

New Zealand: Selected Issues

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NEW ZEALAND

Selected Issues

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I. SOURCES OF ECONOMIC GROWTH IN NEW ZEALAND: A COMPARATIVE ANALYSIS¹

A. Introduction

1. **A heated debate during the last few years has centered on the question of why per capita GDP in New Zealand has not caught up faster with the rest of the OECD countries given the extensive and far reaching structural reforms undertaken since the mid-1980s.** In the past decade, the economy's growth performance has significantly improved, with New Zealand's real GDP growing at a 3.6 percent annual rate between 1993 and 2002 compared to a 3.0 percent average for the OECD countries (Table 1). This is significantly better than New Zealand's 1.6 percent a year GDP growth during the reform period (1984–1992) and 2.1 percent annual growth in the preceding decade. On a per capita and purchasing power parity (PPP) basis, GDP rose by 2.6 percent per year during 1993–2002, slightly higher than the OECD average, and the gap between per capita income in New Zealand and the average for OECD countries at least remained roughly unchanged, after widening in the previous two decades.² While growth has accelerated during the last decade, it has not been sufficient to bring New Zealand's per capita GDP back to the top half of the OECD countries.

Table 1. New Zealand's Growth Performance Relative to Other OECD Countries

	Average Annual Growth Rate				Ranking Among the Sample of OECD Countries						
	1973-02	1973-83	1984-92	1993-02	1965	1970	1975	1985	1990	1995	2002
New Zealand											
Real GDP	2.4	2.1	1.6	3.6							
PPP GDP per capita	1.5	1.1	0.8	2.6	6	9	12	16	17	18	18
Australia											
Real GDP	3.2	2.5	3.4	3.9							
PPP GDP per capita	1.9	1.1	1.9	2.7	7	6	7	11	15	11	8
Canada											
Real GDP	3.2	3.2	2.6	3.6							
PPP GDP per capita	1.9	2.0	1.4	2.4	2	2	2	2	2	4	3
Ireland											
Real GDP	5.3	3.9	4.0	8.1							
PPP GDP per capita	4.4	2.5	3.9	7.0	19	20	20	19	18	17	2
OECD average											
Real GDP	3.0	2.9	3.0	3.0							
PPP GDP per capita	2.3	2.2	2.4	2.4							

Source: OECD and Staff Calculations

2. **This paper conducts a comparative analysis of the main determinants of GDP per capita growth in New Zealand and in other OECD countries to assess the relative importance of macroeconomic factors, institutional settings, and geographical location in**

¹ Prepared by Abdelhak Senhadji (Ext. 3-8380).

² The OECD average is based on the following countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, United Kingdom, and United States.

New Zealand's growth performance during the last 30 years. There is a widespread belief that the relative geographical isolation of New Zealand has been an important impediment to growth. The paper uses a new data set which captures both the notion of intra-country sparsity as well as the distance between a country and the main poles of economic activity to econometrically estimate the impact geographical isolation has had on New Zealand's growth performance. The approach follows the empirical growth literature by estimating a reduced form growth equation to assess the relative contribution of macroeconomic policy, institutional settings, and geographical isolation to growth.

3. **The estimation results find strong support for the view that geographical isolation has significantly hampered growth in New Zealand.** Annual GDP per capita growth in New Zealand was one percentage point below the OECD average during 1971–2002. Half of that was due to geographical isolation. The other factors—including a relatively low rate of capital accumulation and national saving, a relatively high inflation rate during the 1970s and 1980s, and the tendency for countries with a higher initial GDP per capita income to grow slower than countries with lower initial GDP per capita (the phenomenon known as *conditional convergence* in the literature)—accounted for the other half.

B. Potential Determinants of Economic Growth

4. A common result of previous empirical work on economic growth using panel data is that even after controlling for some important macroeconomic and institutional factors, there remains a large unexplained residual for New Zealand.³ To try to capture more precisely New Zealand's growth experience during the last 30 years, a growth equation was estimated including variables that are of particular importance to New Zealand such as: investment; employment growth; the size of the public sector; the marginal corporate and individual income tax rates; macroeconomic variables like inflation and the national saving rate; the degree of openness; the relative competitiveness of New Zealand's labor force; terms of trade shocks; initial conditions; and geographical location.

5. Using the estimated equation, the source of growth for each country in the panel can be decomposed into contributions from each individual variable, allowing a cross-country comparison of sources of growth. An important question that can be addressed using the equation is to roughly judge how much of GDP per capita growth in New Zealand comes from factors that are policy independent (such as geographic location and initial conditions) and how much can be accounted for by variables that may be influenced by economic policy.

6. A derivation of the estimated growth equation is given in Annex I. By including factor inputs (employment and capital stock) in the growth equation, the coefficients on the other explanatory variables can be interpreted as their effect through TFP. The growth equation is

³ See for example, Bassanini, Scarpata, and Hemmings (2001).

estimated using panel data covering 20 countries for the period 1971 to 2002.⁴ The dependent variable is the annual growth rate of GDP per capita in PPP terms.

7. *Initial conditions*, as measured by the *level* of GDP per capita prevailing at the beginning of the period for each country, have been shown in the literature to be an important determinant of growth. A negative coefficient on this variable indicates conditional convergence—that is, that countries with a relatively low level of GDP per capita at the beginning of the estimation period tend to grow faster (after controlling for all variables on the right-hand side of the equation) than countries with higher initial levels.

8. Among the *macroeconomic* variables that have consistently been included in growth regressions is inflation. Recent research has shown that the relationship between inflation and growth is nonlinear. At low levels of inflation, a modest increase in inflation may have a positive effect on growth. However, inflation starts to hurt growth once a certain threshold level of inflation has been crossed. Khan and Senhadji (2001) estimate this threshold to be at 3 percent per year for industrial countries which also corresponds to the upper bound of the inflation target range of the Reserve Bank of New Zealand. Therefore, the specification of the growth equation will allow for the possibility of a nonlinear relationship between inflation and growth discussed above with the threshold level of inflation set at 3 percent per year.

