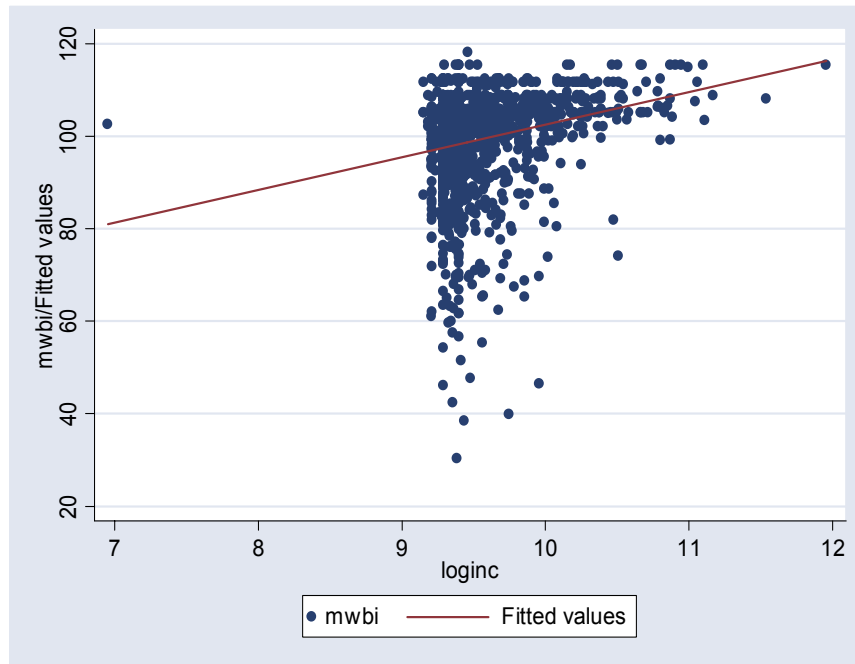
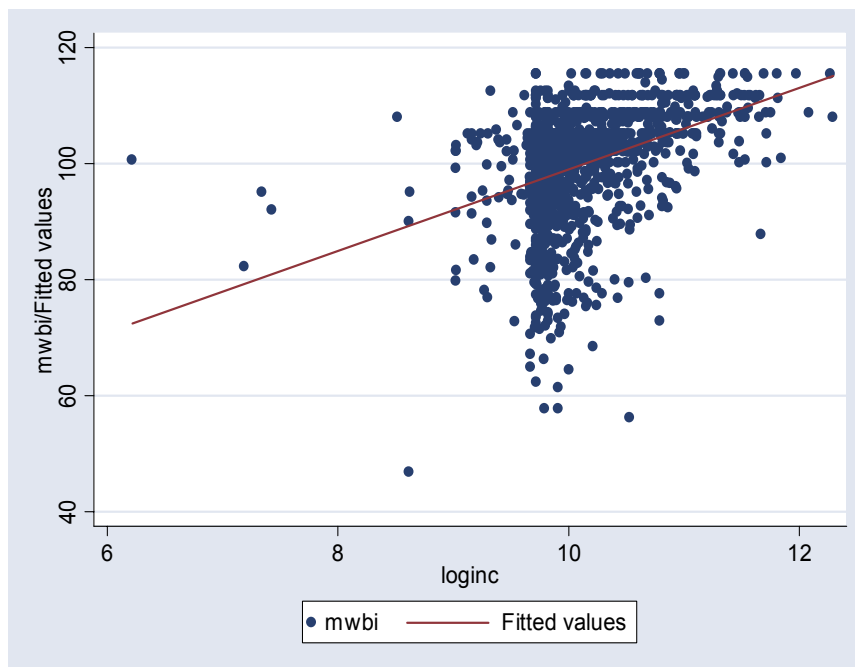


Figure 2 – Scatterplot of Material Well-being Scores and Income

(a) Single Core Economic Units (CEUs)



(b) Couple Core Economic Units (CEUs)



2.3 The Relationship between Material Well-being and Current Income

We now turn our consideration to the specification and interpretation of the relationship between the living standards of older New Zealanders and observable factors that may help “explain” individuals’ living standards. In particular, we focus here on two factors: first, the relationship between living standards and current income; and, second, the relationship between living standards and accommodation costs. We discuss issues associated with each of these in turn.

