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15 Generational Accounting in New Zealand

Bruce Baker

15.1 Introduction

This chapter examines the case of generational accounting in New Zealand. In contrast to the experience of most countries in the world, future generations of New Zealanders are likely to face lower net tax burdens than current generations because of the prudent approach to fiscal policy undertaken in the recent past and projected to continue into the future. Under a range of plausible policy outcomes, New Zealand's generational accounts are likely to be close to balance, with a slight bias in favor of future generations.

This result is not accidental. In 1984, New Zealand faced a deep fiscal crisis, which forced fundamental changes in the structure of the economy, and in particular in the structure of the government's finances. A series of reforms, initiated in 1984 by the newly elected Labour government and extended by the National government elected in 1990, reversed years of poor economic performance and bad fiscal management. These reforms culminated in the Fiscal Responsibility Act of 1994, which requires, among other things, that the government balance the budget over the business cycle.

The recent election held on 12 October 1996 will prove to be a historical watershed, not because of the policies of the government brought to power—after all, the policies of the National–New Zealand First coalition are not very different from those of the National–United coalition that preceded it—but

Bruce Baker was formerly senior analyst in the New Zealand Treasury.

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because it is the first government elected under the new German-style mixed membership proportional (MMP) electoral system.

Under the old English-style system, New Zealand governments were able to deal with crisis efficiently by ramming legislation through the unicameral House of Representatives, often on a strict party vote, and without serious challenge from the opposition. Under MMP, electing a majority party government will be more difficult, raising the likelihood of coalition governments in the future, and the associated problems in passing legislation. Under MMP the reforms initiated in the past 23 years would have been more difficult to implement, but MMP will also make them more difficult to reverse.

In preparing New Zealand's generational accounts, it is assumed that future governments will remain committed to the concept of a balanced budget over the course of the business cycle, as mandated by the Fiscal Responsibility Act. Indeed, even the leftist Alliance Party has promised to fund its social welfare agenda through tax increases, not deficit spending, should it become part of the government.

A more detailed description of the New Zealand economy and current fiscal policy follows in section 15.2. Section 15.3 presents the assumptions behind the generational account calculations, while Section 15.4 presents the findings and discusses their implications and sensitivity to assumptions. Section 15.5 compares these results to a 1995 study of generational accounting in New Zealand (see Auerbach et al. 1997).

15.2 The New Zealand Fiscal Situation

In order to understand New Zealand's current fiscal situation, it is necessary to understand a bit of recent economic history, particularly the reforms that began in 1984 and are continuing today.¹

From its early days, the government played a dominant role in New Zealand's economy, owning major enterprises in many sectors of the economy, including transport, communications, and finance, and restricting other sectors with stifling regulation. Until the mid-1980s, the domestic economy was sheltered from international competition with extensive import and capital restrictions, and domestic industry was supported with a range of subsidies. The government operated a generous social welfare system and provided universal health care and education. Britain's entry into the European Community in 1973, which ended New Zealand's tariff-free exports to Britain, dealt a severe blow to New Zealand's terms of trade, as did the two oil shocks of the 1970s. The reaction of the government to the second oil shock exacerbated New Zealand's fiscal problems as the government sought to ease the crisis with old-fashioned Keynesian stimulus, financing major infrastructure and energy projects while increasing subsidies to domestic businesses.

This spending, in combination with higher social welfare spending and in-

1. This discussion follows Auerbach et al. (1997).

terest on the burgeoning debt, increased financial net expenditure (which excludes lending activities) from 25.6 percent of GDP in fiscal 1973/74 to 38.3 percent in 1983/84. Part of this spending was financed through higher taxes, as revenue increased from 26.5 percent of GDP to 31.8 percent, but much was financed through borrowing, as the financial balance swung from a surplus of 1.0 percent of GDP to a deficit of 6.5 percent. Net debt grew from just 4.5 percent of GDP in 1973 to 31.5 percent in 1984.

As the fourth Labour government took office in 1984, the New Zealand economy was performing poorly. Real growth had averaged only 2 percent per year from 1973 to 1984. Inflation was enjoying a brief but temporary respite from double-digit rates, and short-term interest rates were about 14 percent. The New Zealand dollar had fallen from U.S.\$1.48 in 1973 to below \$0.47 by the end of 1984.

The incoming government instituted a series of reforms designed to reduce the deficit, stabilize the economy, and improve efficiency. In its first budget, the government announced cuts in subsidies and reform of the tax system. These measures were designed both to reduce the deficit and to increase economic efficiency.

In terms of macroeconomic stability, the government directed the Reserve Bank to reduce inflation. The Reserve Bank Act of 1989 formalized the requirement that the Reserve Bank's sole focus should be the achievement and maintenance of price stability.

The government set out to improve the performance of the public sector by setting clear goals for public sector managers and giving greater flexibility for their achievement, including the right to set their own salary structures.

The government also introduced major tax reforms aimed at broadening the tax base and reducing marginal rates. A comprehensive goods and services tax was introduced. Personal tax rates were reduced to 24 percent for income up to \$30,875 and 33 percent above. Tax rebates to low earners created an additional effective marginal rate of 15 percent up to \$9,500. Corporate tax rates were set at 33 percent.

The government also undertook a major deregulation effort, particularly with regard to the financial services sector. The newfound freedoms may have contributed to a speculative bubble on the share market, and when the stock market in New York crashed in 1987, repercussions were deeply felt in New Zealand. While the aftereffects of the crash were relatively minor around the world, in New Zealand the crash coincided with the beginning of a sustained period of difficult times. At the end of September 1992, the level of GDP was about even with that of December 1987.