9. In the neoclassical growth model, *national saving* determines the growth rate of GDP per capita on the transition to a steady state. For a given level of investment, national saving also provides information on a country's dependence on foreign capital. The size of the government, measured as the *share of public consumption in GDP*, has been found to be negatively associated with economic growth.⁵ The explanatory variables also include the *highest marginal tax rate on corporate and individual incomes*. The higher these marginal tax rates are, the lower the incentives to invest and work will be.⁶

10. Another variable that is particularly relevant for New Zealand, and which is generally found to be positively correlated with economic growth, is the *degree of openness* of the economy, defined as the share of exports in GDP. The ability to compete in international markets is also a crucial factor for open economies with a relatively small domestic market. The relative competitiveness of a country will be measured by its *relative unit labor cost index*. Terms of trade shocks (measured as the annual percentage change in the terms of trade index) are likely to be an important determinant of growth for a small open economy with a relatively large share of its exports being primary commodities. Finally, *geographical isolation* is often cited as an

⁴ The countries included in the panel are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Spain, Sweden, United Kingdom, and United States.

⁵ See Grimes (2003).

⁶ The disincentive to work will also depend on the level of income at which these top marginal income tax rates apply. However, this information is not available for most of the countries in the sample.

important impediment to growth in New Zealand. A newly constructed variable which captures both the notion of intra-country sparsity, as well as the distance from the main poles of economic activity, was also included in the set of explanatory variables (see Annex III).

11. Table 3 compares New Zealand macroeconomic performance to that of the OECD average and the six fastest-growing economies during the period 1971–2002.⁷ New Zealand's GDP per capita growth was one percentage point lower than that of the OECD average and two percentage points lower than that of the six-fastest growing economies. New Zealand exhibited higher employment growth, lower public consumption, and a lower top marginal tax rate on individual income than the OECD average. However, New Zealand had slower growth of its capital stock, higher inflation, lower national saving, and slightly smaller annual gains in international competitiveness (as measured by the annual percentage change in the relative unit labor cost index) than the OECD average. The differences between New Zealand and the six fastest-growing economies are significant for some macroeconomic variables. However, these differences are generally small between New Zealand and the OECD average. Therefore, it is unlikely that macroeconomic variables alone could fully explain the one percentage point gap in GDP per capita growth between New Zealand and the OECD average during 1971–2002.

Table 2. New Zealand's Relative Macroeconomic Performance^{1/}

	Average Annual Rate of Growth During 1971–2002		
	New Zealand	OECD average	The six fastest-growing OECD countries ^{2/}
GDP Per Capita Growth	1.3	2.3	3.3
Total Employment Growth	1.2	1.0	1.0
Capital Stock Growth	2.8	3.8	5.9
Inflation	7.9	6.4	6.5
National Saving/GDP	22.7	24.0	33.4
Public Consumption/GDP	18.1	19.2	19.1
Top Marginal Corporate Income Tax Rate	33.0	32.9	36.5
Top Marginal Individual Income Tax Rate	35.0	43.4	48.6
Degree of Openness (Exports/GDP)	28.3	30.8	36.9
Average Annual Percentage Change in Relative Unit Labor Cost Index	-0.2	-0.3	-0.2

1/ All variables have been pre-filtered with the HP filter.

2/ The six-fastest growing OECD countries (in terms of GDP per capita) during 1971–2002 are Austria, Finland, Ireland, Japan, Korea, and Norway.

⁷ Henceforth, the OECD average will refer to the average of the 20 OECD countries in the panel.

C. Econometric Results

12. The estimation results of the *growth equation* are given in Table 3. For comparison purposes, equation (1) does not include the variable on the degree of geographical isolation. All variables have the expected sign and are statistically significant at one percent level. The initial level of income has a negative coefficient which implies conditional convergence. Employment growth and capital formation have positive effects on growth, as expected. As discussed in the previous section, inflation enters the growth equation in a nonlinear fashion.⁸ The estimation results imply that at levels of inflation below the threshold level of 3 percent, modest increases in inflation stimulate growth (henceforth, growth will refer to the annual growth rate of GDP per capita in PPP terms).⁹ The estimated coefficient implies that an increase in the inflation rate from one percent to two percent per year would increase growth by 0.2 percentage points. However, an increase in inflation by one percentage point when inflation is already over 3 percent per year would reduce growth by 0.28 percentage points. An increase in the national savings rate, an improvement in the relative unit labor cost index, an improvement in terms of trade, a reduction in the size of the government, a decline in the highest marginal tax rate on corporate income, and an increase in the degree of openness all have positive effects on growth. The equation has a relatively high explanatory power (R^2 is equal to 0.77), especially considering that the equation was estimated with panel data.

13. An important result is that, despite the good fit, there remains a negative and statistically significant dummy variable for New Zealand. The coefficient on the New Zealand dummy variable implies that New Zealand's growth performance remains a half percentage point below the average of OECD countries included in the sample even after controlling for all the explanatory variables included in the growth equation. Although, this is significantly smaller than what has been found in the literature (about 1 percent), the statistically significant dummy variable for New Zealand suggests that there is an important explanatory variable for New Zealand's growth performance that is missing from the equation. Can this unexplained underperformance come from New Zealand's relative geographical isolation? To test this hypothesis, the variable measuring geographical isolation was also included as explanatory variable in equation (2). Interestingly, the New Zealand dummy variable becomes statistically insignificant, lending support to the view that geographical location has indeed hampered growth in New Zealand. Equations (3) and (4) are identical to equations (1) and (2) but where the highest marginal tax rate on corporate income was replaced by the highest marginal tax rate on individual income. This substitution does not significantly change the results.

14. While Table 2 has suggested that macroeconomic variables alone are unlikely to adequately explain New Zealand's relatively low growth performance during the last three decades, a more quantitative analysis is needed to precisely determine the relative contribution of

⁸ In Table 3, the threshold level is subtracted from inflation in the interactive term to impose continuity in the relationship between inflation and growth.

