Ethnicity and Retirement Wealth

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Version 1.1: 13th May 2011

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Abstract

While it is understood that differing ethnic groups have differing income and therefore differing capacity to save for retirement, it is not generally recognized that differing genders and ethnic groups do not save the same even if income is equalized. This article contributes to the discussion by studying the determinants of retirement wealth across a range of ethnicities, including White, Pasifika and Asian. Differences in retirement wealth between ethnic groups is an area which is important for public policy, but which is relatively unexplored outside of the USA.

The article uses data from a detailed nation-wide survey to examine what demographic factors and socio economic factors are the main determinants of retirement wealth. Gender and ethnicity are found to be a strong predictor of retirement wealth even after controlling for all other factors. Hence effective retirement wealth policy has to take account of ethnic/cultural differences. While the focus is on New Zealanders the results are applicable world-wide.

1.   Introduction

1.1   The aging crisis

Most developed countries are facing aging populations at the same time as they are becoming ethnically more diverse. While governments have started to plan for more elderly, they have not so far generally taken account of the growing diversity of future elderly. While it is understood that differing ethnic groups have differing income and therefore differing capacity to save for retirement, it is not generally recognized that differing groups do not save the same even if income is equalized. This has major implications for governments and for culture. This article contributes to the discussion by studying the determinants of retirement wealth across a range of ethnicities, including White, Pasifika and Asian. While the focus is on New Zealanders the results are applicable world-wide.

The objective of this article is to provide an assessment of the socio-economic determinants of retirement wealth for older New Zealanders and also to investigate whether there or not wealth inequality exists between the main ethnic groups in New Zealand (NZ). Wealth at retirement is a useful indicator of the saving behavior of a household (Le, Scobie & Gibson, 2007), as well as providing insight to the adequacy of an individual preparation for retirement (Hong & Jensen, 2003). It is also a major concern for the government that elderly have adequate economic means to sustain a reasonable standard of living. Earlier studies in N.Z. have not primarily focused on the socio-economic determinants of wealth, and have not moved beyond NZ European and Maori ethnic groups. Therefore this study is unique in that it focuses on ethnic differences and includes Pasifika and Asian ethnic groups.

In New Zealand, those aged 65 years and over are entitled to government provided N.Z. Superannuation (NZS) which is universal and not income or asset tested. This guarantees a basic living standard to all elderly but has been perceived as a dis-saving factor towards retirement saving (Purdue & Orr, 2001). Despite payment levels of NZ Super being low the

net cost of funding is currently at 3.4% of GDP and is expected to double to 6.9% in 2050. Given that health costs will also double it is thus unlikely that current payment levels will remain unchanged. Fergusson, Hong, Horwood, Jensen and Travers (2001) argue that low incomes and low wealth among the elderly is a major contributor to fragility amongst the elderly. It is therefore essential for New Zealanders who wish to have an adequate retirement income to accumulate private wealth.

Three questions of particular relevance in regard to the level of wealth at retirement are of relevant to this study. Firstly; what are the economic and psychological factors that explain the saving behavior or asset accumulation of older New Zealanders resulting in the ultimate retirement wealth. Secondly; whether ethnicity plays a role in determining retirement wealth. Thirdly; to what extent is the variation of the retirement wealth among different ethnic groups which should provide indication to the different behavior of each ethnic group towards determining the level of retirement wealth. Note that while this paper uses behavioral finance theories to explain savings behavior, as this has not been done satisfactory by traditional theories (Asher, 2002), psychological reasons behind the variation of retirement wealth are beyond the scope of this study.

2.0   Literature

There is a substantial amount of theoretical and empirical body of literature related to retirement savings decisions, which offer a diverse range of determinants. Within this there is far smaller body of literature which examines the impacts of race and ethnic group on the savings behavior and the level of wealth at retirement.

Many factors are seen to influence savings or retirement wealth. The basic model is the life cycle model, whereby people save less when they are young, and save more as they get older, which is then consumed during retirement (Modigliani & Brumberg 1954). Empirical studies

support this (Richardson & Kilty, 1989; Lunderberg & Bett, 2000). Fernández, González, Búa and Rodiero (2009) and Bernheim, Skinner, and Weinberg, (2001) show that financial literacy, household income, employment status and saving habits are influential determinants of retirement wealth. Lunderberg and Bett (2000) also show education and good health are important determinants of net worth. Other influential factors have been found to be household composition including marriage status (Lunderberg & Bett, 2000; Schmidt & Sevak, 2006), number of dependencies (Mason, 1975), financial literacy (Lusardi & Mitchell 2005), health Dwyer and Mitchell (1999) and level of formal education above any additional wealth that education provides (Li, Montalto & Geistfeld (1996); Seong-Lim, Myung-He & Montalto 2000). Silva and Dwyer (2003) argue that socio-economic factors such as wealth, income, and pension influence the formation of retirement expectation while health contributes more to the variation of retirement expectation. Within a NZ context Le, Scobie and Gibson (2009) found that 2/3rds of the pre-retirement population have adequate savings levels if no there are future reductions in the levels of NZ Super.

Honig (1996) argues that ethnicity and gender differences are independently important. In a US study he showed that the retirement expectation and plans of African and Hispanic Americans are less than those of Whites, even at comparable income levels, and this generated differences in retirement wealth which are additional to other factors. This ethnicity effect had been confirmed by Short (1984), Avery and Kennickell (1991), Lee, Park and Montalto (2000) and Gustman & Steinmeier (2004). The effect of national culture is mixed, with Fernández et al. (2009) finding an effect whilst Christelis, Jappeli, Paccagnella and Weber (2009) found little independent impact.