Despite the fairly low correlation revealed by Figure 2, the estimated relationship between income and material well-being was statistically significant. The main focus of our attention in this paper is the interpretation and robustness of this relationship. In particular, although current income is correlated with material well-being, this does not necessarily imply a causal link. That is, higher income in older age may act as a proxy for some other factor that independently determines a person’s material well-being. For example, if a person has extra income because of paid employment, his or her material well-being score may, in part, reflect a positive human capital or “health” factor that has facilitated an extended career. Alternatively, if extra income is primarily in the form of investment returns, this might indicate a wealth effect on material well-being. Similarly, if additional income is received in the form of benefit allowances, this might indicate that the person faces unusually high costs and might not have a high level of material well-being in relation to that income level.

One implication of the simple model specification adopted in the 2001 Report is that the marginal dollar of income has the same effect on material well-being irrespective of the source of that dollar (NZS, earnings, investment returns or benefit allowances). Testing this hypothesis helps to shed some light on the question of causation since, if different income sources have different sized effects on material well-being, this would suggest that income is acting as a proxy for one or more other factors.

In order to develop this idea further, we start with the original report’s generic regression specification for modelling the relationship between material well-being and income, controlling for demographic and other characteristics, which we express here as

$$Y_i = \beta_1 \log(Inc_i) + X_i' \gamma + u_i \quad (1)$$

where Y_i is the material well-being score of observation- i (pertaining to either an individual or a couple), $\log(Inc_i)$ is the (natural) logarithm of their total net (annual) income,¹¹ X_i is a vector of other observable control variables,¹² u_i is a residual term to capture unobserved effects, and β_1 and γ are regression model coefficients. In this specification, a 1% increase in net income is associated with a β_1 increase in material well-being. (If this

¹¹ Note, the specification in the original report used the base-10 logarithms for net income, $\log_{10}(Inc_i)$, (also for savings and investments, and accommodation costs). Base-10 and natural logarithms are related by $\log_{10}(Inc_i) = \log(Inc_i)/\log(10)$. We prefer the natural logarithm as small differences between natural logarithms of two incomes is approximately equal to the percentage difference in those incomes. In reporting the original results in table 3 below, we have transformed the coefficients to be on a consistent (natural log) scale to our estimates.

¹² X_i includes demographic factors (age, ethnicity, socio-economic status, CEU-type, educational qualifications, etc), other “current economic factors” (savings and investments, and accommodation costs), measures of “adverse economic life events” (measures of the number of recent “financial stressors”, and the number of adverse economic events over the 10-years 50-59), and a constant intercept term.

association is treated as causal, then a 1% increase in income “causes” a β_1 point increase in material well-being.)

As discussed above, the specification in equation (1) restricts the relationship between material well-being and net income to be the same across different sources of income, in the sense that a marginal increase in income has the same (associative) effect on material well-being irrespective of the source of that income. There are various ways in which this restrictive aspect of the specification could be relaxed and tested. The approach we adopt in the analysis reported below is to extend specification (1) to include the fractions of income from alternative sources:

$$Y_i = \beta_1 \log(Inc_i) + \sum_j \lambda_j IncSrc_{ji} + X_i' \gamma + u_i \quad (2)$$

where $IncSrc_{ji}$ is the fraction of CEU-i's income that is derived from source j , and λ_j is the regression coefficient on this fraction. In the analysis below, we consider two alternative source groupings. First, a fine grouping of income from seven sources: New Zealand Superannuation, wages and salaries, self employment, investment income, overseas income, private pensions, and benefit allowances. Second, we adopt a broader grouping into four sources, by aggregating wages and salaries and self employment income into “earned income”; and aggregating investment income, overseas income and private pensions into “capital income”.

The specification in equation (2) nests the original specification (1). In particular, if the hypothesis that only total income (and not the source of income) matters, then $\lambda_j=0$ for all sources. That is, the original specification is correct and equation (2) reduces to equation (1). On the other hand, if the source of income (as well as the level of income) has an associative effect on material well-being, then we would expect $\lambda_j \neq 0$ for at least one income source j . Thus, testing whether $\lambda_j=0$ for all sources of income provides a test of the simple specification in the original report via the hypothesis that only total income, and not the source of the income, affects material well-being. As discussed above, if this hypothesis is rejected, possible reasons may include that, conditional on total income (and other factors), higher fractions of earned income may proxy for better health, and/or that higher fractions of capital income (or lower fractions of benefit allowances) may proxy for higher wealth levels, both of which may be associated with higher material well-being.

We summarise the incidence of alternative income sources in Table 1: columns (1) and (2) describe the fractions of the sample with income from the various sources, while columns (3) and (4) describe the fractions of income from these sources. NZ Superannuation is the dominant income source with (almost) all the sample receiving NZS, and accounts for 74% of gross income of older people. In contrast, 16% have earned income (11% have wage and salary employment, and 7% have self employment), accounting for 5% of gross income; 77% received capital income (74% investments, 15% private superannuation, and 2% overseas income) accounting for 19% of gross income; and 19% of older people receive additional benefit allowances, which accounts for 2% of gross income.

