# Economic Growth and the Size & Structure of Government: Implications for New Zealand

**Arthur Grimes**[*]
Motu;
&
Department of Economics, University of Waikato

**July 2003**
**(Revised Version)**

**Abstract**
The work of Gwartney, Holcombe and Lawson (GHL, 1998) is cited in New Zealand debate to demonstrate that a larger government share of GDP is detrimental for economic growth. Their work is reassessed here. We find a number of omissions in their analysis lead to a considerable over-statement of the effect of government size on growth. More important for growth, according to other recent work, are the structures of government revenues and expenditures. The size and structure of New Zealand government flows are examined using recent IMF data. This analysis indicates that New Zealand has a relatively small government sector. However, the structures of both government revenues and expenditures warrant attention.

JEL Classification Nos.: E62, H11, O23, O57

[*] This paper was prepared as input for the Medium Term Strategy Group of the Ministry of Economic Development, but the paper in no way purports to represent MED views. Sole responsibility for the contents rests with the author. I wish to thank the editor of this journal and an anonymous referee, as well as MTSG members and participants at a New Zealand Treasury seminar, for extremely helpful comments on an earlier draft.

# Economic Growth and the Size & Structure of Government: Implications for New Zealand

## 1. Background

The New Zealand government has set, as its economic objective: "to return New Zealand's per capita income to the top half of the OECD and to maintain that standing" (NZ Government, 2002). At the same time it has pledged to retain and build social cohesion, not to repeat the "discredited and discarded agendas of the 1980s and 1990s" and to continue "to fund high living standards, high quality public services, and infrastructure" (Clark, 2003). Explicit in this stance – and in its policy settings since 1999 – is a wish to maintain the current role of government within the economy and society more broadly. Implicit within the stance is an intention to maintain government's share of the use of economic resources at around current levels. IMF figures indicate that general government expenditure as a proportion of GDP in New Zealand stood at 34.3% in 2001 (IMF, 2002a); OECD figures place the percentage at 36.5% (OECD, 2003).

By contrast, business groups have called for a scaling back of the government share. Business New Zealand has urged, as its third key priority for policy action: "Reduce the proportion of government spending to GDP to less than 30% by 2005, to be achieved by ensuring that government spending grows at a rate slower than that for GDP" (Business New Zealand, 2002). The New Zealand Business Roundtable chairman has urged: "The government's share of GDP must be rolled back … if the private sector is to expand" (McLeod, 2003). In support of this call, he notes: "Economic research in recent years is pointing increasingly to the conclusion that the central factor in economic growth is better institutions and more limited government." "Governments can … hinder economic growth through excessive spending".[1]

[1] McLeod does not cite which research he is referring to in this comment, but it is likely to include a prior NZBR publication (Bates, 2001).

The New Zealand Chamber of Commerce and Industry (NZCCI, 2003) quote OECD figures[2] that, in New Zealand, central and local governments are responsible for around 40% of the economy. They argue that provision of public services involves some fixed costs and so, as the economy grows, the share of government in GDP can fall: "With 1% p.a. real growth in the government sector and 4% p.a. real growth across the whole economy, we could reduce the government's relative share of the economy from 40% to 30% over the next decade. Such a reduction is likely to have a direct impact on increasing economic growth."

NZCCI refer to the work of Gwartney, Holcombe and Lawson (GHL, 1998): "Such a reduction alone could increase our growth rate by 1% according to *The Scope of Government and the Wealth of Nations*". If, as NZCCI claim, it is feasible to shrink the share of government in GDP significantly, and if the GHL results are applicable, the policy prescription favoured by NZCCI and other industry groups would contribute materially to the economic objective of raising economic growth. A country with 1% p.a. population growth and 3% p.a. GDP growth will have per capita living standards rise by 21.7% over 20 years; by contrast, a country with the same population growth but with 4% GDP growth will have per capita living standards increase by 34.0% over the same period.

The purpose of this paper is twofold. Firstly, it critically assesses the GHL results to check their robustness regarding the impact of government size on economic growth. Secondly, the paper examines other recent contributions on the growth impact of various government revenue sources and expenditures, and relates these findings to New Zealand.