Nearly all the studies, however, are US based, so it is useful to examine non-US data. Within New Zealand there are well documented socio-economic disparity between NZ European, Maori, Pasifika and Asian (Mental Health Commission, 2001; Ministry of Pacific

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Island Affairs / Statistic New Zealand, 2002; Fergusson et al., 2001; Enright & Scobie 2010; Waldergrave & Cameron 2009), with NZ European doing better in terms of income, health and asset accumulation than the other ethnic groups. This income difference results in a difference in savings (Booth, Grimmond & Stroombergen, 2000). None of these studies, however, examine whether there is a pure ethnic cultural factors which generates savings and wealth disparities. The aim of this article is establish whether ethnic/cultural differences, independent of income and other socio-economic factors, contributes to the wealth disparity among different ethnic groups in New Zealand. We specifically include Pasifika and Asian as all prior studies have only focused on NZ European and Maori.

3.0   Data and Methodology

The data in study is taken from the first round of the longitudinal survey of Health, Work and Retirement, conducted by the Psychology Department, Massey University. The source data is rich and broad and includes data on health, labor force participation, wealth, income, retirement and demographic information.

All respondents were randomly selected from all citizens above 18 or older. Two independent samples were extracted electrical rolls representing the general population (5,264), and the Maori population (7,781). The Maori sub sample was oversampled (Stephens, Alpass, Baars, Towers & Stevenson, 2010). The general roll includes all ethnic groups, but excludes those Maori who have chosen to be represented on the Maori roll. As seen from table 1, the response rate after exclusion was 53.5% which provided a representative sample for the HWR first wave of 6,662, with 61% for the general population and 48% for the Maori sample.

Table 1 about here

It needs to be noted that this research is that it is based on existing data and, although the dataset is rich, it is quite limited in some aspects. Firstly it was not collected with this research in mind, secondly some of the variables identified in the literature as factors affecting wealth at retirement are not present, for instance financial literacy and saving habits, thirdly only limited numbers of Pasifika and Asian families were sampled, ands fourthly the range of variables is restricted to those gathered in the 2001 Household Savings Survey (Statistics NZ, 2002).

3.1 Variables - Wealth

Wealth at retirement is measured by the sum of all assets, financial and non-financial, reported by each respondent. Data on liabilities was not collected so net worth cannot be accurately estimated. Private wealth only is used, which does not include the present value of future New Zealand superannuation. There is thus embeds a downward wealth bias. Table 2 shows the average wealth by age groups. IQR is the inter-quartile range defined as the difference between the observations at the 25th and 75th percentile points of the distribution.

Table 2 about here.

Respondent were asked to indicate whether yes or no, to the list of assets. Missing data in wealth categories affected 27% of respondents. If these were excluded there is a bias risk if the group who did not respond differs systematically. These respondents were thus left in and were imputed to have zero wealth in the missing category. This also had the advantage of increasing the sample size of the smaller ethnic groups.

3.2 Health

Health was measured by the Australian and NZ version of the SF-36, which is a generic health survey which consists of 36 questions that measure physical and mental health (Stephens et al, 2010). Scores generated from each health sub-scales were weighed and transformed to scales of 0-100, with higher scores indicating better health whereas lower scores reflecting poorer health. Principle component analysis was used to derive coefficients in order to form two components measuring physical (PCS) and mental (MCS), which the average measure used in our study.

3.3 Age

We extracted only those respondents aged 55 to 70, as there are the years in which wealth peaks. The age for entitlement for universal government superannuation is 65. Note that recorded wealth will thus be peak retirement wealth. There is a female bias in the data due to differing death rates as shown in Table 3 and Graph 1.

Table 3 about here.

Note that wealth peaks at age 65 and then decreases, as would be expected by the life cycle saving model.

3.4 Ethnicity/ gender

The ethnicity variable was a composite of the four main ethnic groups, NZ European, Maori, Pasifika, Asian plus an "other" category. The latter mainly comprised of migrants from nations such as the Middle East Countries, Australia, Europe Countries, South and North America. All respondents were asked which ethnic group they identified with, regardless of duration of migration. Where respondents identified themselves with more than one ethnicity

there were classified where possible under their primarily ethnicity. However the original sample had classified those with any Maori heritage under the Maori classification. This study re-classified those with a Pasifika heritage as Pasifika. Asian took second priority to Pasifika following the same method. This boasted the size of the Pasifika and Asian categories. Table 4 shows the resultant ethnic groups. The Pacific countries which contributed to the Pasifika ethnic groups were Samoa, Tonga, Niue, Fiji and Tokelau. Care is needed before assuming all these migrant groups have the same cultural attitudes. Ethnicity should be negative as NZ European is defined as zero. Gender should be negative as Male is defined as zero.

Table 4 about here

3.5 Martial Status

Respondents were asked in the sample whether they were "legally married," "de facto relationship," "permanently separated," "divorce," "widower", and "never been married". We re-classified respondents into married versus non-married. Those with missing variables were checked using other questions, with a default option of unmarried.

3.6 Migrant Status

This variable asks the by the number of years the respondent has been living in NZ. Migrant status was treated as a continuous variable.

3.7 Urban/ Rural Location

Respondents were classified as "main urban, "other urban" or "rural". Living in a large urban centre increases both wages and costs, though the balance is uncertain. Table 5 shows the sample breakdown.

3.8 Children/ Dependants

Respondents were asked the number of people living in the same household, and the number of children or financial dependant. Where there were missing cases, we used assigned zero.

3.9 Income and Education

Income was reported as the total income for each household within the last 12 months. This income consisted of wages and salary, interest earned, superannuation, insurance, and welfare benefits. Income was measured in logs as a continuous variable.

Education was categorized as "No Qualification," "Secondary Education" or "Tertiary Education".

3.10 Variables - Attitudes to Retirement

Respondents were asked a range of questions and these were grouped into positive or negative expectations towards retirement, and expressed as variable which measured differences between saving behavior as a result of expectation, and saving behavior due to tradition and culture. Note that this variable may pick up some of the ethnic causal variable.

Table 6 shows the expected impact of the variables on retirement wealth.