As the sum of the income fractions across either set of sources is necessarily 1, we need to omit one source fraction from the regressions and choose to omit the fraction of income derived from NZ Superannuation. Given this specification, holding (the log of) total income (ie $\log(Inc_i)$) constant, a 1% higher fraction of income from source j (matched by a 1% lower fraction of income from NZ Superannuation) is associated with a $\lambda_j/100$ unit higher level of material well-being.

Table 1 – Description of Alternative Income Sources

Income Source:	Fraction of Sample		Fraction of Income	
	(1)	(2)	(3)	(4)
NZ Superannuation	1.00	1.00	0.74	0.74
Wages & Salary	0.11		0.03	
Self Employed	0.07		0.01	
Earned Income		0.16		0.05
Investment Income	0.74		0.15	
Overseas Income	0.02		0.01	
Private Pensions	0.15		0.04	
Capital Income		0.77		0.19
Benefit Allowances	0.19	0.19	0.02	0.02

Notes: The number of observations used is 2,986. All table entries are based on weighted calculations.

2.4 The Relationship between Material Well-being and Accommodation Costs

The second focus of our analysis is the way that accommodation costs had entered the model as a factor affecting the material well-being of older New Zealanders. In theory, high accommodation costs might be positively or negatively associated with material well-being. A positive association might arise if costs such as property rates were linked to ownership of a high valued house – the higher the rates, the more likely that the owner was prosperous. On the other hand, a negative association might exist if high accommodation costs were mainly in the form of rental payments by people who had been unsuccessful in acquiring their own home during their working life. The strength of the association between accommodation costs and material well-being, and whether it is positive or negative, might therefore depend critically on the relative importance of these two types of effect.

By analogy with our discussion of the relationship between material well-being and income above, the “type”, as well as the level, of accommodation costs may be an important predictor of material well-being. If so, this would also draw into question whether the estimated relationship represents a direct effect of accommodation costs on material well-being or whether accommodation costs are acting as a proxy for some other causal factor. Our interest in the relationship between material well-being and accommodation costs is also partly motivated by the fact that the measure of accommodation costs used in the original specification excluded property rates, and thus was only a partial measure of costs. In fact, it seems property rates were excluded from the measure of accommodation costs precisely because rates had a positive association with material well-being while other accommodation costs (mainly rent and mortgage payments) had a negative association.¹³ Using the narrower definition of accommodation

¹³ See Fergusson *et al* (2001a, footnote 26, page 113): “Note that the estimate of accommodation costs used here does not include rates. The reason for this is that in preliminary analysis it was found that the amount spent on rates was associated with increased material well-being, whereas other components of accommodation cost were negatively correlated with well-being.”

costs, the model estimation confirmed a statistically significant negative association between the level of material well-being and (the logarithm of) accommodation costs.

Thus, as with the income relationship discussed previously, the relationship between material well-being and accommodation costs may not reflect a simple causal interpretation. Indeed, that the reported preliminary analysis finds opposite signed effects of property rates and other components of accommodation costs suggests that accommodation costs (or its components) may simply be proxying for other factors, such as wealth and/or home ownership status, rather than having a direct impact on material well-being.

The accommodation-related characteristics of the older New Zealanders in the Survey are summarised in Table 2. The majority of older people are freehold homeowners (72%), compared to 6% with a mortgage, 13% renting, and 9% with no reported accommodation costs.¹⁴ Freehold homeowners also have substantially lower accommodation costs (\$21 per week) than either those with a mortgage (\$99 per week) or renters (\$94 per week). Note that older people living in institutional settings such as rest homes were not included in the coverage of the survey.

Table 2 – Description of Accommodation Tenure Variables

Accommodation Tenure:	Fraction of Sample (1)	Average Accommodation Cost (2)
Freehold Homeowner	0.72	\$21.08
Mortgaged Homeowner	0.06	\$98.94
Renter	0.13	\$93.97
No Accommodation Costs	0.09	\$0

Notes: The number of observations used is 2,986. All table entries are based on weighted calculations. Accommodation costs are weekly amounts.

Our approach here is to first adopt a more comprehensive definition of accommodation costs (by including property rates as an accommodation cost), and then to test whether the effect of this on people’s material well-being varies according to their type of housing tenure. This approach allows for the possibility that accommodation costs might have a different association with material well-being according to whether one is renting, mortgage free or still paying off a mortgage.