⁹ It is important to stress that the results need to be interpreted with caution given that the relationship between the explanatory variables and GDP per capita growth in the estimated equations is not necessarily causal.

all the factors used as explanatory variables in the growth equations shown in Table 3. Equation (2) in Table 3 was used to decompose countries' average growth rate of GDP per capita into contributions from the set of explanatory variables using the framework developed in Annex II. The results are given in Table 4. The average growth rate of each variable and for each country is expressed as a deviation from its sample mean.¹⁰ The column labeled *gdppc*^{*} provides the average annual growth rate of GDP per capita (in PPP terms) during the estimation period (1971–2002). The average annual growth rate of GDP per capita was 1.3 percent for New Zealand which is 1 percentage point below the sample mean (that is, the mean across all countries in the sample for the period 1971–2002). The estimated growth equation provides a good fit to countries' GDP per capita growth. This is particularly true for New Zealand where the actual and fitted average growth rates (as a deviation from the sample mean) are very close (-1.0 percent versus -0.97 percent, respectively) even when the effect from the New Zealand dummy variable is not included in the fitted value.¹¹

15. The lower than average growth performance of New Zealand during 1971–2002 reflects to a large extent geographical isolation and initiation conditions. Geographical isolation alone accounted for half of New Zealand's one percentage point below the OECD average growth rate of GDP per capita (in PPP terms) during 1971–2002. New Zealand's relatively high initial income level shaved a quarter of percentage point from New Zealand average growth rate due to conditional convergence—that is, countries with a relatively high initial GDP per capita (the case of New Zealand in the early 1970s) tend to grow more slowly than lower income countries. As expected, this negative factor due to conditional convergence is relatively close to that of Canada and Australia but smaller (in absolute value) than that of the United States. The contribution to GDP per capita growth from employment was almost 0.1 percentage points above the average OECD contribution. This simply reflects New Zealand's higher employment growth (1.2 percent per year) than the OECD average (1.0 percent per year). The contribution from capital formation was 0.1 percentage points below the OECD average, a consequence of the lower than the OECD average annual growth rate of the capital stock (2.8 percent per year compared to 3.8 percent per year). The contribution from inflation was 0.12 percentage points below that of the OECD average due to the relatively high inflation environment that prevailed in New Zealand during the 1970s and 1980s—New Zealand experienced an average annual inflation rate of 7.9 percent compared to 6.4 percent for the OECD average. The size of the government, as measured by the share of public consumption in GDP had a contribution to New Zealand's growth of almost 0.1 percentage points higher than that to the OECD average. Finally, the degree of openness has also contributed to the gap in GDP per capita growth between New Zealand and the OECD average, reflecting perhaps the difficulties faced by New Zealand in accessing markets where it has a significant comparative advantage.

¹⁰ The use of deviations from the mean helps the interpretation of results given that the dependent and explanatory variables have very different means.

¹¹ Including the effect from the dummy variable gives a perfect fit for New Zealand by construction.

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Table 3. New Zealand: Panel Estimation of GDP Per Capita Growth Equations

Independent Variables	Dependent Variable: $\Delta \log(GDPPC)$			
	(1)	(2)	(3)	(4)
$\log(GDPPC_0)$	-0.0095 (-6.95) [*]	-0.0078 (-5.78) [*]	-0.0112 (-7.96) [*]	-0.0093 (-6.55) [*]
$\Delta \log(EMPL)$	0.2528 (6.41) [*]	0.2665 (6.87) [*]	0.2181 (5.32) [*]	0.2351 (5.54) [*]
$\Delta \log(K)$	0.1022 (4.65) [*]	0.1005 (4.53) [*]	0.1155 (4.57) [*]	0.1121 (4.38) [*]
$INFL$	0.2010 (3.80) [*]	0.2588 (4.53) [*]	0.2141 (3.85) [*]	0.2669 (4.50) [*]
$D_1*(INFL-.03)$	-0.2808 (-5.18) [*]	-0.3267 (-5.70) [*]	-0.3122 (-5.49) [*]	-0.3507 (-5.18) [*]
S	0.0305 (4.58) [*]	0.0331 (4.91) [*]	0.0294 (4.72) [*]	0.0316 (5.09) [*]
$\Delta \log(RULC)$	-0.0483 (-3.82) [*]	-0.0692 (-4.90) [*]	-0.0347 (-3.06) [*]	-0.0562 (-4.44) [*]
$\Delta \log(TOT)$	0.0181 (3.19) [*]	0.0223 (4.00) [*]	0.0169 (3.22) [*]	0.0210 (4.05) [*]
Cg	-0.0007 (-8.00) [*]	-0.0008 (-9.03) [*]	-0.0006 (-6.43) [*]	-0.0007 (-7.88) [*]
TAX_c	-0.0554 (-6.14) [*]	-0.0428 (-4.46) [*]		
TAX_i			-0.0244 (-7.47) [*]	-0.0202 (-5.60) [*]
$OPEN$	0.0218 (10.76) [*]	0.0190 (8.95) [*]	0.0250 (10.44) [*]	0.0221 (8.69) [*]
$\log(DIST)$		-0.0082 (-4.58) [*]		-0.0076 (-3.86) [*]
D_NZL	-0.0049 (-3.68) [*]	-0.0003 (-0.20)	-0.0056 (-4.42) [*]	-0.0013 (-0.78) [*]
$Adjusted R^2$	0.77	0.77	0.77	0.78
NT	630	630	598	598

Note: The equations were estimated using panel data for 20 countries and for the period 1971–2002. The dependent variable is the annual growth rate of GDP per capita in PPP terms ($GDPPC$). The independent variables include: the initial level of $GDPPC$ ($GDPPC_0$), the annual growth rate of employment ($EMPL$), the annual growth rate of the capital stock (K), inflation ($INFL$), the interactive term between inflation (minus 3 percent) and the dummy variable D_1 that takes one for inflation rates over 3 percent, national saving as a share of GDP (S), the annual growth rate of the relative unit labor cost ($RULC$), the annual percentage change in the terms of trade (TOT), the share of government consumption in GDP (Cg), the highest marginal corporate and individual tax rates (TAX_c , and TAX_i), the log of the distance between the main trading partners ($DIST$), and a dummy variable for New Zealand (D_NZL). A time trend and two dummy variables for the oil shocks in the 1970s were also included. All variables that are business-cycle sensitive have been pre-filtered with the HP filter to remove business cycle frequencies. A superscript “^{*}” indicates statistical significance at the 1 percent level.