Section 2 briefly outlines the GHL approach and their results. Section 3 raises issues regarding their methodology. It replicates their results and then tests the robustness of their results with the addition of relatively minor changes to their methodology. Section 4 discusses the implications of these robustness

[2] The reference is to: *Economic Outlook 70*, OECD, 2001.

tests and relates the results to other recent estimates of the effect of government activities on growth. The implications for New Zealand are discussed. Brief conclusions are stated in section 5.

## 2. Gwartney, Holcombe and Lawson

GHL use OECD data for 23 countries (including New Zealand) for the period 1960-1996 to examine the relationship between government size and economic growth. Specifically (in GHL's Table 1), they present data for total government outlays as a percentage of GDP (G/Y) for each of 1960, 1970, 1980, 1990 and 1996. In these years, G/Y averaged respectively 27%, 33%, 43%, 46% and 48% across the sample of countries. Thus not only had government expenditure grown along with the size of the economies, its *share* within OECD economies had grown by 78%.

GHL argue that this expansion resulted in government moving into areas beyond its traditional roles, with resulting negative impacts on economic growth. They acknowledge that government expenditures on core functions (which they refer to as "protection of property rights, the provision of a legal structure for settling disputes and the allocation of funds for investment in infrastructure and human capital"[3]) may enhance economic growth. However GHL posit that once government expands beyond this point, negative growth impacts will arise through a number of channels: higher taxes entail a rising excess burden of taxation; productivity within the government sector will decline; private entrepreneurship will decline as the political process becomes relatively more important than private sector activity; and effort will be diverted from wealth creating activities to wealth transfer.

The GHL analysis covers the 23 long-term OECD countries which have mainly similar institutional structures (rule of law, democracy, etc)[4] but which have had substantially different government shares within the economy. They

[3] GHL, p. 165.

have also had quite different growth experiences across time and across countries. Thus GHL regard this group as providing a basis to test the relationship between government share of GDP (G/Y) and GDP growth (henceforth labelled DY).

Their principal methodology is to examine the relationship between decade average growth rates in GDP[5] and the share of government in GDP at the start of each decade. By choosing G/Y at the start of the decade they hope to escape problems of reverse causation. In all their work they treat decades as equivalent (i.e. they do not take into account decade-specific fixed effects; nor do they include country-specific fixed effects). GHL present a graph (their Figure 3) with 92 observations (= 23 countries x 4 decades) where the decade average growth rate is plotted against the share of government expenditure at the start of the decade. Accompanying the graph is a regression line, labelled here as (F3) [where G/Y and DY are measured in percentage terms; t-ratio in parentheses]:

$$DY = 7.14 - \underset{(8.10)}{0.100\ G/Y} \qquad R^2 = 0.42 \qquad \text{(F3)}$$

Accompanying the figure is a comment (p.172): “These data indicate that a 10 percentage point increase in government expenditures as a share of GDP reduces the annual rate of growth by 1 percentage point.” GHL go on to comment (p.173): “The R-squared of .42 indicates that government spending alone explains about 42 percent of the differences in economic growth among OECD nations during the sample period.” They note that none of the countries with very low government expenditure ratios (below 20%) experienced low growth, with 5 of the 6 countries in this group experiencing growth above that predicted by the regression. They conclude that the government share required to maximise economic growth is no higher than 20 percent.[6]

---

[4] Thus forming the basis for a “convergence club” in the terms of Baumol (1986).
[5] The “1990s” growth rate covers just the period 1990-1996, being the data available to the authors.

The GHL data (sourced from the OECD) includes New Zealand. Of the 23 countries, New Zealand's government share (G/Y) ranked 15th highest in 1960, 12th in 1970, 10th in 1980, 7th in 1990 and 17th in 1996. New Zealand's G/Y share was therefore increasing steadily both in absolute terms and relative to other OECD countries throughout the 1960-1990 period, but dropped substantially relative to other OECD countries between 1990 and 1996.

We have estimated GHL's (F3) equation and obtained virtually identical results.[7] Re-estimating (F3) with a New Zealand dummy (DNZ)[8] gives a coefficient on DNZ of -0.46 with a t-statistic of 0.65. Thus while the point estimate indicates a lower than average growth rate (of approximately ½% p.a.) for New Zealand, given G/Y, the country's growth rate is not significantly different from that of other OECD countries, given their levels of G/Y, on the basis of GHL's (F3) specification.