In October of 1990, a new National Party government took office and embraced the Labour reforms, adding new reforms of its own. The Employment Contracts Act of 1991 substantially removed regulation of the labor markets. The 1991 budget introduced sweeping changes, including reductions in social welfare benefits, introduction of "user pays," and restructuring of the provision of health, education, and housing benefits. The budget also introduced new

antievastion and avoidance measures and increases in taxes on alcohol and tobacco.

In 1994, the Fiscal Responsibility Act was passed to enhance fiscal performance over time. The act requires, among other things, that New Zealand's net debt be reduced to "prudent" levels and that the operating balance remain in surplus over time. The act also requires future budgets, beginning with 1994, to use generally accepted accounting principles (GAAP). The new GAAP measures include accrual-based operating statements and balance sheets with cash-based cash-flow and borrowings statements. The new data set allows for a more comprehensive view of the Crown's finances and more sophisticated control.

Through the difficult period of adjustment from 1983/84 to surplus in 1993/94, net financial expenditure initially increased from 38.3 percent of GDP to its high-water mark of 42.1 percent of GDP in 1990/91, before falling off to 35.6 percent in 1993/94. Revenue followed the same path, increasing from 31.8 percent of GDP to a high of 39.9 percent in 1989/90, before falling off to 36.5 percent in 1993/94. The adjusted financial balance rose from a deficit of 6.5 percent of GDP to a surplus of 1.0 percent of GDP in 1993/94. Net debt increased from 31.3 percent in 1983/84 of GDP to a peak of 52.6 percent in 1991/92. With some assistance from asset sales, net debt fell to 43.2 percent of GDP by the end of 1993/94.

Having turned the corner on the deficit, and faced with projections of ever increasing surpluses, the government announced a program of tax reductions, to be implemented in the 1996/97 and 1997/98 fiscal years, provided that net debt was projected to fall within the "prudent" range, that is, under 30 percent of GDP in the first tax cut year. The first tax cut became effective in July 1996 and reduced the lower statutory rate from 24 to 21.5 percent while raising the threshold for the top rate from \$30,875 to \$34,200. The second tax cut was scheduled to take effect in July 1997.

On 12 October 1996, New Zealand elected its first government under MMP.² On election night, National won a plurality of the votes cast with 34 percent, followed by Labour with 28 percent, the populist New Zealand First Party with 13 percent, and the Alliance with 10 percent. The staunchly free market Association of Consumers and Taxpayers won 6 percent of the vote, while the centrist United Party with less than 1 percent of the vote failed to meet the normal 5 percent threshold but gained a single seat in Parliament by winning a constituency seat.³ The Christian Coalition and other smaller parties failed to meet the threshold and won no seats.

2. Proportional representation had been under consideration in New Zealand for many years, driven by the perception that the old first-past-the-post system produced unfair results. E.g., the National Party held power for nine years, from 1975 to 1984, although Labour won more votes in the 1978 and 1981 elections. In the 1993 elections, the last under the old system, the left-wing Alliance Party won 18 percent of the vote but just 2 percent of the seats in Parliament.

3. For a detailed description of MMP election rules, see Electoral Commission of New Zealand (1996).

MMP has been described as a system where the “winner of the bronze determines who gets the gold.” After a series of protracted negotiations with both National and Labour, the third-place finisher, New Zealand First, decided to go into coalition with National. While details of the negotiations are still secret, speculation in the press centered on a number of factors that tipped the balance in National’s favor. First of all, the combined seats of National and New Zealand First gave the coalition an absolute majority in Parliament. A coalition with Labour would have required the support of the Alliance, who would have expected some kind of payback, an unappealing prospect from the point of view of New Zealand First. Second, New Zealand First was uncomfortable with the amount of new spending proposed by Labour. Finally, National offered the leader of New Zealand First the newly created position of treasurer, carrying substantial power over fiscal and monetary policy.

The coalition agreement between the parties calls for additional spending of about 1.2 percent of GDP in fiscal 1997/98, 1.7 percent in 1998/99, and 2.1 percent in 1999/2000. About 70 percent of the additional spending is earmarked for health and education, two areas that are widely seen as underfunded. Additional revenue in 1997/98 is to be provided by deferring the second round of tax cuts, originally scheduled for 1 July 1997, until one year later. In future years, higher spending is to be paid for out of the currently predicted surpluses.

New Zealand First has also proposed to introduce a compulsory private retirement savings scheme, provided voters approve a referendum on the matter. The scheme would be funded through new withholding taxes, roughly offset by future rounds of tax cuts.

The coalition agreement points to one probable consequence of MMP, which is that future governments will find it harder to control spending. With multiparty coalitions (formal or informal) the most common form of government, it is likely that governments will find it necessary to provide funding for a longer list of budgetary priorities, as “rewards” and “bribes” replace strict party discipline as the glue that holds the government together.

15.3 Assumptions Underlying the Generational Account Calculations

Generational accounts are based on net present values of taxes paid and transfers received by different generations over their remaining lifetimes. Therefore, it is necessary to have long-term projections of taxes, transfers, and other government spending. It is also necessary to have long-term projections of population by age and sex.

To link the aggregate projections of taxes and transfers to the appropriate generations, a series of “profiles” of taxpayers and transfer recipients by age and sex are also required. These projections and profiles are used to form cash flows for each generation. In order to translate the dollar amounts into present values, it is necessary to have a discount rate. Finally, in order to solve the

intertemporal budget constraint, it is necessary to have an initial value of government wealth.

Beyond the quantitative assumptions are a number of theoretical assumptions about the incidence of taxes. The general assumption used is that the tax burden is ultimately borne by the payers of each tax type. However, there is one major exception to the rule. For the company income tax, it is assumed that the tax is ultimately borne by workers. Because New Zealand is a small open economy, it is reasonable to assume that taxes on mobile corporate capital are borne by local factors, in this case labor. An alternative simulation was performed assuming that company tax is ultimately borne by the owners of capital.