3.11 Equations

Wealth was expressed as a continuous dependant variable and regressed using the OLS multiple regression model below;

Retirement Wealth (W) = α +β1(Health) + β2(Male) + β3(Age) +

$\quad\quad\quad\quad$ β4(Ethnicity) + β5(Migrant Status) + β6(Region) +

$\quad\quad\quad\quad$ β7(Education) + β8(Marital status) +

$\quad\quad\quad\quad$ β9(Dependant) + β10(Attitude to Retirement) +

$\quad\quad\quad\quad$ β11 (Income).

The final sample was comprised of 6412 individuals; 54.2% female; mean age of 60.98 years; 54.3% held formal educations; 47.3% NZ European.

4.0 Results

4.1 Model 1 - Determinants of Wealth Models

To explore which determinants explained observed wealth five OLS regression were run as follows:

Model 1:1 – All Variables

This model includes all variables contained in the equation, which were motivated by the literature to have an impact on the level of wealth at retirement. Here ethnicity is a composite of five different ethnic groups.

Model 1:2 – Basic Model

This model retained variables that would be common to all respondents; age, gender, ethnicity, health and marital status.

Model 1:3 – Cultural and Ethnic Factors

This model retains the statistical significant factors from model 1:1 and adds the variables which could also reflect cultural differences.

Model 1:4 – Standard of Living Factors

This model retains the statistical significant factors from model 1:1 and adds the variables which could affect standard of living; region, health and dependency.

Model 1:5 – Savings Factors

This model retains the statistical significant factors from model 1:1 and adds the variables which could affect saving patterns; health, marital status, dependency, ethnicity, education, income, and positive and negative attitudes towards retirement. Although education correlates with income (r=.152), it is not included because it inter-reacts with financially literacy.

Table 7 about here

The results of the five models are shown in Table 7. Note that all the adjusted R^2 are acceptable for cross sectional data and that none of the variables were statistically insignificant, with most significant at a 1% level for all models. Only migrant status, dependent, and positive aspect varied in their significance.

All coefficient signs were constantly correct as predicted except for age, dependents and region. As discussed, the correct sign for region is ambiguous as both income and costs rise with increase in urban size. The correct sign of age was also ambiguous as wealth increases to a peak during the middle stage.

Model 1:1 confirmed that wealth at retirement is positively related to health, migrant status, education, marital status, income and having positive attitudes towards retirement. On the other hand, retirement wealth was negatively related to ethnicity, gender and negative attitudes towards retirement. Ethnicity and gender, as predicted, were predicted to be negatively related to retirement due lower incomes for females and for non-New Zealand Europeans. Income was statistically established in all models as the highest contributing factor to wealth at retirement. It also had the highest t-value and, therefore, explained most of the variation in retirement wealth. Of interest, ethnicity is also established to be a key factor in explaining the level of wealth at retirement.

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Model 1:2 confirmed that common characteristics among individuals play key roles in determining the level of wealth at retirement and that income in its association with retirement wealth was most significant.

Model 1:3 established that the factors affecting an individual's standard of living are key determinants of retirement wealth. The sensitivity and significance of each variable included in this model were consistent with respect to model 1, again, with exception of ethnicity with its significance greatly increased from a t-stats value of 2.912 to 5.21. This result suggests that ethnicity, after discounting for income and factors affecting an elderly standard of living, is still a key determinant of the level of wealth at retirement.

Model 1:4 was specified to retain factors that reflect cultural aspect of retirement in addition to ethnicity; such as number of financial dependents, health, education and income. Again, ethnicity was established as a key determinant of the level of wealth, even when discounting for income, individual's common factors and other cultural factors. It was evident that although the dependent variable did not have the expected sign, it was significant at a 1% level which was not the case in any of the other models. This could be the result of specifically omitting the effect of marital status from the effect of financial dependents in the specification of this particular model. This causes an increase in the impact of 'dependents' on retirement wealth from the marginal t-value 2.483 to a significant 3.142.

Model 1:5 confirmed that factors reflecting saving behavior are all key factors in determining or impacting on retirement wealth. Age was limited to the age group of 55-65 which made up about 70% of the sample population. As a result, age was not statistically significant in explaining retirement wealth. This model can also be regarded as a robustness check to the credibility and validity of the data and findings. Therefore, it is established that except for age, the relationship and significance of each and every explanatory variable still

holds. No evidence was observed related to the sensitivity of each variable coefficient and changes in direction towards retirement wealth.

4.2 Model 2 - Ethnic Impact on Retirement Wealth Model

Model 2 explore the impact of ethnic factors on retirement wealth, by subdividing ethnicity into 5 ethnic dummy variables to capture distinctive cultural factors for each ethnic group. These are aspects shared by the individuals in one ethnic group that affect decisions to save or accumulate wealth for retirement. Dummy variables were also formed for gender, marital status, migrant status, region and education.

Table 8 about here

Table 8 shows that wealth at retirement is positively related to health, migrant status, education, marital status, income and importantly, positive attitude (aspect) towards retirement. On the other hand, retirement wealth is negatively related to ethnicity and negative attitude (aspect) of retirement. However, minor differences from Model 1, due to some variables being measured by a number of dummy variables rather than as composite variables. For instance, gender was measured by males relative to females and, therefore, was strongly and positively related to wealth at retirement. Being a male is likely to contribute strongly and positively to wealth at retirement by $156,756. Income when standardizing across all explanatory variables, again, was statistically established as the highest contributing factor to the level of wealth at retirement. Residing in an urban region is likely to have significantly reduced retirement wealth by $180,000 to $230,000. Being in a couple or married headed household increases retirement wealth by $176,346. Processing either a secondary or tertiary qualification is likely to have greater wealth, by approximately $103,000 to $104,000. Note that this is on top of any income effect. These results are consistent with the findings in

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literature that health, being male, formal education, marital status and income are key factors in determining the level of wealth at retirement (Neelakantan & Yunhee, 2010; Fernández et al., 2009; Lunderberg & Bett, 2000; Schmidt & Sevak, 2006, 2006).