Table 4. Sources of Growth Decomposition for 1971–2002 (in percent)

	Deviation From Sample Mean													
	gdppc*	gdppc	fitted	gdppc_0	empl	k	infl	s	cg	tax_c	rulc	tot	open	dist
Australia	1.858	-0.463	-0.475	-0.202	0.202	0.016	0.042	-0.001	0.085	-0.099	0.229	-0.018	-0.272	-0.456
Canada	1.894	-0.427	-0.376	-0.269	0.283	-0.072	0.068	-0.023	-0.151	-0.214	0.007	0.013	-0.023	0.003
Finland	2.182	-0.139	0.054	0.030	-0.200	-0.180	0.017	0.090	-0.135	0.200	0.120	0.005	0.002	0.105
Ireland	4.200	1.879	1.354	0.284	0.174	-0.080	-0.048	-0.022	0.158	0.043	0.253	-0.013	0.540	0.065
Japan	2.651	0.330	0.474	0.294	-0.048	0.217	-0.105	0.261	0.424	-0.057	-0.233	-0.094	-0.373	0.189
Korea	5.667	3.346	3.427	0.890	0.366	0.814	-0.027	0.249	0.694	0.214	-0.019	-0.003	0.054	0.196
New Zealand	1.306	-1.015	-0.965	-0.264	0.074	-0.100	-0.123	-0.045	0.085	0.000	-0.014	-0.024	-0.047	-0.509
Norway	2.910	0.589	0.459	-0.007	0.031	-0.168	0.054	0.260	-0.065	0.214	-0.137	0.014	0.158	0.105
Sweden	1.700	-0.621	-0.794	-0.208	-0.185	-0.112	0.006	-0.053	-0.691	0.214	0.096	0.009	0.033	0.098
United Kingdom	2.069	-0.252	-0.713	-0.101	-0.158	-0.114	-0.013	-0.201	-0.069	0.100	-0.150	0.012	-0.093	0.074
United States	1.977	-0.344	-0.542	-0.380	0.216	-0.074	0.144	-0.197	0.220	-0.085	0.090	-0.016	-0.419	-0.041

Note: The Table provides the contribution of each variable to the average (over 1971–2002) country growth rate of GDP per capita (*gdppc*). The average country growth rate of GDP per capita is given by *gdppc**. All the other variables are expressed as deviation from the sample mean. For example, column 2 shows that New Zealand had a growth performance over 1971–2002 of almost 1 percentage point lower than the average of the 20 OECD countries in the panel. Column 3 provides the corresponding fitted value. The next 11 columns provide the contribution of each variable to a country's average growth rate relative to the whole sample average growth rate. The variables are: initial GDP per capita (*gdppc_0*), employment growth (*empl*), growth in the capital stock (*k*), inflation (*infl*), national saving as a ratio of GDP (*s*), public consumption as a share of GDP (*cg*), the highest marginal tax rate on corporate income (*tax_c*), the change in the relative unit labor cost (*rulc*), the change in terms of trade (*tot*), the degree of openness (*open*), and the distance from the main trading partners (*dist*). The exact formulae for the decomposition in this table is given in Annex II.

Derivation of the Empirical Growth Equation

The approach follows the empirical growth literature by estimating a reduced form growth equation which is typically derived from an aggregate production function as follows:

$$Y_{it} = A_{it} F(K_{it}, L_{it}) \quad (1)$$

where Y_{it} is GDP per capita on a purchasing power parity (PPP) basis, A_{it} is total factor productivity, K_{it} is the stock of capital, and L_{it} is total employment, all for country i in year t . Differentiating equation (1) with respect to time yields GDP per capita growth on a PPP basis as a function of growth in total factor productivity, growth in the capital stock, and growth in total employment:

$$y_{it} = a_{it} + f(k_{it}, l_{it}) \quad (2)$$

where the lower case variables represent the growth rate of the corresponding uppercase variable in equation (1). It is assumed that TFP growth, a_{it} , is a function g of a set of factors $x_{it}^1, \dots, x_{it}^K$ that is:¹²

$$a_{it} = g(x_{it}^1, \dots, x_{it}^K) \quad (3)$$

Substituting equation (3) into (2) yields the final equation:

$$y_{it} = f(k_{it}, l_{it}) + g(x_{it}^1, \dots, x_{it}^K) \quad (4)$$

The set of explanatory variables $x_{it}^1, \dots, x_{it}^K$ varies across the studies in the literature. The choice mainly depends on the countries included in the sample. The larger and the more heterogeneous the sample is, the larger the set $x_{it}^1, \dots, x_{it}^K$ generally is to control for cross-country heterogeneity. In this study, limiting the sample to OECD countries reduces the high degree of heterogeneity associated with studies that include both developed and developing countries while providing a rich set of country experiences. Furthermore, limiting data to OECD countries should also yield a higher quality dataset.

¹² While k_{it} and l_{it} represent growth rates of the capital stock and total employment, the variables $x_{it}^1, \dots, x_{it}^K$ do not have to be expressed in growth rates.

Sources of Growth Decomposition

The panel regression model can be written as:

$$y_{it} = a + \sum_{j=1}^K b_j x_{it}^j + e_{it} \quad (1)$$

where the indexes i, j , and t refer to one of the N countries in the sample, one of the K variables in the model, and the year, respectively. The dependent and explanatory variables are defined in Table 3. Taking time averages for each country and noting that the panel is unbalanced yields:

$$\sum_{t=t_i}^{T_i} y_{it} = a + \sum_{t=t_i}^{T_i} \sum_{j=1}^K b_j x_{it}^j + \sum_{t=t_i}^{T_i} e_{it} \quad (2)$$

where t_i and T_i refer to the first and last years for which the data is available for country i . Equation (2) can be rewritten as:

$$\bar{y}_i = a + \sum_{j=1}^K b_j \bar{x}_i^j + \bar{e}_i \quad (3)$$

where a “bar” over a variable represents the mean of the variable. Subtracting the whole sample mean from individual country means yields:

$$\bar{y}_i - \bar{y} = \sum_{j=1}^K b_j (\bar{x}_i^j - \bar{x}) + \bar{e}_i \quad (4)$$

where the whole sample means defined as:

$$\bar{y} = \sum_{i=1}^N \sum_{t=t_i}^{T_i} y_{it} , \quad \bar{x} = \sum_{i=1}^N \sum_{t=t_i}^{T_i} x_{it} , \quad \text{and noting that } \sum_{i=1}^N \sum_{t=t_i}^{T_i} e_{it} = 0 \quad (5)$$

Equation (4) provides the decomposition in Table 4.

Data Sources and Definitions

The panel data contains 20 countries for the period 1971 to 2002. The countries included in the sample are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Spain, Sweden, United Kingdom, United States. The definition and sources for each variable are as follows:

GDP per capita in PPP terms (GDPPC). Source: OECD.