Population Projections. The population projections used are special very long term extensions of Statistics New Zealand's central population projections (series 6). The projections assume medium fertility (1.90 children per woman), medium mortality (life expectancy rises from 73.6 years in 1994 to 79.5 in 2031 for males, from 79.2 to 84.0 for females), and annual immigration of 5,000 (roughly the average for the past 20 years). Beyond 2031, life expectancy continues to rise, but more slowly than in the first period.

One implication of the medium-fertility assumption, which is below the replacement rate, is that the number of children per person of working age drops from 45.2 percent in 1995 to 35.8 percent in 2100. However, increasing longevity leads the number of elderly per working-age person to more than double, from 19.5 percent in 1995 to 49.7 percent in 2100. Overall, the dependency ratio increases from 64.7 percent in 1995 to 85.4 percent in 2100. See table 15.1.

Fiscal Projections. All fiscal projections were made with Treasury's long-term fiscal model. National fiscal aggregates were supplemented with projections of the relatively small tax and spending activity of local authorities. In New Zealand most governmental activity is funded and provided at the national level. There are no states or provinces.

Taxes are categorized as wage income taxes, nonwage income taxes, corporate income taxes, goods and services tax (GST), excise taxes, local property taxes, and other taxes. Transfer payments are categorized as superannuation benefits, health, unemployment insurance, family and housing benefits, education, and other benefits.

It was necessary to make a number of adjustments to the basic GAAP numbers. New Zealand social welfare benefits are generally taxable, and the GAAP transfer numbers are gross of tax. These taxes were removed from both the income tax and transfers in order to allocate taxes and transfers to generations on a net basis. GST paid by the government to itself was similarly removed. It was also necessary to adjust the GAAP capital spending estimates to a concept compatible with the generational accounting method. In GAAP, capital expen-

Table 15.1 Population Projections

Year	Population (thousands)			Dependency Ratios (%)			
	All Ages	Children (0–17)	Working Age (18–64)	Elderly (65+)	Elderly	Child	Total
1995	3,577	981	2,171	424	19.5	45.2	64.7
2000	3,743	1,017	2,273	454	20.0	44.7	64.7
2005	3,887	1,031	2,372	484	20.4	43.5	63.9
2010	4,008	997	2,480	532	21.4	40.2	61.6
2015	4,119	957	2,550	612	24.0	37.5	61.5
2020	4,226	936	2,593	697	26.9	36.1	63.0
2025	4,325	935	2,578	811	31.5	36.3	67.7
2030	4,405	940	2,541	924	36.4	37.0	73.4
2035	4,456	934	2,520	1,002	39.8	37.1	76.9
2040	4,474	914	2,494	1,066	42.7	36.6	79.4
2045	4,468	891	2,504	1,073	42.9	35.6	78.5
2050	4,447	877	2,507	1,063	42.4	35.0	77.4
2055	4,418	871	2,475	1,072	43.3	35.2	78.5
2060	4,387	867	2,423	1,097	45.3	35.8	81.1
2065	4,354	859	2,381	1,113	46.8	36.1	82.8
2070	4,320	846	2,355	1,120	47.6	35.9	83.5
2075	4,285	832	2,338	1,114	47.6	35.6	83.2
2080	4,247	822	2,320	1,105	47.6	35.4	83.1
2085	4,205	813	2,291	1,101	48.1	35.5	83.6
2090	4,162	805	2,256	1,101	48.8	35.7	84.5
2095	4,119	797	2,224	1,098	49.4	35.8	85.2
2100	4,079	787	2,200	1,092	49.7	35.8	85.4

Sources: 1995–2051 from Statistics New Zealand; 2052–2100 from author's calculations.

diture is treated as a financing item, which affects accumulation of debt but is not reflected directly in the operating balance. The operating balance uses depreciation instead. However, in order to correctly attribute spending to the generation that actually paid for it, a timing adjustment was needed. A further adjustment was made to remove administrative expenses from transfers and allocate them to government consumption.

For the current year, 1996/97, the base case was identical to the baseline in the 1996 budget. For the three following years, the coalition agreement was added onto the budget. Beginning in fiscal 2000/01, individual income taxes were reduced to phase out the budget surplus over three years, after which the budget remained in balance year by year. All projections were done in nominal dollars and then converted into constant 1995/96 dollars, the base year for the accounts. The base-case assumption of balanced annual budgets involves a short-run reduction in individual income tax rates relative to current law.

As figure 15.1 shows, the amount of revenue required to balance the budget over the next decade will tend to fall as a percentage of GDP. This is partly due to favorable demographic pressures—the cohort of new retirees, born dur-

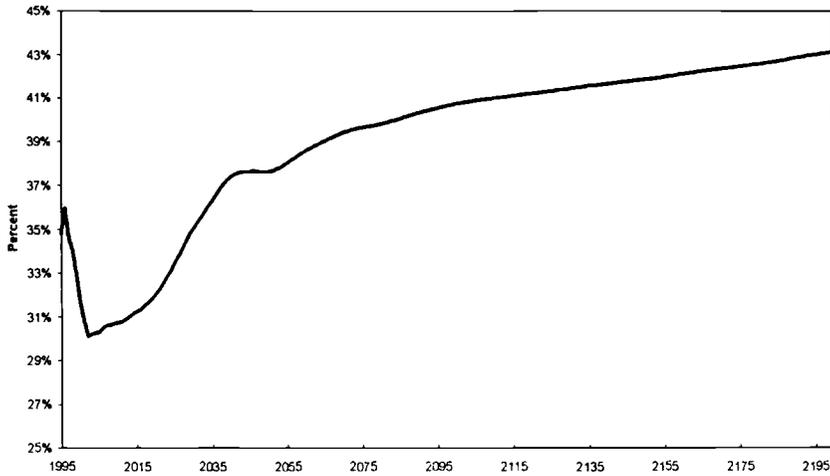


Fig. 15.1 Tax-to-GDP ratio underlying generational account calculations

ing the Depression, is a relatively small cohort, as is the cohort of students now of university age. This effect is also partly due to the legislated increase in the age of qualification for New Zealand superannuation, from 62 to 65 years, being phased in through the year 2000. During this period, the number of superannuitants is projected to fall. However, these favorable circumstances will not last long. Beginning around 2010, the oldest members of the “baby boom” generation will begin to retire and will be joined by their younger brethren in ever larger numbers. Around 2040, the peak of the baby boomers will have passed away, providing a brief fiscal respite, but in the long term, the tension between greater longevity and low fertility will lead to continuing increases in the tax-to-GDP ratios required to balance the budget. Of course, this assumes continuation of retirement at age 65.