With respect to ethnicity, sub-dividing ethnicity into Maori, Pasifika, Asian and 'Other' relative to NZ European (omitting NZ Euro = 1 dummy variable) provided evidence of racial and ethnic wealth disparity. Table 2, indicates that once the effect of the elderly characteristics and saving behavioral factors have been discounted for, being Maori will decreases retirement wealth by \$160,529, being Pasifika by -\$121,676, being Asian by -\$144,441 and of "other" ethnicity by -\$138,196.

Our most important finding is that racial and ethnic wealth disparity significantly differs from zero even when controlling for income, education, attitudes and saving behavior factors. However, it poses the question of whether this racial wealth disparity is mainly attributable to pure cultural ethnic causes? Are there aspects shared only by each ethnic group which makes them differ in their decisions to save or accumulate wealth for retirement.

Note that Pasifika ethnicity was negative but not statistically significant in determining wealth at retirement. This could be the consequence of the small number making up the Pasifika sample. A similar effect may be the cause of Asian factor being marginally significant.

4.3 Model 3 - Ethnic Impact on Retirement Wealth Interactive Model

Ethnic dummies are often regarded as too noisy to capture ethnic differences. We thus run model 3, which uses OLS regression on sub-sample of the five different ethnic groups. This should give the opportunity for differences in the determinants on retirement wealth for each ethnic group to be extracted.

The results, presented in table 9, again, confirmed the determinants of retirement as established by model 1. That is, wealth at retirement is positively related to income, health, migrant status, education, rural location, marital status, income and positive attitudes towards retirement and negatively related to gender and negative attitudes towards retirement. Of note is that the significance of the migrant status variable for the three ethnic groups indicates that the more established migrants are, as reflected in the number of years of residence, the more better that will prepare for retirement.

The ethnic retirement wealth difference is not the mean difference in retirement wealth - it is the difference due to cultural factors. The findings in table 9 suggest that controlling for the above key determinants of retirement wealth, being a NZ European will contribute strongly and positively to retirement wealth by $139,793, whereas being a Maori, Pasifika or Asian would contributes negatively to retirement wealth. On the other hand being a Maori will decrease retirement wealth by $148.757, Pasifika by $48448, Asian by $69,055 and of 'other' ethnicity by $97,146.

It is important to note, however, that the Asian and Pasifika ethnic variables are statistically insignificant. This could indicate that there is little ethnic difference once socio- economic factors like low income or low education are taken into account. However it could indicate the small sample size is an issue; thus, these findings need to be treated with caution.

4.4 Diagnostic Tests

We run a number of diagnostic tests on the results, as running the different sets of variables for all models specified in this study provided no indication of the sensitivity of each of the variable coefficients. None of the variables included in each of the specified models had a

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bivariate correlation between themselves and towards the dependant variable of more than 0.7, indicating no 'excessive' variables (Appendix B1). Hence, all variables specified can be retained in each specification. In addition, variance inflator factors (VIF) values ranged only from 1 to 2 with no values greater than 10, indicating the absence of multicollinearity (Appendix A1)

We also run a collinearity diagnostic test (Appendix A1). With respect to 'Tolerance', values which is calculated by $1-R^2$. The rule stated that if the tolerance value for each variable is very low (ie. near zero), then this indicates that the multiple correlation with other variables is high. The results presented for all specified models for this study showed tolerance values of above 0.6 (Tables in Appendix) hence, each variable does not appear to violate this assumption.

4.5 Ethnic effects on Retirement Wealth Disparity

It is remarkable that after discounting for income, health and other factors there is still a significant wealth disparity among the main ethnic groups indicating it is the difference due to cultural factors. This result raises the questions as to why?

One answer would be that lower income and relative deprivation adversely influence culture amongst minorities against retirement savings which does not impact on the majority culture at comparative income levels. Note, however, that we have defined wealth as additional to superannuation. Minorities may have access to inter-generational income which allows them to more easily live on government superannuation. Alternatively minorities may be more reluctant to disclose wealth. Note that minority interviews were generally conducted by a member of that minority in the respondent's language.

Wealth disparity could also be attributed to the homogenous grouping of heterogeneous nations. For instance Pasifika or pacific people category was comprised of Samoa, Tonga,

Niue and a small number of Fijian. Although they do share some common way of living and life, treating them as homogenous is not ideal. Migrant status are also differs significantly within groups, with some groups far better established than others. Similar issues arise within the Asian grouping, as it is comprised of a heterogonous; Chinese, Indian, Korean, Sri Lankan etc. Some of the recent migrant groups still had their immediate families in their home country, and are sending money rather than saving for retirement.

5.0   Conclusion

This study shows the factors which positively influence the level of wealth at retirement include: health, male gender, migrant status, education, marital status, income and positive aspect towards retirement. The results support the hypothesis that socio-economic variables affect the level of wealth at retirement. Out of all the above factors considered, income was established as the key determinant of retirement wealth. Interestingly ethnicity was shown to be a key independent determinant of the level of retirement wealth. Future surveys should specifically over-sample smaller ethnic groups, so more detailed analysis can be undertaken.

The study empathizes that empirical study on retirement wealth needs to take account of the saving behavior of different ethnic groups, as pure cultural factors play a crucial role in their decision to save and accumulate wealth for retirement. The results confirm that wealth disparity among ethnic groups is quite substantial even after adjusting for income. New Zealand, like a number of western countries is becoming more ethnically diverse, and this will be reflected within the future elderly. However governments have not yet started preparing for this.