Total employment (EMPL). Source: OECD

Capital stock of the business sector (K). Source: OECD

Inflation (INFL). It is based on the CPI index. Source: OECD.

National saving as a share of GDP (S). Source: OECD.

Relative unit labor cost (RULC). It is used as a measure of relative competitiveness of a country. Source: OECD.

Terms of trade index (TOT). The annual percentage change of this index is used to control for terms of trade shocks. Source: OECD.

Public consumption as a share of GDP (Cg). Used as a measure of the size of the government in the economy. Source: OECD.

The highest marginal tax rate on corporate income (TAX_c). Source: World Bank.

The highest marginal tax rate on individual income (TAX_i). Source: World Bank.

Population (POP). Source: OECD.

Average distance of a country from main economic centers (DIST). The economic centers are the United States, the European Union, Japan, and China. The average distance of country i from the main economic centers is defined as the sum of the distances to each economic center:

$DIST_i = d_i^{USA} + d_i^{EU} + d_i^{JPN} + d_i^{CHN}$ where d_i^j $j = USA, EU, JPN, and CHN$ is the distance between country i and the center of economic center j . The distances d_i^j are defined as:¹³

$d_i^j = \left[\sum_{k \in i} (pop_k / pop_i) \sum_{l \in j} (pop_l / pop_j) (d_k^l)^q \right]^{1/q}$ where pop_k designates the population of

agglomeration k belonging to country i . The parameter θ measures the sensitivity of trade flows

¹³ This formula was developed by Head and Mayer (2002).

to bilateral distance d_k^l and is set equal to -1, which corresponds to the usual coefficient estimated from gravity models of bilateral trade flows. This measure of distance uses city-level data to assess the geographic distribution of population (in 2000) inside each nation. The basic idea is to calculate distance between two countries based on bilateral distances between the biggest cities of those two countries with inter-city distances being weighted by the share of the city in the overall country's population. The data of main cities come from Vernon Henderson.¹⁴

Source: Centre d'Étude Prospectives et d'Informations Internationales (CEPII).¹⁵

¹⁴ <http://econ.pstc.brown.edu/faculty/henderson/worldcities.html>

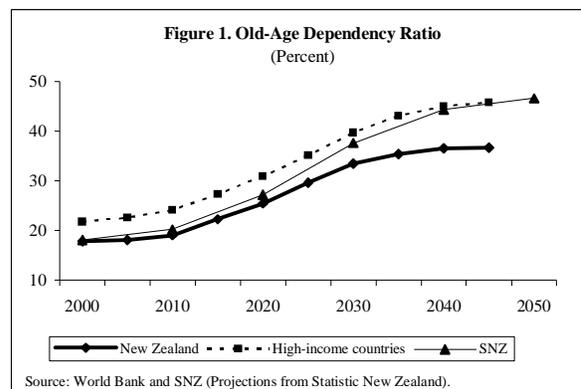
¹⁵ http://www.cepii.fr/anglaisgraph/bdd/distance/noticedist_en.pdf

II. NEW ZEALAND SUPERANNUATION FUND: INTERNATIONAL COMPARISONS AND ECONOMIC IMPLICATIONS¹⁶

D. Introduction

1. As in other industrial countries, New Zealand faces significant spending pressures related to population aging.

The old-age dependency ratio (defined as the ratio of people at age 65 and older to that of people at ages 15-64) in New Zealand is projected to more than double in the next 40 years, based on the latest projections from either the World Bank or Statistics New Zealand (Figure 1). According to estimates by the New Zealand Treasury, these demographic changes imply that the net cost of New Zealand Superannuation (NZS)—the government-funded public pension scheme—will increase from about 4 percent of GDP to 9 percent of GDP during 2000-2050.¹⁷

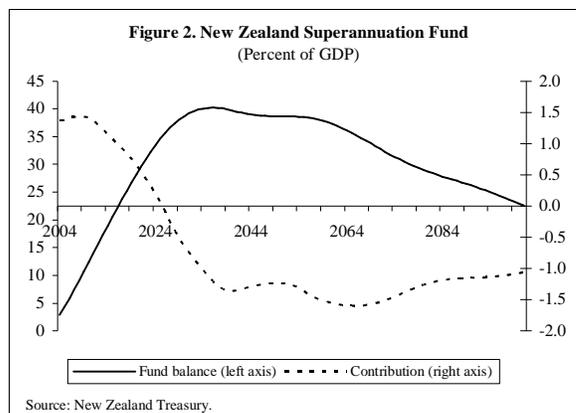


2. To smooth the impact of increasing public pension payments on fiscal balances, the government has established the New Zealand Superannuation Fund (NZSF) to partially pre-fund the future obligations of NZS. The NZSF, which is entirely funded by the government, commenced its investment program on October 1, 2003 after receiving initial funding of \$NZ 2.4 billion. The government is currently expected to continue making net contributions to the Fund through 2025, with no withdrawals from the Fund explicitly mandated by legislation before July 2020. During 2003-20, the government expects to contribute an average of \$NZ 2.3 billion per year (1.2 percent of GDP on average). The Fund is governed by an independent Board of Guardians, which is charged with managing and administering the NZSF in a prudent and commercial manner consistent with best-practice

¹⁶ Prepared by Ranil Salgado (Ext 3-4182).

¹⁷ NZS is a universal pension benefit that is provided by the government to all eligible citizens or permanent residents over the age of 65. The eligibility requirement, with some exceptions, is that the beneficiary has spent 10 years in New Zealand after the age of 20 and five years after the age of 50. The benefit is not subject to means tests or income history requirements. For a married couple (both eligible), the minimum pension level (for both) is 65 percent of the national average ordinary time weekly earnings. For estimates of net pension cost, for example, see McCulloch and Frances (2003). Net cost, which is defined as the after-tax cost, is considered the relevant cost to the government, as NZS payments are taxed as income to the recipients. These estimates are broadly consistent with those found in Sarel (1998), Polackova (1997), and other studies.

portfolio management, maximizing returns without undue risk to the Fund as a whole, and avoiding prejudice to New Zealand’s reputation as a responsible member of the world community. The Guardians are responsible for establishing investment policies and standards and procedures for the NZSF. With an objective of achieving average annual returns, before tax, exceeding 2½ percent more than the risk-free rate (defined as the interest rate on Treasury bills) over rolling 20-year periods, the Board currently plans—when the Fund is fully invested later in 2004—to allocate 22 percent of its assets domestically (including fixed interest investments, listed equities, and other growth assets such as private equity, property, commodities, and infrastructure) and the rest abroad (with almost 60 percent in international equities).¹⁸ Based on expected returns from this investment strategy and expected government contributions, the New Zealand Treasury projects that the assets in the NZSF will peak at around 40 percent of GDP in the mid-2030s before falling gradually thereafter but remaining above 20 percent of GDP through 2100 (Figure 2).