In their Table 4 (reproduced below), GHL provide additional econometric estimates, based on a similar structure to that accompanying their Figure 3. Equation (1) adds the change in G/Y to equation (F3) with similar results. The coefficient on G/Y is slightly larger in absolute value than in (F3) and the change in G/Y has an additional (just significant) negative effect.

GHL decompose the impact of government expenditure on growth through their equations (2) and (3). Equation (2) adds the investment share to equation (1) with a significant positive coefficient. The effect of G/Y is still significant, but now a little smaller in magnitude. The reason is that G/Y has a negative coefficient in the investment share equation (equation 3). Equation (1) can therefore be thought of as a reduced form equation relative to equations (2) and (3) embodying the effect of G/Y on investment as well as the direct effect on growth holding the investment share constant. There is

[6] GHL also demonstrate that countries with the largest increases in the government share over the sample had considerably larger falls in GDP growth rates during the sample than did countries with the smallest increases in the government share (see GHL, Table 3).
[7] Using the data outlined in section 3 of this paper, our estimate is DY = 7.13 – 0.103 G/Y (with almost identical diagnostic statistics).

little difference in explanatory power between equations (1) and (2). No other diagnostics are presented by GHL.

**GHL TABLE 4**
**THE IMPACT OF GOVERNMENT EXPENDITURES ON INVESTMENT AND GROWTH IN OECD COUNTRIES 1960-96**

| | Dependent Variable: Growth of Real GDP during the Decade | | Dependent Variable: Investment as Share of GDP during Decade |
|---|---|---|---|
| Independent Variable | (1) | (2) | (3) |
| Government Expenditures as Share of GDP at Beginning of Decade | -0.110*** (8.14) | -0.099*** (6.81) | -0.159*** (5.14) |
| Change in Government Expenditures during Decade | -0.046* (1.70) | -0.055** (2.06) | - |
| Investment as a Percentage of GDP | - | 0.087** (2.08) | - |
| Constant | 7.724 | 5.365 | 28.4 |
| Adjusted $R^2$ | .43 | .45 | .22 |
| Number of Observations | 92 | 92 | 92 |

NOTE: t-ratios are in parentheses below estimated coefficients; * indicates coefficient is statistically significant at the 90 percent confidence level; ** indicates coefficient is statistically significant at the 95 percent confidence level; *** indicates coefficient is statistically significant at the 99 percent confidence level.
SOURCES: Derived from *OECD Historical Statistics* and *OECD Economic Outlook*.

[8] The value of DNZ = 1 for New Zealand and 0 otherwise.

GHL present other evidence (some based on a larger sample of countries) supporting their thesis that a larger government share (in excess of 20% of GDP) is detrimental to GDP growth. Their key results are, however, embodied in the material presented above, leading the authors to conclude (p.187): “The regression results presented above suggest that a decrease of 10 percent in government expenditures as a share of GDP will produce an increase in the GDP growth rate of about 1 percent.”

## 3. Robustness of GHL’s Results

The GHL results summarised above are cited in New Zealand and internationally[9] as evidence that the government share needs to be shrunk from current levels in OECD countries in order to revive economic growth to rates experienced in the 1960s.

Their paper is one of many which has investigated the impact of government size (and other aspects of fiscal policy) on national growth rates. This literature has recently been the subject of meta-analysis by Nijkamp and Poot (NP, 2003). NP (p.8) examine what they term "the conventional prior belief" that "increases in government consumption, defence, or increases in tax rates, lower growth; while increases in government expenditure on education or infrastructure enlarge growth." They note that tests of the effect of government size on growth generally relate government consumption to GDP growth, but on some occasions relate consumption plus transfers or total government expenditure (as do GHL) to growth.

NP's meta-analysis finds that "the evidence for the conventionally expected impact of policy on growth is rather weak" (p.9). This is especially the case for the posited negative relationships.[10] They discuss a number of reasons,

[9] A “Google” search yielded 115 references to the paper.
[10] Specifically, with respect to the relationship between government size and growth, NP (p.10) conclude that the meta-analysis indicates "that the relative distribution of economic

which we develop in our analysis below, as to why the empirical record produces inconclusive or contradictory results on these relationships. They note also the potential usefulness of "secondary analysis" in testing the conclusions of earlier ("primary") analyses, whereby authors carry out replications and extensions of prior research using the same data. Secondary analysis can provide information on the role of key maintained assumptions (including the effect of omitted variables, functional form, endogeneity assumptions, etc) in the determination of cited results.