The generally sanguine finding of this chapter that future generations of New Zealanders will face a lower *net* tax burden does not deny that future generations will face a higher *gross* tax burden needed to pay the higher health and superannuation costs that come with longer life spans.

Tax and Transfer Profiles. Most of the tax and transfer profiles used in the generational account calculations were developed from Statistics New Zealand’s Household Expenditure and Income Survey (HEIS). The HEIS is a survey of about 4,600 New Zealand households.

In New Zealand, health and education are usually provided in kind, and they were thus not included in the survey. For these categories of expenses, profiles were developed from administrative data.

Government Wealth. For government wealth, the measure used is equal to the government's net financial assets, equal to financial assets less gross debt. Although New Zealand has a full balance sheet available, the Crown's tangible assets were excluded from this measure because the flows associated with these assets (both revenues and expenses) are already incorporated in the government's spending and revenue projections. Including the assets would amount to double counting in present value terms. An alternative way of handling productive assets would have been to include the assets and to exclude the revenues and expenditures associated with the assets. In theory, both approaches are equivalent because the present value of the net revenue from the productive assets should equal the asset's value.

Discount Rates. The appropriate discount rate for calculating the present value of future amounts depends on whether these amounts are known with certainty. Future government receipts and expenditures are risky, which suggests that they be discounted by a rate higher than the real rate of interest on government securities. On the other hand, government receipts and expenditures appear to be less volatile than the real return on capital, which suggests that they be discounted by a lower rate than that. The base-case calculations assume a 5 percent real discount rate, which is approximately equal to the government's assumed long-term borrowing rate. Alternative simulations were performed with real discount rates of 3 and 7 percent.

15.4 Findings

This section includes a discussion of the results for the baseline case followed by a sensitivity analysis and a discussion of some alternative scenarios.

15.4.1 Baseline Results

Tables 15.2 and 15.3 present the basic set of generational accounts for males and females for the base year of 1995/96, assuming a 5 percent real discount rate and a 1.5 percent productivity growth rate (table 15.4 reports combined results). For each of several cohorts ranging in age from 0 to 90 the tables list the generational account and the breakdown of this account into the components of household payments and receipts. The row at the bottom of each table labeled "future generations" provides the generational account, adjusted for economic growth, for the representative male or female of each future generation. This account for future generations is calculated as a residual, based on the assumption that current policy will continue to hold for existing generations and the requirement of intertemporal government budget balance.

Looking at the first column of table 15.2, one can observe that the generational account for male newborns is \$47,700 (all dollar amounts are expressed in U.S. dollars, converted from New Zealand dollars at a rate of NZ\$1.00 =

Table 15.2

Composition of Male Generational Accounts: Base Case (present value of receipts and payments in thousands of U.S. dollars)

Generation's Age in 1995	Net Payment	Tax Payments						Transfer Receipts					
		Wage Income Taxes	Nonwage Income Taxes	Corporate Income Taxes	GST	Excise Taxes	Property Taxes	Super- annuation	Health	UI	Family and Housing	Education	Other Benefits
0	47.7	47.1	14.1	22.7	32.5	8.3	4.6	5.1	21.8	5.4	3.5	39.6	6.3
5	61.2	52.2	16.3	26.7	35.6	9.9	5.6	6.0	18.8	6.4	4.2	42.1	7.5
10	80.3	57.4	18.8	31.4	38.1	11.8	6.8	7.1	19.9	7.7	5.0	35.4	8.8
15	104.6	63.6	21.8	36.6	39.5	13.9	8.1	8.3	20.8	9.0	5.8	24.7	10.4
20	132.3	71.5	25.0	42.4	41.1	15.8	10.0	10.0	22.2	9.8	6.7	12.7	12.1
25	158.9	81.7	30.3	49.5	45.6	18.0	12.1	13.1	25.8	9.1	7.7	8.1	14.5
30	158.5	79.8	32.2	48.8	44.7	17.8	12.8	15.6	27.4	7.3	7.3	6.0	14.1
35	145.0	72.5	33.0	44.3	42.1	16.6	12.9	18.3	28.7	5.8	6.4	4.3	13.0
40	122.4	62.4	33.6	37.9	39.3	15.1	12.6	22.0	30.8	4.8	5.3	3.0	12.5
45	91.0	49.3	33.3	29.5	35.6	13.2	11.9	26.3	32.9	4.1	4.1	1.8	12.6
50	57.9	35.3	32.6	20.8	31.5	11.1	11.1	31.6	33.4	3.4	3.1	0.7	12.1
55	26.3	22.3	31.1	12.8	27.1	9.0	10.1	38.1	34.1	2.3	2.2	0.0	9.5
60	-3.2	12.1	29.0	6.6	22.6	7.0	9.1	46.7	35.7	1.0	1.4	0.0	4.8
65	-35.4	3.8	26.1	1.9	18.2	5.1	8.1	59.4	38.2	0.0	1.0	0.0	0.0
70	-41.1	0.1	22.6	0.0	14.2	3.5	7.0	52.3	35.5	0.0	0.7	0.0	0.0
75	-40.9	0.0	18.4	0.0	10.6	2.3	5.8	43.0	34.4	0.0	0.5	0.0	0.0
80	-36.8	0.0	13.8	0.0	7.6	1.4	4.5	35.0	28.6	0.0	0.4	0.0	0.0
85	-36.1	0.0	9.3	0.0	5.4	0.9	3.1	28.5	25.9	0.0	0.3	0.0	0.0
90	-31.1	0.0	4.7	0.0	3.8	0.6	2.1	22.2	19.7	0.0	0.3	0.0	0.0
Future generations	42.6												
Percentage difference	-10.8												

Note: Productivity growth assumed to be 1.5 percent; real discount rate, 5 percent.