3. **The shift to pre-funding pension liabilities and the large projected size of the Fund have raised concerns about the economic implications and risks of the NZSF.** This chapter reviews the international experience with pre-funding public defined-benefit pension schemes, with a focus on recent reforms in industrial countries—Canada, Ireland, Norway, and Sweden. It also examines the potential implications and risks to New Zealand from the Fund including specific concerns, inter alia, on the impact on national saving and on foreign exchange and domestic capital market markets, the implications for government and individual behavior, and the vulnerability to political pressures.¹⁹

¹⁸ As of end-February 2004, the value of the NZSF was \$NZ 3.2 billion, with roughly 41 percent in international equities, 9¾ percent in international fixed income, 8¼ percent in New Zealand private fixed income, 6¾ percent in New Zealand equities, and 34 percent in domestic Treasury bills and cash (NZSF, 2004).

¹⁹ See New Zealand Treasury (2000) for a broader discussion of potential implications and risks.

E. International Experience in Industrial Countries

4. **To address the expected burden on public pensions of population aging, many countries have implemented reforms to increase the size of pension fund reserves relative to the expected liability.** These reforms include reducing long-term pension liabilities—by lowering or means-testing benefits and/or raising the retirement age—and increasing pension reserves—by raising taxes and/or earmarking funds. Some countries have also taken steps to increase investment returns of earmarked funds by investing in private assets. This section briefly reviews the experience of countries that have chosen government-managed investment of pension liabilities, particularly those countries that made reforms in recent years to allow investments in private assets.²⁰ These countries include Canada, Ireland, and Sweden (Table 1).²¹ In addition, in Norway, central government budget surpluses (including net oil revenues) are invested in the State Petroleum Fund (SPF). Although the SPF is not technically a pension fund, an objective in creating the SPF was to help cover increased pension and health care costs due to population aging.

	Year Investments Commenced 1/	Asset Size (Percent of GDP) 2/	Fund Manager/Administrator	Statutory Asset Class Restrictions on Manager/Administrator
New Zealand Superannuation Fund	2003	2.2	Independently appointed professional investment board.	None
Canada Pension Plan Investment Board	1999	5.5	Independently appointed professional investment board.	30 percent limit on foreign securities.
Ireland National Pensions Reserve Fund	2001	6.3	Professional investment commission appointed by Finance Minister.	Prohibited from holding domestic government bonds.
Norway State Petroleum Fund	1996	54.0	Central bank, using private investment managers.	Ministry of Finance sets benchmark portfolio (which is all in foreign assets, including ranges for asset mix and currency composition).
Sweden National Pension Fund	2001	22.9	Board appointed by government and employer/employee organizations.	40 percent limit on unhedged foreign currency exposure and 30 percent minimum of high-rated fixed income instruments.

1/ For Sweden, year new fund commenced investment operations.
2/ End-2003, except Ireland July 2003 and Sweden end-2001. For Canada, total assets of the Canada Pension Plan.

Sources: New Zealand Superannuation Fund; Canada Pension Plan Investment Board; Ireland National Pensions Reserve Fund Commission; Norges Bank; Palacios (2002); and staff estimates.

²⁰ An alternative, which has been implemented in countries such as Australia and Switzerland, would be a publicly-mandated retirement scheme in which assets are managed in private individual accounts. Such a scheme (combined with a public top-up provision to guarantee a minimum pension) was almost universally rejected by voters in New Zealand in a 1997 national referendum. See Sarel (1998) for more information on the proposed scheme.

²¹ See Casey et al. (2003) for a summary of other recent pension reforms in OECD countries.

5. **There are a number of concerns related to government management of pension funds.** Aside from typical problems with (funded or unfunded) public pension schemes (such as disincentives to work and save), these concerns include vulnerability to political interference, which may lower the investment returns of the funds, and capital market and other economic disruptions and risks related to the potentially large size of the funds. Political interference mainly stems from pressures to make socially or politically attractive investments, such as to subsidize state governments and public enterprises, housing, and construction projects. Pressures could also arise to prop up ailing stock or capital markets. The large size of the funds could lead to the government becoming a price maker in capital markets (including in government securities markets), with government decisions on asset allocation leading to significant market fluctuations and added market uncertainty. Moreover, while expected returns would be higher if funds were invested in private assets than solely in government securities, risks on investment returns would also increase leading to potential negative implications for the government's balance sheet.

6. **To address these concerns, recent reforms in industrial countries have improved the governance, transparency, and accountability of public pension reserve funds.** Fund managers have been given greater independence in setting investment policies, and reporting and auditing requirements have been increased. In some of the countries, strict investment allocation restrictions (such as passive versus active management of assets and limits on acquiring domestic government bonds or other domestic assets) have been added to address issues related to the size and level of development of capital and foreign exchange markets, as well as concerns about political interference and government incentives. The long-term nature of the pension reserve funds, often with withdrawals restricted for many years, also reduces shorter-term risks related to holding private assets.

7. **In Canada, a professional body, the Canada Pension Plan Investment Board (CPPIB) was set up at arm's length from the government to manage new investments in the Canada Pension Plan (CPP).**²² Statutory provisions generally require the CPPIB to follow the existing regulatory framework for private pension plans, including concentration limits on exposure in real estate or to any single entity. Based on this framework, the share of foreign investments was also initially restricted to 20 percent of total assets (subsequently raised to 30 percent of total assets by 2001 in two steps). In addition, the CPPIB was originally required to follow a passive investment strategy for domestic equity investments (replicating one or more widely recognized broad market indices), but subsequently active management has been allowed. The act establishing the CPPIB also mandated explicit objectives for the Board—primarily to maximize investment returns without incurring undue risk to the CPP. Currently the CPPIB, using external managers, only manages assets in its diversified market-based portfolio that have been accumulated since its inception in 1999, but after 2005, the Board will also manage legacy holdings of the CPP, mainly provincial government bonds. Withdrawals from CPP reserves are expected to begin in 2020.