Given the prominence sometimes accorded the GHL findings, we test their conclusions by conducting a secondary analysis which examines the robustness of their results. We take the GHL OECD-based data and the GHL methodology as our starting point in this process. We then examine whether the GHL results are upheld when minor modifications are made to their approach. In section 4, we relate the results to other recent work using different methodologies and other data sets.

One issue with interpreting the GHL results is the potential for them to be affected by reverse causality[11] (recalling that GHL hoped to avoid this problem by using decade start G/Y data in explaining the ensuing decade's growth). A regularity, known as Wagner's law, is that demand for government services tends to rise as countries become richer. This leads to a positive correlation between government share and national income (Kolluri *et al*, 2000). Another commonly observed feature amongst countries with similar institutions is for income convergence to occur (Ben-David, 2002). Thus there tends to be a negative correlation between countries' initial incomes and subsequent growth rates. Putting these two observations together, if convergence factors are omitted from the regression there is a risk of finding a spurious negative correlation between initial government share and GDP growth rates where no causal link exists.

---

activity between the private and public sectors across countries and regions appears to have no clear impact on long-run growth at the macro level."

[11] See NP (p.6) on issues of endogeneity of government expenditure, convergence of income across countries, and population growth, each of which is controlled for in the empirical work below.

A second issue with interpreting the GHL results is that observations across each country and across each decade are treated equally (i.e. GHL use pooled OLS estimation without decade or country fixed effects). The time period under consideration is one that has been subject to major international shocks. In particular, during the mid-late 1970s the world experienced two significant oil shocks which are widely considered to have been associated with (and possibly to cause) a global productivity slowdown (Bruno and Sachs, 1985). Given that growth in the late 1970s and beyond was affected negatively by such shocks, but the government shares in 1970, 1980 and 1990 were generally higher than in 1960 it is again possible that a spurious correlation will arise between the government share at the start of the decade and that decade's subsequent GDP growth rate if decade-specific effects are omitted.

A third issue with interpreting the GHL results is that the authors examine the relationship between the government share and GDP growth, whereas the more relevant relationship is between government share and GDP *per capita* growth. Population growth rates have tended to decline over time[12] so, for a constant productivity growth rate, GDP growth will have been higher in the 1960s than in subsequent decades. The lower government share in 1960 than in subsequent decades will therefore induce a spurious negative correlation with GDP growth rates.

To test the robustness of the GHL results to these issues, we proceed as follows. Firstly, we attempt to replicate the GHL results from equation (1) of their Table 4 and then proceed to control for convergence, population growth, and decade and country-specific fixed effects. Given the similarity of GHL's equation (2) results to those in equation (1) we do not extend the analysis to include the investment effect. Thus our results should be compared to their reduced form results in (1). In some equations, where we test sensitivity of

[12] For instance, New Zealand's population grew by 18.6% in the 1960s, followed by 11.5%, 7.5% and 13.0% respectively in the 1970s, 1980s and 1990s.

results to the omission of the change in government share (DG/Y), the results should be compared against GHL's (F3) results reproduced above.

In attempting to replicate their results, we do so using GHL's data for the government share (GHL Table 1). GDP (and, subsequently, GDP per capita) data is obtained from the Groningen database on a 1990 PPP basis[13]. We drop Luxembourg from the sample owing to its tiny size and unavailability of data from the Groningen database (leaving 22 countries and hence 88 observations = 22 countries x 4 decades). We present all results using the same time period as do GHL (i.e. 1960-1996). We have also extended the sample to the full 1990s decade but this extension makes no material change to the magnitude or significance of our results and so are not discussed further here. (The full period results corresponding to Tables 1 and 2 are presented in Tables (A1) and (A2) of the Appendix for completeness.)

[Table 1 about here]

Column (1) in Table 1 presents our results based on the same format as GHL's Table 4. The estimation method (OLS), time period, use of GDP growth as the dependent variable, and the G/Y data is identical to that of GHL, but there are two differences. Firstly, our work excludes Luxembourg. Secondly, our income (and hence economic growth) data is sourced from an alternative source (discussed above).