In particular, we again start with the original report’s generic regression specification as expressed in equation (1) above, but re-expressed here to highlight the role of accommodation costs:

$$Y_i = \beta_1 \log(Inc_i) + \beta_2 \log(Acc_i) + X_i' \gamma + u_i \quad (1')$$

where $\log(Acc_i)$ is the log of CEU-i’s accommodation costs, and β_2 is the associative impact of a 1% increase in accommodation costs on material well-being.

We focus our attention here on two issues. First, what is the estimated relationship between material well-being and full or “true” accommodation costs – ie the measure of accommodation cost that includes rates as well as rents and mortgage repayments?

¹⁴ This situation could arise, for example, where an older person lives with other family members who cover the costs of accommodation.

Second, whether, and if so how, the associative effect of accommodation costs on material well-being varies according to the type of accommodation tenure the CEU has: distinguishing freehold homeowner, mortgaged homeowner, renter, and those with zero accommodation costs. In particular, treating freehold ownership as the base category, we consider extensions to equation (1') that either includes dummy variables for the alternative tenure types and/or interactions between such dummy variables and $\log(\text{Acc}_i)$.¹⁵ That is, we consider variants of the following specification:

$$Y_i = \beta_1 \log(\text{Inc}_i) + \beta_2 \log(\text{Acc}_i) + \sum_k \delta_k D_{ki} + \sum_k \delta'_k D_{ki} \cdot \log(\text{Acc}_i) + X_i' \gamma + u_i \quad (3)$$

where D_{ki} is a dummy variable for whether CEU-i's accommodation tenure is of type-k, and δ_k and δ'_k are coefficients. We refer to equation (3) as the “dummy-variables” specification when $\delta'_k=0$ for all tenure types, and as the “interactions” specification when $\delta_k=0$ for all tenure types.

Again equation (3) nests the original specification, equation (1'). That is, if tenure type does not affect material well-being, then $\delta_k=0$ and $\delta'_k=0$ for all tenure types in equation (3), and this specification reduces to equation (1').

3 Empirical Analysis and Results

We now turn to our empirical analysis. Before reporting the results for the extensions to the specifications for the relationships between material well-being and current income and accommodation costs discussed above, we first briefly discuss our replication of the base specification from the original report. All the analysis presented here is weighted so as to be representative of the over-65 population of older New Zealanders. The weights used are a revised set of weights provided by the original researchers that, except for a scale adjustment, are the same as the original (Statistics New Zealand provided) weights for single CEUs, and for couple CEUs whose respondents' partners are also over-65, but equal to one-half of the original weights for couple CEUs with partners aged under-65.

3.1 Replicating the Original Results

We first present our replication of the base specification we adopt from the original report (Table 7.11) because we understand that some data editing by Statistics New Zealand has resulted in different versions of the base data being available. As a result of this issue and possibly different identification of outliers and/or treatment of missing data values, our analytical sample does not match exactly that used in the original report. For example, our sample has about 100 more observations than originally reported for the model that we adopt as our base specification. In particular, we compare the original results reported in Table 7.11 of the original report with our estimated version of this model. These results are reported, respectively, in columns (1) and (2) of Table 3 and appendix Table A1. Table 3 contains the estimates of the income variable coefficients, while the remaining coefficient estimates are reported in the appendix Table A1. Overall, the replicated results are close to the original results. Each of the estimated coefficients is not statistically significantly different from the original estimates at conventional levels of

¹⁵ We adopt a dummy variable approach for accommodation tenures here rather than, by analogy with how we relax the income specification, the fractions of accommodation costs ascribed to different components (rent, mortgage repayments, rates, etc) because these are largely mutually exclusive (rates and mortgage repayments aside).

significance,¹⁶ and only two coefficient estimates (on the interaction between the Couple CEU dummy variable and the Number of Adverse Events, and the NZSEI Score variable) differ by more than 1 standard error. Also, that the R-squared from our regression model (0.39) is a little lower than the original specification (0.40), suggests that the more inclusive sample used here contains more outliers than in the original analysis.

Although we have been unable to achieve a complete replication, we believe the results of the analysis presented here are sufficiently close to provide confidence that our analysis closely replicates the earlier analysis. Subsequently, we treat the specification in column (2) of Table 3 as our base specification for extending the analysis of the relationship between material well-being and incomes and accommodation costs outlined above. We now turn to our main analyses.