²² More details are available at <http://www.cppib.ca>.

8. **In Ireland, an independent professional commission governs the National Pensions Reserve Fund (NPRF), which was launched in 2001.**²³ The Commission has an explicit commercial investment mandate to maximize total financial returns subject to a prudent level of risk. In addition, investments in domestic bonds (including government bonds) are forbidden. Withdrawals from the NPRF are programmed to commence in 2025. The Commission determines the investment strategy, including the asset allocation, with the National Treasury Management Agency (NTMA) as the investment manager for the first ten years of the NPRF. The NTMA contracts out most of the funds to private asset managers and directly manages only the passive euro zone (non-Irish) government bond portfolio (18 percent of total assets at end-2002), strategic and residual cash (26 percent), and the currency (hedging) overlay program (NPRF Commission, 2003). The NTMA also monitors the performance of the NPRF, including risks to the Fund.

9. **The Norges Bank, the central bank, manages Norway's SPF on delegation from the Ministry of Finance.** The SPF is formally a local-currency account with the Norges Bank, which then manages a foreign-currency denominated portfolio in its own name against this portfolio (Norges Bank, 2004). According to the regulations, the Ministry of Finance, after consultation with the Norges Bank, establishes a benchmark portfolio with limits on credit and interest rate risk and stipulated ranges for the asset mix (fixed income versus equity investments) and currency and market distribution. The central bank is then required to achieve the highest possible returns, given the restrictions implied by these regulations. The Norges Bank uses both external and internal management of the fund and a mix between active and passive management. The SPF cannot raise loans, so contributions to the Fund can only come through government budget surpluses and withdrawals occur with budget deficits. The primary objective of the SPF is redeploy petroleum wealth to avoid excessive current spending and promote a gradual transform of this wealth into foreign financial assets. Investing in foreign assets also prevents excessive exchange rate appreciation, reduces political pressures related to investing in domestic assets, and builds reserves to help cover increased fiscal costs due to population aging.

10. **In Sweden, pension reserves in five pre-existing funds were transferred to four new units with improved governance and less onerous constraints on investment decisions.**²⁴ The new funds, which began investment operations in 2001, were given the objective of maximizing returns subjected to stated risks tolerances. The legislation related to these funds forbids social, economic, and industrial policy goals in managing the funds, although it notes that investment policies need to state how environmental and ethical considerations are taken into account while still achieving high investment returns. The two main investment restrictions are a 40 percent limit on unhedged foreign currency exposure

²³ More details are available at <http://www.ntma.ie>.

²⁴ See Palacios (2002) for more information, including other reforms to Sweden's pension scheme.

and a requirement to allocate at least 30 percent of assets in fixed income instruments with high credit ratings. The funds are also subject to exposure limits on individual firms and can invest no more than five percent of assets in unlisted securities.

11. **In all four countries, the pension reserve funds have at least annual audit and public reporting requirements.** Performance compared to objectives and financial and management controls are also reviewed on an annual or longer-term basis. In Canada and Norway, quarterly financial statements are provided to the public, while in Sweden, audited semi-annual reports are published for each fund. In Canada, public meetings on the CPP must be held once every two years in each participating province (all but Quebec).

F. Economic Implications of the NZSF

12. **Governance, accountability, and transparency arrangements of the NZSF are similar to best practices in these other government pension reserve funds and private pension funds.** The NZSF is managed by an independent board with a duty to invest the Fund on a prudent commercial basis. Performance statements and reports are published on a regular basis.²⁵ The Fund's performance is also reviewed on an annual basis in the NZSF Annual Report against a Statement of Intent, which sets out the NZSF's objectives and financial forecasts at the beginning of each year. In addition, the performance of the NZSF and the Board of Guardians will be assessed independently at least once every five years by a person appointed by the Minister of Finance, with the report provided to Parliament and the public.

13. **Concerns that NZSF investments could disrupt the functioning of capital markets are mitigated by the Fund's investment strategy,** which allocates only 22 percent of assets domestically. The decision to invest only 7½ percent of funds in New Zealand equities is expected to limit exposure of the NZSF (even at its peak) to under 10 percent of the value of any individual stock.²⁶ In 2001, average *daily* trading volume of the New Zealand dollar in Australia and New Zealand alone—additional trading occurs in London and New York—was approximately \$NZ 2.8 billion in the spot market and \$NZ 13 billion in the swap market. As these trading volumes dwarf the amount of funds being invested internationally by the NZSF (roughly \$NZ 1.8 billion *annually* on average during 2003-2020 or 78 percent of the total investment), the foreign exchange market is unlikely to be significantly affected. Risks to the entire Fund from potentially more volatile private investment returns are also decreased by the long-term (20-year or greater) horizons of the

²⁵ The NZSF publishes a monthly performance report on its website (<http://www.nzsuperfund.co.nz>).

²⁶ Based on estimates by the NZSF staff. Currently, the stock market capitalization in New Zealand is about 44 percent of GDP. At its peak in the mid-2030s, the size of the funds invested in domestic equities is projected to be about 3 percent of GDP.

NZSF's investments. The Board of Guardians' interim policy is to hedge 60 percent of the Fund's foreign currency exposure in international growth assets and 100 percent of the exposure in the international fixed interest portfolio. If this policy remains unchanged, the NZSF may have difficulty finding counterparties as its stock of international investments grows. The current investment strategy allots 10 percent of assets to domestic fixed interest investments, but does not preclude investments in domestic government securities (as found in Ireland and Norway). If government net debt continues to decline, a prohibition on these investments may be warranted, including to reduce government incentives to tap these funds.

14. **National saving could increase somewhat if pre-funding pension liabilities in the NZSF leads to increased government saving.** Empirical studies have shown that roughly 50 percent of increased public saving tends to be offset by a reduction in private saving.²⁷ An assumption that contributions from the government to the NZSF meant higher public saving would imply an increase in public saving of 1.2 percent of GDP annually (the average annual contribution to the NZSF through 2020, as noted above). With a 50 percent offset in private saving, overall national saving would increase by 0.6 percent of GDP, with a similar increase in the current account balance if domestic investment and the value of the exchange rate do not change.²⁸ However, it is unclear if earmarked contributions to the NZSF would affect overall government saving as instead of making these contributions, the government could allocate surpluses to retire government debt. If overall government saving were not changed by the NZSF, the impact on private saving theoretically would depend on the extent to which individuals believe that pensions have become more certain by the creation of the NZSF.