Despite these two differences, our results are very similar to those of GHL, especially for the long run effect of G/Y on DY (-0.117 in our case versus an estimate of -0.110 in GHL's case). Based on the GHL comparison, our initial results here suggest that a shrinkage in the share of government by 10 percentage points (e.g. from 40% to 30%) would raise a country's annual GDP growth rate by approximately 1.2%. The effect of DG/Y on DY is stronger in our case than it is in GHL's case. The explanatory power of the equation is very similar. Thus we can be confident that any differences

between our extended results (presented below) and those of GHL are not due to data differences or to the exclusion of Luxembourg from our sample.

In column (2) of Table 1, we test for robustness of the results once the income convergence effect is included. We add the ratio of each country's initial (PPP-adjusted) per capita income relative to the US per capita income at the start of each decade (Y/USY) to the equation. The coefficient on this variable is negative, as expected given the convergence thesis. Coefficients on G/Y and on DG/Y are almost unchanged.

Decade-specific fixed effects for the 1970s, 1980s and 1990s (D70, D80, D90 respectively) are added in column (3) through the inclusion of dummy variables taking the value of 1 in the relevant decade and zero otherwise. These fixed effects measure the difference in average growth rates relative to the 1960s that are not accounted for by other explanatory variables. Each of these variables is statistically significant with a pattern of increasing (negative) effect over time.

Once each of these effects is included, the coefficient on G/Y halves, although the effect of DG/Y strengthens slightly. Nevertheless each of these effects remains statistically significant at the 99% confidence level. The equation now "explains" 73% of the variation in country decade average growth rates.

A further issue discussed earlier is the potential endogeneity of the government expenditure share. This will particularly be a problem for the DG/Y variable which reflects the change in the government share of income over the decade. Column (4) presents the results as for column (3) but deleting this variable from the equation. All coefficients remain significant at the 99% confidence level although the coefficient on G/Y falls to -0.041. This coefficient can be compared with that in GHL's (F3) equation of -0.100. The inclusion of Y/USY and the decade fixed effects results in a considerable

[13] See www.eco.rug.nl/ggdc/. Data for Iceland is not available from this source; instead data for Iceland GDP and population is obtained from IMF *International Financial Statistics*.

diminution of the effect of government size on GDP growth, but the effect remains highly significant in a statistical sense.

Table 2 presents comparable results to those of Table 1, but using GDP per capita as the dependent variable in each case. This adjustment takes account of the fact that population growth rates differ across countries and have differed within countries over the period considered.

[Table 2 about here]

Equations (1) and (2) retain sizeable coefficients on the G/Y and DG/Y terms. In equation (2), the strength of the income convergence term is now stronger than previously. Once decade fixed effects are added, the G/Y coefficient falls considerably, but remains significant at the 95% confidence level. Its magnitude is now a third of that in the GHL paper. Again the DG/Y term is strengthened but the problem of endogeneity of this term remains. Once DG/Y is excluded, in equation (4), the G/Y coefficient drops further to –0.027, around a quarter of its value in GHL. This point estimate implies that a country with a constant 40% government share will, over twenty years, grow by 5.5% less than will a country with a 30% share, but the coefficient is not statistically significant at standard levels.

Table 3 presents further robustness checks with respect to the GDP per capita growth data. Country-specific fixed effects are tested to see if any countries have significantly different intercepts than the average.[14] After testing each country effect, only those that are statistically significantly different from zero at the 5% level are included in the following. This results in the inclusion of dummies (DNZ, DICE, DJAP) for just three countries: New Zealand (with a negative country-specific fixed effect) and Iceland and Japan (with positive country-specific fixed effects). The estimates in Table 3 imply that, after adjusting for all other factors in the regression, annual New Zealand

[14] It is possible that the intercept dummies, where significant, are proxying for different country slope coefficients. However, we are unable to test country interaction effects on the slope coefficients since there are only four observations on each country.

per capita GDP growth has been approximately 1.0% - 1.4% below the OECD norm over the relevant period.

[Table 3 about here]

Equations (1) and (2) of Table 3 replicate columns (3) and (4) of Table 2, but with the inclusion of the country-specific fixed effects. In each case, while negative, the coefficient on G/Y is not significantly different from zero at any conventional level of significance. In column (1), the coefficient on DG/Y is significantly negative, indicating a potential transitory negative effect on the growth rate of increasing the government share, but this result remains questionable because of the potential for endogeneity of DG/Y.