Table 3 – Alternative Material Well-being and Income Specifications

	Original Specification	Replication	Six Income Indicators	Three Income Indicators
	(1)	(2)	(3)	(4)
log(Income)	4.69 (0.37)	4.62 (0.39)	2.36 (0.81)	2.42 (0.79)
Fraction of Income from:				
Wages and Salary			4.83 (1.80)	
Self employment			5.25 (2.04)	
Earnings				4.88 (1.66)
Investments			6.02 (1.62)	
Overseas			-0.38 (4.47)	
Private pensions			5.76 (1.95)	
Capital				5.64 (1.58)
Benefit allowances			-7.01 (3.61)	-7.01 (3.61)
Intercept	74.26 (2.56)	74.84 (2.55)	78.47 (2.91)	78.44 (2.91)
R-squared	0.40	0.39	0.40	0.40
No. Observations	2,882	2,986	2,986	2,986

Notes: Estimated standard errors are in parentheses. All table entries are based on weighted calculations.

¹⁶ The F-statistic for testing the equivalence of all the coefficients is 1.66 (p-value=0.05).

3.2 Relaxing the Income Specification

We first focus on the relationship between material well-being and current income. Columns (3) and (4) of Table 3 contain estimates from two alternative specifications considered for relaxing the income specification in the model presented in column (2).

The first specification, in column (3), includes the fraction of total income from each of the six (excluding NZ Superannuation) income sources wages and salaries, self employment, investment income, overseas income, private pensions and benefit allowances. The results of this exercise imply, first, that the estimated associative effect of $\log(\text{income})$ on material well-being is about one-half that presented in column (2), suggesting that current income *per se* is less important than the original report found. That is, a 10% increase in income is associated with about a 0.24 increase in material well-being score compared to an estimate of about a 0.46 in column (2).

Second, controlling for the level of total income (and other factors), the fraction of income from each of these sources, other than from overseas, is individually significantly correlated with material well-being. A 10 percentage point increase in wage and salary, self-employment, investment, or private pension income, at the expense of a 10 percentage point decrease in NZ Superannuation, is associated with an increase in material well-being score of 0.4—0.6, while a 10 percentage point increase in benefit allowances is associated with a 0.7 point fall in material well-being score.

It is also worth noting that the standard error on the coefficient of $\log(\text{income})$ in this specification is roughly double that in column (2). This is due to the income source fractions being quite strongly correlated with $\log(\text{income})$, and implies potential difficulty in identifying effects associated with (the log of) income versus the source of income. Nonetheless, there remains sufficient precision in the estimates to reject, at conventional levels of statistical significance, the hypotheses that the coefficients on the income source fractions are zero, and that the coefficient on $\log(\text{income})$ is the same as estimated in column (2).

The comparative similarity between the estimated coefficients on the fractions of income from wages and salary and self-employment income, and on the fractions of income from private pensions, overseas and other income, lead us to consider aggregating these two sets of income sources, giving four income sources: NZ Superannuation, “earned” income, “capital” income, and other benefit allowances. The regression results based on this more parsimonious specification are reported in column (4) of Table 3. The results are similar to those reported in column (3), and the two sets of restrictions are individually and collectively accepted statistically.¹⁷

The results presented here imply that the originally specified relationship between material well-being and current income is incomplete and, at least, too simplistic to be interpreted as representing direct causal effect from current income to material well-being. Although, we are not necessarily proposing the extended specifications here as being “correct”, we believe the results from these specifications provide a better appreciation of the observed relationship(s) between material well-being, current income and its sources for older New Zealanders. For example, the results are consistent with the hypotheses that current income, at least partially, proxies for other factors that affect material well-being, and that these factors may be related to the health and wealth holdings of older New Zealanders.

¹⁷ The F-statistics (with p-values in parentheses) are as follows: for the equivalence of the two earned-income coefficients, 0.05 (0.82); for the equivalence of the three capital-income coefficients, 1.06 (0.35); and for both of these tests, 0.72 (0.54). Furthermore, the equivalence of the earned- and capital-income effects is also accepted at conventional significance levels: $F=0.68$ (p-value=0.60).

3.3 Relaxing the Accommodation Costs Specification

We now focus on the relationship between material well-being and accommodation costs. Our re-analysis of this relationship begins by replacing the accommodation cost measure used in the original report, which excludes property rates, with what we refer to as “true” accommodation costs, which includes rates as well as the other components of accommodation costs. To examine the effect of this change, column (1) of Table 4 reproduces the results of our attempted replication of the baseline model, reported in column (2) of Table 3, using the measure of accommodation costs excluding rates, while column (2) contains the results from the corresponding regression using “true” accommodation cost measure. The effect of including rates in accommodation costs is to lower the estimated accommodation costs’ coefficient from -1.04 to -0.86, although this change is not statistically significant at conventional levels.