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<p style="text-align:center">**Tables**</p>

Table 1: Overview of the Sample data

Category	General Electoral Roll	of which those identifying as being of Maori descent
Total number of 55-70 year olds	609,000	47,436
Sample drawn	5,264	7,781
Number excluded[1]	210	341
Final sample	5,054	7,440
Response rate	62%	48%
Number of respondents	3,133	3,529
Total sample numbers available for analysis	**6,662** (corresponding to an overall response rate of 53.3%)	

Note: 1. Excluded from the study as they were never able to participate (e.g. they were unable to be contacted, deceased, or had been institutionalised).

Source: Scobie & Enright (2009)

Table 2: Wealth by age groups.

Age Range	Recorded Wealth ($'000)		
	Mean	**Median**	**IQR[1]**
55-59	684	353	747
60-64	620	300	647
65-70	417	215	473
Total	**595**	**300**	**630**

Source: Enright & Scobie (2009), 3966 observation

Table 3: Age bands by Gender

	Male	**Female**	**No - response**	**Total**
55-59[1] Years	1284	1501	12	**2797**
60-64 Years	852	1046	7	**1905**
65-70[2] Years	797	926	10	**1733**
No response	41	71	115	**227**
Total	**2974**	**3544**	**144**	**6662**

1. Include those observations aged less than 55 years of age
2. Includes observation aged more than 70 years of age

Graph 1: "Ethnicity" by Gender
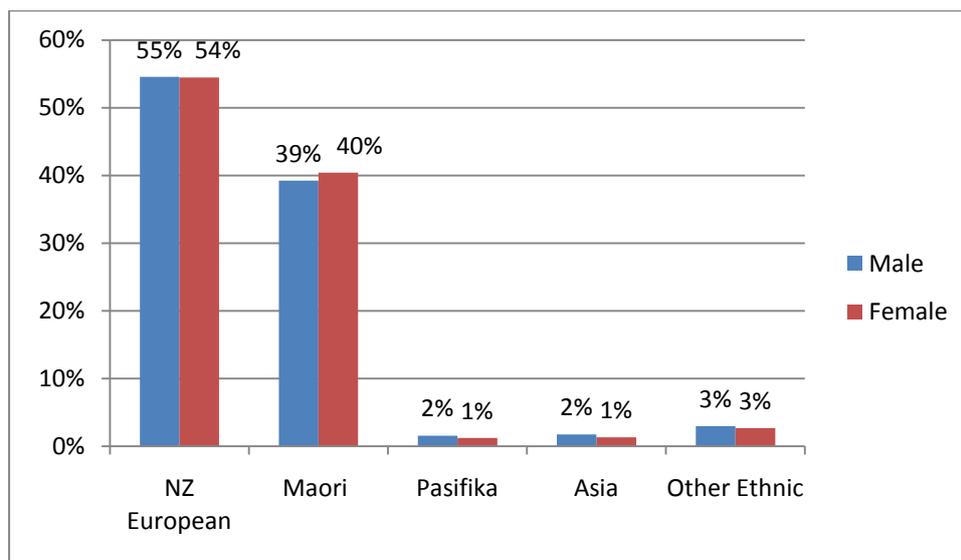
Table 4: Ethnic weights

Ethnicity	2006 general population		2006 HWR		Sample ethnic
	55- 70 Years		sample		weights
	Count	Proportion of total count	Count	Proportion of total count	pop proportion/ sample proportion
NZ Euro	424, 713	0.697	3085	0.474	**1.468**
Maori	47, 436	0.078	3032	0.466	**0.167**
Pasifika	19, 383	0.032	106	0.016	**1.950**
Asian	31, 257	0.051	117	0.018	**2.849**
Other	86,931	0.143	162	0.025	**5.722**
Total	609,720	1.000	6502	1.000	

Note: 151 individuals did not identify with any ethnic group. These individuals are assigned a weighting of 1 to ensure their inclusion in future analyses.

Table 5: Urban/ Rural breakdown.

Region	Frequency	Percentages
Urban	3305	52.30%
Urban other	1677	26.50%
Rural	1333	21.10%
Total	6315	100.00%

Table 6 - Expected impact of variables on retirement wealth

Variable	Definitions	Expected Sign	Short description
Health	Mental and Physical average score	Positive	Good health, work consistently, save more, greater wealth
Gender	Composite of Male and Female.	Negative	Since more female to male; female usually associate with lower wealth
Age	Age	Positive	As implied by Life Saving Model
Ethnicity	Composite of all ethnic groups	Negative	Weighted towards Non-NZ European so expected be associated with lower wealth
Migrant status	Age in NZ	Positive	The more established, more advanced educational, higher paid job, greater wealth
Region	Rural, urban & other urban	Negative	More than 50% of the residents reside in urban areas where the standard cost of living is high.
Education	Level of education attainment	Positive	Earn a good job, greater wealth
Marital Status	Couple vs. single	Positive	Married couples are more inclined to become financially stable, and save more.
Dependant	Number of financial dependent	Negative	Cost of living (expenses) high therefore lower propensity to save
Attitude to retirement	Positive aspect and negative aspect	Positive/Negative	Positive aspect imply tendency to save for retirement, otherwise no incentive to save.
Income	Log of income level	Positive	Higher level of income, higher disposable income, greater ability to save

Table 7: Determinants of wealth at retirement.