Table 15.3

Composition of Female Generational Accounts: Base Case (present value of receipts and payments in thousands of U.S. dollars)

Generation's Age in 1995	Net Payment	Tax Payments						Transfer Receipts					
		Wage Income Taxes	Nonwage Income Taxes	Corporate Income Taxes	GST	Excise Taxes	Property Taxes	Super- annuation	Health	UI	Family and Housing	Education	Other Benefits
0	-13.3	24.8	10.2	12.2	33.3	5.6	5.3	8.1	28.4	2.7	8.5	39.0	18.1
5	-10.2	27.5	11.8	14.4	36.7	6.7	6.5	9.5	27.8	3.2	10.1	41.6	21.6
10	-2.2	30.5	13.7	17.0	39.4	8.0	7.8	11.3	30.5	3.9	11.9	35.4	25.7
15	9.9	34.4	16.2	20.0	41.2	9.5	9.5	13.3	33.4	4.5	14.0	25.2	30.4
20	25.6	38.9	18.4	22.9	43.7	10.8	11.8	16.3	35.0	4.7	16.3	13.7	35.0
25	34.4	40.6	21.3	24.4	47.6	11.6	14.2	20.8	38.4	3.5	17.3	9.7	35.7
30	36.6	37.3	22.2	22.8	46.0	10.9	14.5	24.2	37.5	2.5	14.5	7.9	30.5
35	36.1	33.8	23.2	20.8	43.7	10.0	14.4	28.6	36.9	2.1	10.8	6.4	24.9
40	31.3	29.8	24.3	18.2	41.1	9.1	14.1	34.6	36.8	1.9	7.5	4.8	19.8
45	20.2	24.3	25.2	14.5	37.7	8.0	13.6	41.7	36.8	1.6	5.0	2.9	15.2
50	1.9	17.4	25.8	10.1	33.9	6.9	13.0	50.5	37.6	1.2	3.6	1.2	11.2
55	-22.0	10.2	25.6	5.8	29.7	5.7	12.3	61.1	38.6	0.7	3.0	0.0	7.9
60	-48.4	4.7	24.6	2.6	25.3	4.5	11.5	74.1	40.3	0.3	2.4	0.0	4.4
65	-66.1	1.3	22.5	0.6	20.9	3.3	10.4	80.6	42.5	0.0	2.0	0.0	0.0
70	-67.3	0.0	19.3	0.0	16.7	2.3	8.9	73.2	39.7	0.0	1.7	0.0	0.0
75	-63.2	0.0	15.3	0.0	13.0	1.5	7.2	61.0	37.9	0.0	1.3	0.0	0.0
80	-54.4	0.0	10.8	0.0	9.8	0.9	5.3	49.3	30.7	0.0	1.1	0.0	0.0
85	-48.2	0.0	6.5	0.0	7.3	0.6	3.5	39.7	25.4	0.0	1.0	0.0	0.0
90	-38.2	0.0	2.9	0.0	5.3	0.4	2.2	29.8	18.6	0.0	0.7	0.0	0.0
Future generations	-11.8												

Note: Productivity growth assumed to be 1.5 percent; real discount rate, 5 percent.

Table 15.4

Composition of Combined Generational Accounts: Base Case (present value of receipts and payments in thousands of U.S. dollars)

Generation's Age in 1995	Net Payment	Tax Payments						Transfer Receipts					
		Wage Income Taxes	Nonwage Income Taxes	Corporate Income Taxes	GST	Excise Taxes	Property Taxes	Super- annuation	Health	UI	Family and Housing	Education	Other Benefits
0	18.0	36.2	12.2	17.6	32.9	7.0	5.0	6.6	25.0	4.1	5.9	39.3	12.1
5	26.4	40.1	14.1	20.7	36.1	8.3	6.0	7.7	23.2	4.9	7.1	41.8	14.4
10	39.0	44.0	16.2	24.2	38.8	9.9	7.3	9.2	25.2	5.8	8.4	35.4	17.3
15	57.9	49.2	19.1	28.4	40.4	11.7	8.8	10.8	27.0	6.8	9.8	25.0	20.3
20	78.7	55.1	21.7	32.6	42.4	13.3	10.9	13.2	28.6	7.2	11.5	13.2	23.6
25	95.3	60.7	25.7	36.7	46.6	14.7	13.2	17.0	32.3	6.2	12.6	8.9	25.3
30	95.9	58.0	27.1	35.4	45.4	14.2	13.7	20.0	32.6	4.8	11.0	7.0	22.5
35	88.7	52.5	27.9	32.1	43.0	13.2	13.6	23.7	32.9	3.9	8.7	5.4	19.1
40	75.1	45.5	28.8	27.6	40.2	12.0	13.4	28.5	33.9	3.3	6.4	3.9	16.3
45	55.6	36.8	29.3	22.0	36.7	10.6	12.8	34.0	34.9	2.9	4.6	2.3	13.9
50	30.3	26.5	29.2	15.5	32.7	9.1	12.0	40.9	35.5	2.3	3.4	1.0	11.7
55	2.4	16.3	28.4	9.3	28.4	7.4	11.2	49.5	36.4	1.5	2.6	0.0	8.7
60	-26.3	8.3	26.8	4.5	24.0	5.7	10.3	60.7	38.1	0.7	1.9	0.0	4.6
65	-50.2	2.6	24.4	1.3	19.5	4.2	9.2	69.6	40.3	0.0	1.5	0.0	0.0
70	-55.8	0.0	20.7	0.0	15.6	2.8	8.1	64.0	37.9	0.0	1.2	0.0	0.0
75	-53.7	0.0	16.6	0.0	12.0	1.8	6.6	53.3	36.4	0.0	1.0	0.0	0.0
80	-47.1	0.0	12.0	0.0	8.9	1.1	4.9	43.4	29.8	0.0	0.8	0.0	0.0
85	-44.5	0.0	7.3	0.0	6.7	0.7	3.4	36.2	25.6	0.0	0.8	0.0	0.0
90	-36.3	0.0	3.4	0.0	4.9	0.5	2.2	27.7	18.9	0.0	0.6	0.0	0.0
Future generations	16.0												
Percentage difference	-10.8												