Table 4 – Alternative Material Well-being and Accommodation Costs Specifications

	Table 3.2 Specification (1)	With True Acc Costs (2)	Spec 3.4, True Acc Costs (3)	3 Acc-tenure Indicators (4)	Acc Cost Interactions (5)	Indicators & Interactions (6)
log(Acc'n costs)	-1.04 (0.12)					
log("True" Acc'n costs)		-0.86 (0.12)	-0.76 (0.12)	-0.56 (0.17)	-0.20 (0.14)	-0.21 (0.21)
Accommodation tenure:						
Mortgaged				-4.68 (0.83)		-1.97 (2.24)
Renter				-2.56 (0.61)		-0.18 (1.38)
Zero Acc'n costs				-0.83 (0.75)		0.14 (0.83)
Mortgage *					-1.23 (0.21)	-0.79 (0.58)
log(True Acc'n costs)						
Renter *					-0.77 (0.15)	-0.73 (0.36)
log(True Acc'n costs)						
Intercept	74.84 (2.55)	76.43 (2.51)	79.78 (2.92)	80.38 (2.99)	79.41 (2.95)	79.49 (3.01)
R-squared	0.39	0.38	0.39	0.40	0.40	0.40

Notes: Estimated standard errors are in parentheses. The number of observations used in all regressions is 2,986. All table entries are based on weighted calculations.

Next we re-estimate the specification from Table 3, column (4), which includes the fractions of income from earnings, capital and benefit allowances, and again uses the “true” accommodation costs measure. The results for this specification are contained in column (3) of Table 4. The impact of using “true” accommodation costs is again similar to that between columns (1) and (2): the accommodation costs’ coefficient falls from -0.95 to -0.76, although this change is again not statistically significant.

Building on the specification reported in column (3), we next control for the type of accommodation tenure, by including dummy variables for whether the CEU is a home

owner with a mortgage, a renter, or has zero accommodation costs. (Note that the omitted tenure type here is freehold home ownership.) The results for this model are presented in column (4). First, the estimated coefficient on the log(true accommodation cost) variable in this model falls to -0.56 from -0.76 in column (3). Although this point difference is again not statistically significant, the difference between this estimate (-0.56) and the originally reported estimate of accommodation costs (-1.04) is both statistically significant and sizeable, representing roughly a 40% drop in the coefficient value. Other factors equal, this specification implies that 10% higher “accommodation costs” is associated with about a 0.06 point drop in material well-being score, compared to a 0.10 drop based on the original specification.

Second, the material well-being scores of both “mortgaged home-owner” and “renter” CEUs are significantly lower than those of “freehold home-owner” CEUs. For example, controlling for the level of accommodation costs (and other factors), having a mortgage is associated with a 4.7 point lower material well-being score on average; while being a “renter” is associated with a 2.6 point lower material well-being score. For those with no accommodation costs, we find a smaller and statistically insignificant, negative association with material well-being compared to freehold home-ownership.

An alternative specification to that adopted in column (4), to allow for different tenure effects of accommodation, is to interact the log(accommodation costs) with the tenure-type dummy variables. This hypothesises that there is a tenure effect on material well-being that is proportional to accommodation costs, rather than being a fixed size effect. We present the results for this specification in column (5). Although the precise interpretation of this specification differs from the dummy level-effects specification in column (4), the basic intuition for the results remains the same. After controlling for other factors, the coefficient on the log(true accommodation costs) variable (-0.20) is now relatively small and statistically insignificant. This coefficient represents the relationship between material well-being and accommodation costs of freehold home-owners.¹⁸ This coefficient *plus* the coefficient on the interaction term between accommodation costs and the relevant tenure-type dummy variable provides the estimated association between accommodation costs of that tenure-type and material well-being. We find that higher accommodation costs for mortgaged home-owners and for renters are associated with significantly lower material well-being than for freehold home-owners, and again the effect is stronger for those with a mortgage than those renting. For example, other factors being equal, 10% higher accommodation costs is associated with lower material well-being scores of about 0.02 points for freeholders, 0.14 points for those with a mortgage, and 0.10 points for renters.

The final specification we present in Table 4, presented in column (6), combines the previous dummy variable and interaction specifications. In other words, tenure is hypothesised to have both fixed and variable effects on material well-being. The large standard errors on the coefficient estimates in this model compared to those in columns (4) and (5) implies there is quite strong collinearity between the dummy variables and the interaction terms, which makes interpreting the results from this model difficult. However, that the estimated coefficients on the log(accommodation costs) and interaction variables are broadly similar to those in column (5),¹⁹ whereas the dummy variable coefficients are

¹⁸ Note, taken on face value, the negative relationship estimated here is in contrast to the finding of a positive association between property rates and material well-being reported in footnote 26 of the original report. CEU's with zero-accommodation costs may contribute to this negative coefficient estimate although, based on the weakly negative estimates for this group in column 3 of table 4, we do not expect it to explain all of this effect.