	Model 1	Model 1:2	Model 1:3	Model 1:4	Model 1:5
Age	-0.048+++	-0.043+++	-0.038+++	-0.049+++	-.002ns
	(-3.435)	(-3.342)	(-2.912)	(-3.525)	(-.129)
Gender	-0.067+++	-0.074+++	-0.066+++	-0.073+++	-.066+++
	(-4.855)	(-5.72)	(-4.855)	(-5.269)	(-4.060)
Health	0.051+++	0.064+++	0.067+++	0.059+++	.048+++
	(3.778)	(4.928)	(5.126)	(4.394)	(3.056)
Ethnicity	-0.045+++	-0.066+++	-0.066+++	-0.051+++	-.066+++
	(-2.912)	(-5.18)	(-5.107)	(-3.272)	(-4.308)
Migrant Status	0.044+++			0.04++	
	(2.699)			(2.456)	
Region	0.062+++		0.064+++		
	(4.76)		(4.994)		
Education	0.041+++			0.036+++	.047+++
	(3.034)			(2.681)	(3.054)
Marital Status	0.067+++	0.076+++	0.068+++		.078+++
	(5.057)	(5.847)	(5.21)		(5.087)
Dependent	0.035++		0.034++	0.043+++	.027+
	(2.543)		(2.483)	(3.142)	(1.71)
Positive attitude	0.029++			0.035+++	.036++
	(2.24)			2.679	(2.345)
Negative attitude	-0.055+++			-0.061+++	-.062+++
	(-4.164)			(-4.588)	(-4.029)
Income (log)	0.112+++	0.115+++	0.118+++	0.112+++	.118+++
	(8.312)	(8.681)	(8.905)	-8.279	(7.587)
Constants	ns	ns	ns	+	ns
	(0.085)	(1.113)	(0.163)	(1.699)	(-.566)
R^2	.058	.046	.052	.049	.049
Adjusted R^2	.058	.046	.050	.047	.047

+ + + = Significance at 1% level, + + = Significance at 5 % level, + = Significance at 10 % level

Note: Explanatory variables includes Health (average of physical and mental scores), AGE (in years)

Gender (1= Male), Ethnicity (Maori, Pasifika, Asian relative to NZ European), Migrant status (years in Z),

Region (1= urban, 2= 'other urban 3'= rural), Education (1=Tertiary, 2=Secondary 3= no qualification),

Marital status (dummy variable couple=1 single =0), Dependency (number of financial dependent),
Positive aspect of retirement and negative aspect of retirement, Income (level of reported
disposable income)

Table 8: Model 2 – Ethnic Differences (Dummy variable model)

Dependent Variable: Total Wealth ($000)			$R^2= 0.063$
Explanatory Variable	Coefficient	Standardized. Coefficient	Standard Error
Age (years)	-11.756	046+++	
Health (average of physical and mental)	7.248	.044+++	2.286
Male (base= female)	156.756	.067+++	2.263
Ethnicity (base = New Zealand European)			
Maori	-160.529	-.037+++	3.567
Pasifika	-121.676	-.018ns	58.111
Asian	-144.441	-.027+	90.107
Other	-138.196	-.041+++	77.457
Migrant Status (years in New Zealand)	3.438	.046+++	51.272
Region (base= rural)			
Urbanmain	-185.635	-.079+++	1.268
Urbanother	-231.021	-.087+++	39.030
Education (base = no qualification)			
Edusecond	103.853	.038++	44.283
Edutertiary	104.383	.044+++	41.761
Marital Status (base= single)			37.276
Couple/Partner	176.346	.065+++	36.302
Dependents (number)	43.321	.040++	15.228
Attitudes to retirement			
Positive attitude of retirement)	71.503	.029++	32.121
Negative attitude retirement)	-136.705	-.053+++	33.818
Income (log)	65.701	.108+++	8.284
Intercept	219.294	+++	254.826

Note: +++ = significance at 1 level, ++ significance at 5%, + = significance at 10% level. Explanatory variables includes Health (average of physical and mental scores), AGE (in years) Gender (1= Male), Ethnicity (Maori, Pasifika, Asian relative to NZ European), Migrant status (years in Z), Region (1= urban, 2= 'other urban 3'= rural), Education (1=Tertiary, 2=Secondary 3= no qualification), Marital status (dummy variable couple=1 single =0), Dependency (number of financial dependent), Positive and negative attitude of retirement, Income (level of reported income).

Table 9: Model 3 – Ethnic Differences - OLS regression by ethnicity

	NZ Euro	Maori	Pasifika	Asian	Other
Age	-.049+++	-.054+++	-.052+++	-.052+++	-.050+++
	(-3.533)	(-3.914)	(-3.755)	(-3.717)	(-3.560)
Gender	-.067+++	-.068+++	-.068+++	-.068+++	-.068+++
	(-4.843)	(-4.902)	(-4.903)	(-4.884)	(-4.882)
Health	.048+++	.048+++	.049+++	.049+++	.052+++
	(3.586)	(3.532)	(3.661)	(3.664)	(3.861)
Specified ethnic group	.055+++	-.034+++	-.007ns	-.013ns	-.029++
Unstandardized coefficient	139,793	-148.757	-48.448	-69.055	-97.146
	(3.771)	(-2.572)	(-.548)	(-.936)	(-2.000)
Migrant status	.045++	.075+++	.069+++	.066+++	.056+++
	(2.909)	(5.375)	(4.976)	(4.558)	(3.659)
Region	.062+++	.064+++	.062+++	.061+++	.063+++
	(4.794)	(4.907)	(4.777)	(4.731)	(4.839)
Education	.039+++	.039+++	.040+++	.040+++	.042+++
	(2.889)	(2.869)	(2.947)	(2.982)	(3.084)
Marital status	.065+++	.068+++	.069+++	.070+++	.069+++
	(4.905)	(5.071)	(5.171)	(5.250)	(5.156)
Dependents	.038+++	.034++	.033++	.033++	.032++
	(2.766)	(2.484)	(2.399)	(2.376)	(2.354)
Positive Attitude	.029++	.031++	.032++	.031++	.030++
	(2.249)	(2.395)	(2.423)	(2.388)	(2.299)
Negative Attitude	-.054+++	-.054+++	-.055+++	-.056+++	-.055+++
	(-4.071)	(-4.057)	(-4.165)	(-4.215)	(-4.186)
Income (log)	.110+++	.113+++	.114+++	.115+++	.114+++
	(8.148)	(8.376)	(8.443)	(8.498)	(8.476)
Constant	ns	ns	ns	ns	ns
	(-.321)	(-.097)	(-.268)	(-.259)	(-.275)
R^2	.059	.057	.056	.056	.057
Adjusted R^2	.057	.055	.054	.054	.055

Note: +++ = significance at 1 level, ++ significance at 5%, + = significance at 10% level.