Note: Productivity growth assumed to be 1.5 percent; real discount rate, 5 percent.

U.S.\$0.70). The generational account rises steadily until age 25 and falls thereafter. The initial rise is due to the fact that the heaviest taxpaying years loom closer and closer as one ages from childhood to young adulthood. The fall in the generational account occurs thereafter as more taxpaying years fall into the past and the receipt of old-age pensions and health benefits approaches. The typical 40-year-old has an account of \$122,400, while a 65-year-old, entering years of peak transfer receipt, has an account of *minus* \$35,400. In interpreting this pattern, it is important to remember that a generation's account equals the present value of its *remaining* lifetime net tax payments to the government. Thus one cannot directly compare the accounts of different current generations to determine their relative *lifetime* burdens.

Perhaps the most salient general observation to make about these accounts is that they indicate that future generations will bear a *lower* lifetime net tax burden than current newborns. That is, under the base-case assumptions, it will be necessary to reduce taxes on or increase transfers to future generations in order to satisfy the government's intertemporal budget constraint. For males and females combined, the reduction in lifetime tax burden is about \$2,000, or 10.8 percent of the *net* burden faced by current newborns. While the amount is not great, it stands in marked contrast to those for other countries, which generally indicate that future generations will face a substantially higher burden than current generations.

A second important observation to make about these base-case results is the distinction between males and females. Though males and females have the same general pattern of generational accounts that first rise and then fall with respect to age, the accounts for females at each age are considerably lower than those for males of the same age. While today's newborn males face a lifetime net tax burden of \$47,700, females face a burden that is *negative*, -\$13,300. That is, they will receive transfers and government educational spending that, in present value, exceed the taxes they will pay during their lifetimes. These results come from a combination of women's lower tax payments and higher transfer receipts. The lower tax payments are due in large part to women's lower projected labor force earnings, which in turn reduce their relative burdens of labor income taxes and corporate income taxes (the latter due to our assumption about the incidence of such taxes being on labor). The higher transfer payments come in part from the fact that social welfare benefits during child-raising years go primarily to women, but even more from women's greater share of superannuation benefits and health benefits in old age, a result due to greater female life expectancy.

Tables 15.2 and 15.3 also permit a number of other interesting observations regarding the New Zealand fiscal system. One is the importance of indirect taxes. For newborn males, over one-third of all lifetime taxes take the form of indirect taxes (GST plus specific excise taxes); for females, this share is nearly one-half. On the transfer side, the largest program for both men and women is education. While, in absolute terms, pension benefits are larger, they occur much later in life and hence have a smaller present value than educational benefits.

15.4.2 Sensitivity Analysis

Generational accounts are sensitive to the assumptions used in their construction. In particular, they are sensitive to the assumed rates of discount and productivity growth. To a lesser extent, they are sensitive to the incidence assumptions.

Table 15.5 presents nine sets of calculations, corresponding to three real, before-tax interest rates (3, 5, and 7 percent) and three rates of multifactor productivity growth (1, 1.5, and 2 percent). The center column corresponds to the base-case assumptions of a 5 percent rate of interest and a 1.5 percent rate of productivity growth. For each combination of discount rate and productivity growth rate, the table shows generational accounts for newborns and future generations, and the difference between the two.

As we move from left to right in the table, we can observe that, for newborns, a rising interest rate lowers the generational account. In fact, with a 7 percent discount rate the generational account of newborns is generally negative, as the present value of the health care currently being received and the benefits of education, soon to be received, slightly outweigh the discounted present value of taxes to be paid later in life. For future generations, the same pattern of falling generational accounts can be observed.

Changes in the assumed rate of productivity growth raise projected levels of both taxes (which depend directly on the level of economic activity) and transfers (through indexing arrangements); thus there is relatively little net impact.

It is clear that the dollar amounts in the generational accounts are quite sensitive to the discount and growth assumptions used. However, the underlying message is that the accounts are in relatively close balance under most combinations of interest rate and growth.

Next is an analysis of alternative incidence assumptions, with the results given in table 15.6. The table provides the results of three simulations, all based on the intermediate discount rate, growth rate assumption ($r = 5.0$, $g = 1.5$), the first of which is simply the base case shown in table 15.4.

As discussed above the basic assumption in the base-case simulations is that the corporate income tax is borne by labor, in proportion to labor income. This assumption is consistent with the view of New Zealand as a small open economy. However, it differs from the assumptions made in the past for other countries, notably the United States, for which corporate taxes have generally been attributed to owners of capital. Thus it is important to know how much the results for New Zealand depend on this difference in assumption, rather than differences in underlying fiscal structure.

The second simulation presented in table 15.6 allocates corporate income taxes according to capital, rather than labor, income. As one would expect, the effect of this change in assumptions is to shift a part of each year's tax burden from the young to the old.