To avoid this endogeneity problem, while retaining the potential for lagged effects of government share changes on the growth rate, we include lagged DG/Y (LDG/Y) in place of the current DG/Y variable. This tests for the effect of one decade's growth in the government share on the next decade's GDP per capita growth rate. In order to do so, we have to exclude the 1960s decade from our sample, leaving 66 observations. One of the decade-specific fixed effects (D90) therefore also has to be omitted. All other variables are retained.

Equations (1a) and (2a) repeat estimates of specifications (1) and (2) over the shorter period (1970-1996, excluding D90 as discussed above) for comparison with estimates using LDG/Y. There is little substantive change arising from the dropping of the first decade's observations.[15]

Equation (3) reports the results with LDG/Y in place of DG/Y. The lagged DG/Y effect is negative, of a material size and highly statistically significant. However, the G/Y coefficient is now positive and significant, albeit relatively small in an economic sense (and considerably smaller than LDG/Y indicating that the initial decade-long effect of an increase in G/Y is negative for growth).

All other variables remain statistically significant (albeit only at the margin in the case of the Japan country fixed effect). If G/Y is dropped from this equation, as in column (4), the lagged DG/Y coefficient remains materially negative and statistically significant. This result suggests a “temporary” (decade-long) negative effect on economic growth of increasing the government share of the economy.[16]

## 4. Relationship to Other Work

The GHL analysis focuses on the effect of aggregate government size on cross-country GDP growth. Easterly (2002) claims that such a link is tenuous, although he does not refer explicitly to the GHL analysis when sounding this caution. Nevertheless, the estimates contained herein suggest that Easterly’s caution regarding the strength of this link is warranted. Easterly does, however, cite a range of evidence that certain types of government taxation, expenditure and regulatory policies can have a negative – or, in some cases, a positive – effect on the growth rate.

Recently, more detailed analyses link the effect of government taxation and expenditure to growth using disaggregated fiscal (and other) data within a cross-country panel setting. The best examples of this work embed the equations to be estimated within a clear theoretical framework in order to be able to interpret the empirical findings rigorously. Two recent analyses, discussed below, have pursued such strategies. The qualitative similarity of results across these two analyses and the fact that each uses a different theoretically-based framework to underpin its empirical work (one based on a Solow growth model, the other on an endogenous growth framework) gives some confidence that the qualitative nature of the results are reasonably robust.

---

[15] The changes in D70 and D80 coefficients arise because the "base case" is now the 1990s rather than the 1960s.

[16] This result is consistent with the "convergence view" (e.g. Evans, 1996) in which country policies can influence the GDP growth rate temporarily, albeit for years or even decades, but not permanently.

Bassanini *et al* (BSH, 2001) use OECD data since 1970 to estimate the impact of disaggregated government revenue and expenditure flows (as shares of GDP) on steady state output. They find that increased taxes and government expenditures affect national income both directly (i.e. affect productivity given the level of capital) and indirectly through affecting the level of private investment and thence the capital stock.[17]

An increase in the tax to GDP ratio reduces steady state income, with an increase of 1 percentage point in the ratio of tax to GDP being associated with a reduction of 0.6 – 0.7% in per capita income.[18] However the structure of the tax take is also important. A higher proportion of direct to indirect tax receipts reduces income; increasing the ratio of direct tax to total tax from 50% to 60% is estimated to decrease per capita income by 3.3%.

On the expenditure side, a higher ratio of government investment to GDP is estimated to be neutral to positive for income[19]; an increase in the ratio of government investment to GDP from 10% to 11% increases income by between 0 and 0.9%[20] (before taking account of any negative growth effect resulting from the financing decision). BSH estimate that an increase in government consumption expenditure reduces national income, with an increase of half a percentage point in government consumption to GDP associated with a reduction of 0.6 – 0.7% in per capita income. A higher ratio of government transfer expenditure to GDP is estimated also to have a negative effect on income exceeding the negative effect arising from government consumption.

[17] Inflation outcomes, and hence government's financing decisions, are also found to affect steady state income. BSH estimate that higher inflation decreases investment and thence output, with a 1 percentage point increase in the annual inflation rate reducing per capita income by about 0.4%. Greater variability of inflation is also estimated to reduce output directly; a 1 percentage point increase in the standard deviation of inflation reduces per capita income by approximately 2%.