Explanatory variables includes Health (average of physical and mental scores), AGE (in years) Gender (1= Male), Ethnicity (Maori, Pasifika, Asian relative to NZ European), Migrant status (years in Z), Region (1= urban, 2= 'other urban 3'= rural), Education (1=Tertiary, 2=Secondary 3= no qualification), Marital status (dummy variable couple=1 single =0), Dependency (number of financial dependent), Positive and negative aspect of retirement, Income (level of reported income).

Appendix A1: Tolerance and VIF Values
Model 1:1 Determinants of retirement wealth

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	age	0.850	1.176
	gender	0.858	1.165
	health avg	0.911	1.097
	ethnic	0.682	1.466
	years in nz	0.614	1.629
	region	0.987	1.013
	education	0.901	1.11
	married	0.931	1.074
	dependents	0.875	1.143
	Positive attitude	0.959	1.043
	Negative attitude	0.947	1.055
	Income log	0.904	1.106

a. Dependent Variable: total wealth

Model 1:2: Common Characteristics

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	age	0.955	1.047
	gender	0.962	1.040
	health	0.961	1.041
	ethnic	0.990	1.010
	married	0.962	1.040
	incomelog	0.919	1.088

a. Dependent Variable: total wealth

Model 1:3: Living Standards

| Model | Collinearity Statistics | |
	Tolerance	VIF
1 (Constant)		
age	0.938	1.066
gender	0.887	1.128
health	0.958	1.044
ethnic	0.980	1.02
region	0.991	1.009
married	0.947	1.056
dependents	0.878	1.139
income log	0.916	1.092

a. Dependent Variable: total wealth

Model 1:4 Cultural factors

| Model | Collinearity Statistics | |
	Tolerance	VIF
1 (Constant)		
age	0.851	1.175
gender	0.865	1.156
health	0.928	1.078
ethnic	0.685	1.461
yearsinnz	0.62	1.614
education	0.903	1.107
dependents0	0.886	1.129
Positive attitude	0.965	1.037
Negative attitude	0.951	1.051
incomelog	0.908	1.101

a. Dependent Variable: totalwealth

Model 1:5 Saving behavior

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	age	.947	1.056
	gender	.855	1.170
	health	.910	1.098
	ethnic	.959	1.043
	education	.931	1.075
	marital status	.941	1.063
	dependents	.870	1.149
	positive attitude	.963	1.039
	negative attitude	.956	1.046
	log income	.921	1.086

Model 2: Dummy variable

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	age	.840	1.191
	health	.889	1.125
	male	.856	1.169
	maori	.940	1.064
	pacific	.900	1.112
	asian	.810	1.235
	other	.698	1.433
	yearsinnz	.568	1.760
	urbanmain	.593	1.685
	urbanother	.590	1.696
	edusecond	.703	1.422
	edutertiary	.656	1.525
	married	.924	1.083
	dependents	.853	1.172
	Positive attitude	.957	1.045
	Negative Attitude	.943	1.061

	Tolerance	VIF
incomelog	.896	1.116

Model 3: Interactive Model

Euro

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	age	.857	1.167
	gender	.858	1.165
	health	.911	1.098
	euro	.772	1.295
	yearsinnz	.699	1.430
	region	.987	1.013
	education	.901	1.110
	marital status	.928	1.077
	dependents0	.868	1.152
	Positive attitude	.960	1.041
	Negative attitude	.947	1.056
	incomelog	.900	1.111

Maori

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	age	.857	1.167
	gender	.859	1.165
	health	.908	1.102
	maori	.951	1.051
	yearsinnz	.848	1.179
	region	.985	1.015
	education	.899	1.112
	marital status	.931	1.074
	dependents0	.877	1.140

		Tolerance	VIF
	Positive attitude	.962	1.040
	Negative attitude	.945	1.058
	incomelog	.905	1.105

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	age	.860	1.163
	gender	.859	1.165
	health	.907	1.103
	pacific	.938	1.066
	yearsinnz	.855	1.169
	region	.986	1.014
	education	.897	1.115
	married	.929	1.076
	dependents0	.861	1.161
	Positive attitude	.961	1.041
	Negative attitude	.947	1.056
	incomelog	.902	1.108

Asians

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	age	.858	1.165
	gender	.858	1.165
	health	.910	1.099
	asian	.895	1.118
	yearsinnz	.789	1.267
	region	.984	1.017
	education	.901	1.110

	marital status	.934	1.071
	dependents0	.878	1.138
	Positive attitude	.962	1.040
	Negative attitude	.946	1.057
	incomelog	.907	1.102

Other ethnicity

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	age	.853	1.173
	gender	.858	1.165
	health	.906	1.104
	other	.780	1.282
	yearsinnz	.696	1.437
	region	.987	1.013
	education	.899	1.112
	marital status	.933	1.071
	dependents0	.879	1.137
	Positive attitude	.959	1.042
	Negative attitude	.948	1.055
	incomelog	.907	1.102