¹⁹ The column (6) coefficients on log(true accommodation costs) and the interaction with renter are almost identical to those in column (5), while the coefficient on the interaction with mortgaged drops from -1.23 to -0.79.

generally substantially smaller than in column (4), suggests the “interaction” specification is perhaps the dominant specification. This conclusion is supported by tests of the joint statistical significance of the dummy variables (F-statistic=0.31, p-value=0.82), versus the joint significance of the interactions (F-statistic=2.55, p-value=0.08).

The results presented here on the relationship between accommodation costs and material well-being demonstrate that a coherent understanding of the relationship needs to allow for differences across types of accommodation tenure. Although it could be argued that the specification in the original report did this by restricting accommodation costs to exclude property rates, which will directly affect freehold home-owners and, to a lesser extent, those with mortgages, this does not seem a satisfactory approach to us, at least under the guise of “accommodation costs”. This aside, the results here are largely consistent with the footnote 26 comment in the original report (quoted above) that the (negative) association between accommodation costs and material well-being is stronger for those with mortgage and/or rent obligations. However, the more important issue is whether this result is due to a direct effect of such accommodation costs on material well-being, or reflects the impact of other factors. Perhaps the most obvious factor is, again, a wealth effect that isn’t adequately captured by either the savings/investment variable or the income specification adopted, although there may be other explanations for this finding.

4 Concluding Discussion

The research reported here has attempted to unpick some of the associations between living standards (material well-being) and each of current income and accommodation costs in a way that helps to bring out the underlying drivers. What at first glance may appear to be simple associations can sometimes mask more complex relationships. The relationships between current income and accommodation outlays on the one hand and material well-being on the other should not be interpreted as fully and directly causal. The way they ‘explain’ material well-being seems to depend not simply on the dollar amounts involved, but also on the source or nature of the amounts, and these secondary factors may signal some precursors to the situation observed at the time of the survey.

We suggest that these precursors, which probably include health status, human capital, stable employment history, savings propensities, home ownership and successful financial planning, may offer some useful lessons for public policy design. Earlier interventions for younger age groups may be desirable to help address the risk factors and promote the resilience factors that we suspect influence living standard outcomes in old age. Clearly, many of these factors will affect people’s ability to generate income and accumulate assets throughout their working lives. However, their influence may also extend beyond the strictly material domain and encompass other components of life satisfaction.

These comments should not be taken as implying that the challenge for older people of balancing weekly incomes and expenses is of little policy relevance. It is. Those people in the survey who scored low on the material well-being scale were clearly struggling to make ends meet. The point we wish to bring out is that not all people on the same income or with the same accommodation expenses face the same struggle. Other factors, financial and nonfinancial, historical and current, can be expected to mediate the effect of the size of the weekly budget on living standards.

The fact that living standards vary so much among older people with similar incomes suggests that, despite its merits from several points of view, flat-rate universal income support alone is not particularly efficient or effective in addressing pockets of hardship. For this reason, supplemental forms of assistance for older New Zealanders, in cash or in kind, targeted on identified need are likely to remain important components of the overall social protection system.

Our conclusions echo some of the policy themes articulated in the original report (Fergusson et al., 2001a, pp. 51-52). First, the current system of income support has been successful in protecting the great majority of older people from hardship. Second, supplementary assistance might need to be targeted to the minority of the older population who are facing some degree of material and economic hardship. Third, many of the factors influencing the material well-being of older people are likely to reflect events and circumstances that occurred before retirement rather than their current economic circumstances. The additional insight we believe our work offers is to strengthen and extend the third point by illustrating how even the indicators of current economic circumstances include components that may have links back to differences that played out through earlier stages of the life course.