A second difference between the base-case assumptions and those used in

Table 15.5 **Sensitivity Analysis: Discount and Growth Rate Assumptions (thousands of U.S. dollars)**

	$r = 3$			$r = 5$			$r = 7$		
	$g = 1$	$g = 1.5$	$g = 2$	$g = 1$	$g = 1.5$	$g = 2$	$g = 1$	$g = 1.5$	$g = 2$
Generational accounts for									
Newborns	44.2	54.1	64.4	12.3	18.0	24.6	-2.8	-0.1	3.1
Future generations	40.6	50.2	56.4	9.5	16.0	23.5	-4.0	-1.0	2.6
Difference	-3.6	-3.9	-8.0	-2.8	-2.0	-1.1	-1.2	-0.9	-0.5

Note: r is real discount rate (percent); g is productivity growth (percent).

Table 15.6 Alternative Incidence Assumptions (present value of receipts and payments in thousands of U.S. dollars)

Generation's Age in 1995	Base Case	Corporate Tax Falls on Shareholders	Education in Government Purchases
0	18.0	8.4	57.3
5	26.4	15.2	68.2
10	39.0	26.4	74.4
15	57.9	43.4	82.8
20	78.7	63.4	91.9
25	95.3	81.3	104.2
30	95.9	87.1	102.9
35	88.7	87.1	94.1
40	75.1	82.2	79.0
45	55.6	72.3	57.9
50	30.3	56.9	31.3
55	2.4	37.1	2.5
60	-26.3	13.1	-26.3
65	-50.2	-9.8	-50.2
70	-55.8	-19.5	-55.8
75	-53.7	-24.6	-53.7
80	-47.1	-26.6	-47.1
85	-44.5	-33.5	-44.5
90	-36.3	-32.1	-36.3
Future generations	16.0	6.5	55.3
Difference	-2.0	-1.9	-2.0
Percentage difference	-10.8	-22.0	-3.4

past work by Auerbach, Gokhale, and Kotlikoff (1991) relates to educational expenditures. Here, the benefits of educational expenditures have been allocated to individual generations. Leaving educational expenditures out of the generational account calculations clearly would raise the level of the accounts, as the final column in table 15.6 shows. The accounts rise the most for the young and future generations who will benefit from educational spending. Thus this alternative assumption changes the age profile of generational accounts for existing generations. However, it has relatively little impact on the absolute size of the imbalance between current newborns and future generations. Thus neither changes in discount and growth rates nor alternative incidence assumptions alter the qualitative picture offered by the base-case results.

15.4.3 Generational Balance under Alternative Policies

Generational accounts depend heavily on the fiscal policy projections on which they are based. Obviously, there is considerable uncertainty about the actual course that fiscal policy will take over the next 200 or more years, aside from that indicated in subsection 15.4.2. In this section, a number of scenarios

Table 15.7 **Summary of Alternative Cases (present value of receipts and payments in thousands of U.S. dollars)**

Generation's Age in 1995	Alternative Cases			
	Base Case	Debt Remains at 30% of GDP	Deficit Is 2.2% of GDP	Current Tax Rates
0	18.0	19.7	19.1	11.1
5	26.4	28.2	26.4	22.1
10	39.0	40.9	37.6	38.2
15	57.9	58.9	65.5	60.6
20	78.7	78.6	75.5	84.1
25	95.3	94.3	91.2	103.3
30	95.9	93.9	91.6	105.0
35	88.7	86.1	84.7	97.9
40	75.1	72.0	71.4	83.9
45	55.6	52.4	52.5	63.5
50	30.3	27.4	37.6	37.2
55	2.4	-0.1	0.0	8.5
60	-26.3	-28.6	-28.3	-20.9
65	-50.2	-52.2	-51.9	-45.8
70	-55.8	-57.5	-57.2	-52.2
75	-53.7	-55.3	-54.7	-51.1
80	-47.1	-48.4	-47.6	-45.4
85	-44.5	-45.5	-44.7	-43.5
90	-36.3	-37.0	-36.4	-35.9
Future generations	16.0	18.3	21.9	5.3
Difference	-2.0	-1.4	2.8	-5.8
Percentage difference	-10.8	-7.2	14.6	-51.7

have been constructed to examine the fundamental assumption that individual income taxes will rise and fall in order to balance the budget, year by year. Results are displayed in table 15.7.

The first alternative scenario is a search for generational balance. Under the baseline, the budget remains in balance year by year. A consequence of this assumption is that debt as a share of GDP falls as nominal debt remains constant while nominal GDP rises. In this first alternative scenario, net debt is held constant at 30 percent of GDP instead of falling, as in the baseline.

This scenario is partially successful in balancing the generational accounts, as it reduces the imbalance in favor of future generations relative to newborns from \$2,000 to \$1,400. However, this result can also be said to reinforce the notion that there is no simple relationship between fiscal balance and generational balance.

The second scenario assumes a return to annual deficits amounting to 2.2 percent of GDP, the average over the past 20 years. Under this scenario, the generational balance swings away from future generations to favor current generations. Under this scenario, future generations face a net burden 14.6 percent

higher than current generations. The principal beneficiaries of this policy are young adults, who face a lifetime of lower taxes.

The third scenario assumes that income tax rates remain at 1998/99 rates (after two rounds of tax cuts) instead of falling and then rising as in the baseline scenario. Under this scenario, huge surpluses build up in the current decade, completely retiring the debt by 2005. Aided by interest earnings on a rapidly accumulating stock of financial assets, surpluses eventually build to more than 100 percent of GDP. Under this scenario, future generations would face a net tax burden 51.7 percent less than that on current newborns. There are many reasons to regard this scenario as implausible, not the least of which is the assumption of relatively restrained expenditure growth in the face of huge surpluses.