Pearson Correlations

		totalwealth	age	health	male	maori	pacific	asian	other	yearsinnz
Pearson Correlation	totalwealth	1.000	-.068	.096	.100	-.044	-.036	-.030	-.041	.033
	age	-.068	1.000	-.066	.002	-.009	-.012	-.042	-.050	.288
	health	.096	-.066	1.000	.029	-.099	-.116	-.041	.070	-.005
	male	.100	.002	.029	1.000	-.018	.015	.016	.029	-.066
	maori	-.044	-.009	-.099	-.018	1.000	-.052	-.065	-.118	.142
	pacific	-.036	-.012	-.116	.015	-.052	1.000	-.041	-.074	-.101
	asian	-.030	-.042	-.041	.016	-.065	-.041	1.000	-.093	-.308
	other	-.041	-.050	.070	.029	-.118	-.074	-.093	1.000	-.449
	yearsinnz	.033	.288	-.005	-.066	.142	-.101	-.308	-.449	1.000
	urbanmain	-.008	-.055	.084	.036	-.058	.012	.042	.027	-.067
	urbanother	-.066	.099	-.118	-.038	.029	.017	.014	-.020	.031
	edusecond	.014	.003	.029	-.053	-.036	.028	.041	.005	-.032
	edutertiary	.053	-.114	.114	.116	-.065	-.067	.025	.121	-.179
	maritalstatus	.106	-.047	.142	.124	-.075	-.065	.043	.008	-.075
	dependents	.068	-.135	-.019	.292	.038	.142	.061	.038	-.111
	Positive att	.026	-.053	-.010	-.150	.004	.026	-.029	-.066	.028
	Negative att	-.075	-.057	-.190	-.027	.076	.069	-.024	-.020	-.004
	incomelog	.153	-.190	.144	.151	-.068	-.094	-.010	-.002	-.038
Sig. (1-tailed)	totalwealth	.	.000	.000	.000	.000	.002	.008	.001	.004
	age	.000	.	.000	.448	.230	.177	.000	.000	.000
	health	.000	.000	.	.012	.000	.000	.001	.000	.360
	male	.000	.448	.012	.	.075	.120	.101	.010	.000
	maori	.000	.230	.000	.075	.	.000	.000	.000	.000
	pacific	.002	.177	.000	.120	.000	.	.000	.000	.000
	asian	.008	.000	.001	.101	.000	.000	.	.000	.000
	other	.001	.000	.000	.010	.000	.000	.000	.	.000
	yearsinnz	.004	.000	.360	.000	.000	.000	.000	.000	.
	urbanmain	.256	.000	.000	.002	.000	.175	.000	.015	.000
	urbanother	.000	.000	.000	.001	.011	.084	.126	.053	.007
	edusecond	.128	.390	.014	.000	.002	.012	.000	.335	.006
	edutertiary	.000	.000	.000	.000	.000	.000	.025	.000	.000
	maritalstatus	.000	.000	.000	.000	.000	.000	.000	.270	.000
	dependents	.000	.000	.075	.000	.001	.000	.000	.001	.000
	positive att	.020	.000	.218	.000	.388	.022	.011	.000	.013
	negative	.000	.000	.000	.017	.000	.000	.028	.058	.380

att								
incomelog	.000	.000	.000	.000	.000	.000	.211	.426	.001

		urbanmain	urbanother	edusecond	edutertiary	married	dependent	respositive	resnegative	incomelog
Pearson Correlation	totalwealth	-.008	-.066	.014	.053	.106	.068	.026	-.075	.153
	age	-.055	.099	.003	-.114	-.047	-.135	-.053	-.057	-.190
	health	.084	-.118	.029	.114	.142	-.019	-.010	-.190	.144
	male	.036	-.038	-.053	.116	.124	.292	-.150	-.027	.151
	maori	-.058	.029	-.036	-.065	-.075	.038	.004	.076	-.068
	pacific	.012	.017	.028	-.067	-.065	.142	.026	.069	-.094
	asian	.042	.014	.041	.025	.043	.061	-.029	-.024	-.010
	other	.027	-.020	.005	.121	.008	.038	-.066	-.020	-.002
	yearsinnz	-.067	.031	-.032	-.179	-.075	-.111	.028	-.004	-.038
	urbanmain	1.000	-.630	.028	.048	-.016	-.006	-.012	.000	.087
	urbanother	-.630	1.000	-.028	-.057	-.037	.007	.003	.025	-.091
	edusecond	.028	-.028	1.000	-.513	.024	-.027	.030	-.028	.003
	edutertiary	.048	-.057	-.513	1.000	.003	.069	-.006	-.039	.133
	maritalstatus	-.016	-.037	.024	.003	1.000	.137	.056	-.073	.087
	dependents	-.006	.007	-.027	.069	.137	1.000	-.006	.045	.070
	Postive att	-.012	.003	.030	-.006	.056	-.006	1.000	.066	-.007
	Negative att	.000	.025	-.028	-.039	-.073	.045	.066	1.000	-.045
	incomelog	.087	-.091	.003	.133	.087	.070	-.007	-.045	1.000
Pearson Correlation	totalwealth	.256	.000	.128	.000	.000	.000	.020	.000	.000
	age	.000	.000	.390	.000	.000	.000	.000	.000	.000
	health	.000	.000	.014	.000	.000	.075	.218	.000	.000
	male	.002	.001	.000	.000	.000	.000	.000	.017	.000
	maori	.000	.011	.002	.000	.000	.001	.388	.000	.000
	pacific	.175	.084	.012	.000	.000	.000	.022	.000	.000
	asian	.000	.126	.000	.025	.000	.000	.011	.028	.211
	other	.015	.053	.335	.000	.270	.001	.000	.058	.426
	yearsinnz	.000	.007	.006	.000	.000	.000	.013	.380	.001
	urbanmain	.	.000	.014	.000	.098	.321	.171	.487	.000
	urbanother	.000	.	.013	.000	.002	.289	.421	.024	.000
	edusecond	.014	.013	.	.000	.030	.014	.009	.013	.418
	edutertiary	.000	.000	.000	.	.404	.000	.306	.001	.000
	maritalstatus	.098	.002	.030	.404	.	.000	.000	.000	.000
	dependents	.321	.289	.014	.000	.000	.	.311	.000	.000

Positive att	.171	.421	.009	.306	.000	.311	.	.000	.297
Negative att	.487	.024	.013	.001	.000	.000	.000	.	.000
incomelog	.000	.000	.418	.000	.000	.000	.297	.000	.