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Appendix

Appendix Table A1 – Material Well-being and Income Specifications

	Original Specification	Attempted Replication	Six Income Indicators	Three Income Indicators
	(1)	(2)	(3)	(4)
Couple	-3.92 (0.44)	-3.93 (0.47)	-3.10 (0.53)	-3.11 (0.53)
log(Savings / Investments)	0.57 (0.06)	0.56 (0.05)	0.50 (0.05)	0.51 (0.05)
log(Acc'n costs)	-1.07 (0.12)	-1.04 (0.12)	-0.95 (0.12)	-0.95 (0.12)
No. financial stressors (past 12 months)	-3.07 (0.32)	-3.07 (0.29)	-3.05 (0.28)	-3.03 (0.28)
No. adverse econ Events (aged 50-59)	-2.23 (0.35)	-2.01 (0.31)	-2.00 (0.30)	-2.00 (0.30)
Couple * No. adverse events	1.46 (0.44)	1.01 (0.40)	0.93 (0.39)	0.92 (0.39)
Age	0.19 (0.03)	0.18 (0.03)	0.21 (0.03)	0.20 (0.03)
Maori	-5.60 (1.52)	-5.23 (1.42)	-5.09 (1.37)	-5.07 (1.37)
Pacific peoples	-6.12 (2.19)	-5.80 (1.89)	-5.90 (1.90)	-5.88 (1.90)
NZSEI score	0.03 (0.01)	0.05 (0.01)	0.04 (0.01)	0.04 (0.01)
No NZSEI score	1.71 (0.68)	2.05 (0.62)	2.00 (0.62)	2.00 (0.62)
Highest Qualifications	0.45 (0.19)	0.36 (0.20)	0.27 (0.20)	0.27 (0.20)
Single * Auckland	-2.20 (0.68)	-2.22 (0.66)	-2.06 (0.66)	-2.09 (0.66)
R-squared	0.40	0.39	0.40	0.40
No. Observations	2,882	2,986	2,986	2,986

Notes: Estimated standard errors are in parentheses. All table entries are based on weighted calculations.

Appendix Table A2 – Material Well-being and Accommodation Costs Specifications

	Table 3.2 Specification	With True Costs	Acc Spec 3.4, True Acc Costs	3 Acc-tenure Indicators	Acc Cost Interactions	Indicators & Interactions
	(1)	(2)	(3)	(4)	(5)	(6)
Couple	-3.93 (0.47)	-3.49 (0.47)	-2.73 (0.54)	-2.95 (0.54)	-2.90 (0.54)	-2.91 (0.54)
log(Income)	4.62 (0.39)	4.56 (0.38)	2.41 (0.81)	2.34 (0.85)	2.36 (0.84)	2.34 (0.84)
log(Savings / Investments)	0.56 (0.05)	0.63 (0.05)	0.56 (0.05)	0.50 (0.05)	0.49 (0.05)	0.49 (0.05)
No. financial stressors (past year)	-3.07 (0.29)	-3.02 (0.29)	-2.98 (0.29)	-2.96 (0.28)	-2.95 (0.28)	-2.96 (0.28)
No. adverse econ events (50-59)	-2.01 (0.31)	-2.03 (0.32)	-2.02 (0.31)	-1.96 (0.30)	-1.96 (0.30)	-1.96 (0.30)
Couple * No. adverse events	1.01 (0.40)	0.92 (0.41)	0.86 (0.40)	0.89 (0.39)	0.88 (0.39)	0.89 (0.39)
Age	0.18 (0.03)	0.18 (0.03)	0.20 (0.03)	0.20 (0.03)	0.20 (0.03)	0.20 (0.03)
Maori	-5.23 (1.42)	-6.10 (1.44)	-5.79 (1.38)	-5.19 (1.34)	-5.03 (1.34)	-5.07 (1.34)
Pacific peoples	-5.80 (1.89)	-6.46 (1.93)	-6.51 (1.94)	-5.94 (1.92)	-5.79 (1.91)	-5.81 (1.91)
NZSEI score	0.05 (0.01)	0.05 (0.01)	0.05 (0.01)	0.05 (0.01)	0.04 (0.01)	0.04 (0.01)
No NZSEI score	2.05 (0.62)	2.22 (0.62)	2.16 (0.62)	2.06 (0.62)	2.02 (0.62)	2.02 (0.62)
Highest Qualifications	0.36 (0.20)	0.40 (0.20)	0.30 (0.20)	0.28 (0.20)	0.29 (0.20)	0.29 (0.20)
Single * Auckland	-2.22 (0.66)	-2.39 (0.67)	-2.21 (0.67)	-2.15 (0.65)	-2.09 (0.66)	-2.12 (0.65)
Fraction of Income from:						
Earnings			4.22 (1.62)	5.32 (1.69)	5.36 (1.72)	5.41 (1.71)
Capital			5.83 (1.62)	5.81 (1.68)	5.74 (1.67)	5.74 (1.67)
Benefit allowances			-9.14 (3.76)	-7.67 (3.69)	-6.91 (3.65)	-6.96 (3.65)
R-squared	0.39	0.38	0.39	0.40	0.40	0.40

Notes: Estimated standard errors are in parentheses. The number of observations used in all regressions is 2,986. All table entries are based on weighted calculations.