15.4.4 Achieving Generational Balance

As an alternative to a trial-and-error search for a fiscal policy that balances the generational accounts as in the first alternative simulation, it is possible to solve the accounts backward for the required changes in inputs. Balance in this context means that the ratio of the net payment burden on future generations to that on newborns should be no higher than the rate of multifactor productivity growth. Most of the simulations performed for the sensitivity analysis in table 15.5, and most of the scenarios presented in table 15.7, indicate that future generations will bear a somewhat lower burden than current generations. The implication is that imposing generational balance may require a shift in some of the fiscal burden from current to future generations and is unlikely to require a shift in the other direction.

Of course, many different policies could accomplish generational balance. Starting from the base-case assumptions, we find that each of the following policies would succeed in doing so:

- A reduction of 0.8 percent in all income taxes;
- A reduction of individual income taxes by 1.1 percent;
- An increase in superannuation benefits of 2.7 percent.

15.5 Comparison with Previous New Zealand Study

A 1995 study of generational accounting in New Zealand, prepared for the New Zealand Treasury, was based on fiscal projections from the 1995 budget. The fiscal projections used in this chapter are generally based on the 1996 budget, but with an additional spending package as contained in the new government's coalition agreement. Taxes are also higher in 1997/98 as the second round of tax cuts has been deferred by one year.

Between 1995 and 1996, projections for short-term economic growth were revised downward while projections for spending were revised upward. However, both the 1995 and 1996 budgets projected substantial budget surpluses

as far as the eye can see. In practice, these surpluses were overridden by the assumption made in both studies that tax rates would fall and then rise to maintain year-by-year budget balance, although the phase-in of the balanced budget assumption was faster in the 1995 study, balancing in 1998/99 rather than in 2001/02 as in the current study.

Since the 1995 study was completed, there have been a number of important developments that have changed the demographic and fiscal projections underpinning the generational accounts.

New Demographic Projections. Statistics New Zealand has updated its population projections from a 1991 base to a 1994 base. In doing so, it has revisited its assumptions regarding fertility and mortality. It reduced its fertility assumption from 1.95 children per woman to 1.90, while raising life expectancies by nearly two years at 2031 (the ending point for many of its projections), a margin that remains about constant throughout the projections to 2200. The new projections still assume average net immigration of 5,000 but incorporate actual immigration in recent years, which has averaged well above 5,000. Taken together, these changes have adversely affected the dependency ratio throughout the period.

New Fiscal Projections. The earlier study was based largely on the 1995 budget, while the current study is based on the 1996 budget, with adjustments for higher spending. The 1996 budget assumes weaker economic growth than the 1995 budget, with average GDP growth through 2003/04 of 2.5 percent instead of 3.4 percent. The 1996 budget also assumes higher taxes and spending, even without the coalition agreement.

The results from the earlier study were expressed in New Zealand dollars. For ease of comparability, they have been converted to U.S. dollars at the current exchange rate.

Comparison of Results against 1995 Study. Overall, the results are quite similar (as can be seen in table 15.8). The balance between newborns and future generations is substantially the same, with an imbalance of between \$2,000 and \$3,000 in each case. However, for currently living generations, the results are fairly different, with the current chapter showing net payments about \$16,000 higher for 30-year-old persons. This is mainly the effect of higher taxes in the current baseline. With spending accounting for a share of GDP that is about 1.5 percent higher than before, middle-aged persons pay substantially more in taxes.

15.6 Summary and Conclusion

This paper has used generational accounting, a new tool for fiscal analysis and planning, to study New Zealand's long-term fiscal position. Generational

Table 15.8 Comparison with 1995 Study (present value of receipts and payments in thousands of U.S. dollars)

Generation's Age in 1995	1996 Base Case	1995 Base Case
0	18.0	18.4
5	26.4	26.4
10	39.0	38.6
15	57.9	54.2
20	78.7	72.6
25	95.3	83.8
30	95.9	79.9
35	88.7	75.6
40	75.1	62.8
45	55.6	44.4
50	30.3	21.0
55	2.4	-5.2
60	-26.3	-31.7
65	-50.2	-55.7
70	-55.8	-58.3
75	-53.7	-55.7
80	-47.1	-49.2
85	-44.5	-44.8
90	-36.3	-36.6
Future generations	16.0	15.7
Difference	-2.0	-2.7
Percentage difference	-10.8	-14.7

accounting emphasizes the importance of implicit as well as explicit government commitments. A key question for New Zealand is whether the country's apparent fiscal health masks large implicit burdens not captured in official debt and deficit measures.

The weight of evidence suggests that behind New Zealand's projected budget surpluses, there is indeed a sound fiscal picture. Even under the base-case scenario of annual budget balance for the foreseeable future, which entails substantial short-run tax reductions, the burden on future generations (relative to income) is projected to fall slightly below that on current newborns. This striking result is not materially changed by the adoption of alternative assumptions about economic or policy parameters. New Zealand appears to have avoided the large fiscal imbalances plaguing the United States and other OECD countries, not by placing large tax burdens on young current generations, but by limiting the size of its commitments. Its fiscal health, therefore, is contingent on the maintenance of such spending discipline.

References

- Auerbach, Alan J., Bruce Baker, Laurence J. Kotlikoff, and Jan Walliser. 1997. Generational accounting in New Zealand: Is there generational balance? *Journal of International Tax and Public Finance* 4, no. 2 (May): 201–28.
- Auerbach, Alan J., Jagadeesh Gokhale, and Laurence J. Kotlikoff. 1991. Generational accounts: A meaningful alternative to deficit accounting. In *Tax policy and the economy*, vol. 5, ed. D. Bradford, 55–110. Cambridge, Mass.: MIT Press.
- Electoral Commission of New Zealand. 1996. *Voting under MMP, New Zealand's electoral system*. Wellington: GP Publications.

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