²⁷ For example, see Masson et al. (1995). The offset is generally known as Ricardian equivalence—namely, as government balances improve individuals believe that taxes in the future will be lower than otherwise, so expected permanent disposable income rises and consumption increases. Feldstein (1996) similarly finds that the U.S. Social Security System reduces private saving by about 50 percent.

²⁸ It is unclear how domestic investment would be affected by the NZSF, given that New Zealand has a very open capital account. Theoretically, domestic investment could increase if the marginal product of capital rises (due to an increase in productivity) or if interest rates fall. The latter could occur if increased national saving due to the NZSF allows for a decline in the risk premium for New Zealand.

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III. Macroeconomic Policy Coordination and Short-Term Economic Stabilization²⁹

G. Introduction

1. New Zealand has been a pioneer in the development of rules-based macroeconomic policies. New Zealand's monetary and fiscal frameworks are well established, highly credible, and guided by a medium-term focus with an emphasis on transparency. The existing institutional arrangements have promoted macroeconomic stability, even through several adverse economic shocks. Under current rules, monetary policy provides the first line of defense for reacting to developments in inflation and output, and fiscal policy provides support through the operation of automatic stabilizers.

2. A question arises, however, as to whether there are circumstances when more discretionary use of fiscal policy could assist monetary policy with short-term demand management. Although several scenarios can be envisaged in which discretionary fiscal measures could play a role in short-term macroeconomic stabilization, evidence and experience suggest that the role of discretionary fiscal policy as a short-term stabilization tool should be limited. In addition to the well-known problems of discretionary fiscal policy, such as implementation lags, political constraints, and difficulty in reversing policies, temporary fiscal measures could also render monetary policy-making more difficult, particularly if procyclical outcomes result from the lags in fiscal action. Hence, great caution should be used in considering any increased role for discretionary fiscal policy.

H. The Literature

15. Several industrial countries adopted rules-based policy frameworks during the 1990s, as governments sought to give credibility to their macroeconomic policies by limiting discretionary intervention (Kopits, 2001). Academic research shows that rules-based policies could be superior to a discretionary approach because of time inconsistency issues that arise with the latter (Kydland and Prescott, 1977). However, not all rule-based fiscal frameworks are created equal. For example, it has been argued that a binding annual deficit rule would not achieve the same level of stabilizing effect as a medium-term rule. Annual targets could lead to a procyclical bias to fiscal policy, since contractionary measures may be adopted during a downturn when revenues are low, while windfall revenue gains would be spent during an upturn (Daban Sanchez, *et al*, 2003).

16. Empirical evidence suggests that fiscal multipliers are generally small, although the impact varies based on the circumstances and the type of fiscal action taken. A recent survey by Hemming, *et al* (2002) concluded that fiscal multipliers in industrial countries were positive but small. Blanchard and Perotti (2002) found that, although U.S. output increased when government spending rose and dropped when taxes increased, the size of the multipliers were typically small. Likewise for Japan, relatively small multiplier effects have

²⁹ Prepared by Uma Ramakrishnan (Ext. 3-5413) and Zhiwei Zhang (Ext. 3-7809).

been found (Matsuoka (1996), IMF (1998), IMF (2002)). However, Giavazzi *et al* (2000) showed that lower taxes or higher spending actually weaken economic activity in OECD countries because long-term interest rates rise for fear of future deficits, and several other studies have also found that fiscal consolidations have an expansionary short-term impact on the economy (Giavazzi and Pagano (1990), Alesina and Ardagna (1998)).³⁰

17. Some studies have examined whether the structural and cyclical components of fiscal measure have differing impacts. Van den Noord (2000) found that both automatic stabilizers and discretionary fiscal actions helped dampen fluctuations in economic activity across OECD countries, although there was significant cross-country variability. Taylor (2000) estimated a fiscal policy rule and found that the cyclical component of the budget balance played an important role in driving the budget balance over the cycle, and discretionary policy had little relation to the cycle. Likewise, Auerbach (2002) also found little evidence of an important stabilization role for discretionary fiscal policy in the United States, while the automatic stabilizers were found to help soften cyclical fluctuations.

I. Use of More Discretionary Fiscal Policy

18. In principle, discretionary fiscal policy may have a useful role in stabilizing growth under some conditions, including: (i) large movements in asset prices; (ii) large movements in the exchange rate; (iii) high level of public debt; or (iv) zero bound on interest rates. While the latter two instances are not particularly relevant to New Zealand at present, the former two are potentially of more immediate interest and have sparked some debate on the relative roles of monetary and fiscal policy. For example, the recent strong rise in housing prices could create a significant policy dilemma in the event the economy were to slow. A reduction in interest rates in such circumstances could have the undesired effect of feeding a further run-up in housing prices. An alternative approach to providing stimulus to the economy in these circumstances would be to substitute an easing of fiscal policy for the interest rate decrease and thereby avoid the effect on housing prices.

19. Another example is the dilemma for macroeconomic policies in the event of a need for a policy tightening created by the sharp appreciation of the New Zealand dollar over the past two years. Tightening monetary policy could put further upward pressure on the exchange rate. That pressure could be avoided if a fiscal policy tightening could be substituted instead.

20. Although these theoretical considerations suggest that it might be useful for a discretionary fiscal policy action to substitute for a change in monetary policy, it may not be possible for very practical reasons. Temporary fiscal measures typically take time to initiate

³⁰ Such an expansionary effect typically takes place when the fiscal consolidation focuses on unproductive spending, and occurs against a background of high public debt levels which lead to a high risk premium.

because of the legislative process entailed. Such long implementation lags may result in the policy measure going into effect well after the time when they would be most effective. Likewise, fiscal policy actions are more difficult to reverse, unlike monetary policy. Just as the legislative approval process can lead to delays in approving a short-term fiscal measure, reversing the measure could involve similar delays as well. Also, it is more difficult to target discretionary fiscal policy actions to limit their size and impact. In theory, it may be possible to design a discretionary fiscal policy mechanism that could function in a manner similar to monetary policy. However, unlike monetary policy, governments may be unwilling to cede a significant part of its fiscal powers to an independent body. In addition, discretionary fiscal policy is often expected to impart a loosening bias to fiscal policy, and therefore, undermine policy credibility.

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