[18] NP's meta-analysis also indicates tentative "empirical support for the hypothesis that higher tax rates lower growth" (p.11).

[19] Consistent with this result is BSH's finding that there are relatively high returns to education; an extra year of schooling on average across the workforce is estimated to raise per capita income by 4-7%.

BSH recognise that the estimated effects listed above are conservative since the maintained assumption is that the economy is characterised by a Solow-type neo-classical growth model. Thus each of the postulated policy effects may affect the long run level of income (upwards or downwards) but there is no effect on the long run growth rate. They note that if any of the above policy settings were to affect the long run growth rate then the estimated long term effects on income could be greater than shown above.

BSH (p.36) decompose the average output per capita growth rates over the 1970s-1990s for each of the 19 countries in their sample. Over this period, New Zealand grew at a rate 1.02% p.a. slower than the OECD average. According to their estimates, factors which impacted negatively on New Zealand's growth differential (% p.a. growth effects in brackets) were: investment share (-0.17), population growth (-0.29), variability of inflation (-0.07) and trade exposure (-0.36). Positive impacts were: initial conditions, i.e. lower than average per capita GDP (0.34), human capital (0.31) and government consumption (0.10). After accounting for these effects, the residual country-specific effect for New Zealand was -0.87. This residual was the fourth highest in absolute terms of the 19 countries[21], consistent with our findings in the previous section that New Zealand's growth has attached to it a country-specific negative effect unaccounted for by "standard" factors.

An alternative approach, and further evidence on the links between government activities and growth outcomes, comes in two papers by Bleaney, Gemmell and Kneller (BGK, 2001) and Gemmell and Kneller (GK, 2003).[22] They have derived estimates of the impact of different types of taxation and government expenditures on growth in the context of an endogenous growth model that builds in the government budget constraint (Barro, 1990). In this context, “distortionary taxes” (e.g. on labour and capital income) may have a

[20] This result is consistent with NP's meta-analysis which indicates a positive growth impact of both government infrastructure expenditure and education expenditure.
[21] Other large residuals were: Portugal (-1.52), Greece (-1.48) and United States (1.89). The next largest residual after New Zealand was Netherlands (-0.50).
[22] These papers do not include New Zealand in their sample.

negative impact on growth rates, whereas “non-distortionary taxes” may have no effect or may even have a beneficial growth impact through the increase in the fiscal balance and hence on the potential to reduce future distortionary taxes. Within this model, "productive government expenditures" may have a positive growth impact, while "unproductive government expenditures" have no direct growth impact but will have a negative growth impact if financed by distortionary taxes.

In their econometric work covering 16 OECD countries, BGK find that increasing distortionary tax revenues by 1 per cent of GDP reduces the average annual growth rate of an economy by 0.41 percentage points, whereas increasing productive expenditures by the same amount increases annual growth by 0.39 percentage points. Non-distortionary taxes and non-productive expenditures are found to have no direct effect on the growth rate, but are found to have an indirect effect once their impact on the budget surplus and hence on financing requirements is considered. In testing the robustness of their results, BGK find that GST and other similar indirect taxes are grouped with other non-distortionary revenues in terms of their estimated effect - or lack of effect - on growth.

On the basis of these estimates, if productive expenditures are financed by distortionary taxes there is no net benefit to the growth rate; if they are funded by non-distortionary taxes there is, on average, a benefit. Similarly, transfer (and other non-productive) expenditures that are financed by distortionary taxes have a negative effect on the growth rate, while if funded by non-distortionary taxes the effect is neutral. Separate from these effects, an increase in the fiscal surplus of 1 per cent of GDP has a partial effect of increasing the average annual growth rate by 0.11 percentage points.

GK test the robustness of these results with a slightly different methodology both for the same 16 OECD countries and for 10 European Union countries plus the USA. In these estimates, the impact of distortionary taxes on growth varies within a range of -0.34 to -0.40; that of productive expenditure varies between 0.15 and 0.29; and that of the fiscal surplus between 0.07 and 0.12.

The direction of these results is the same as those in BGK, with similar magnitudes for the impact of both distortionary taxes and the fiscal surplus on growth, but with a smaller positive impact of productive expenditures. BGK's and GK's results are obtained after including fixed effects accounting for the influence of common international shocks across countries and for country-specific circumstances. They also test whether the strength of estimated effects is similar across countries and find no evidence to reject that this is the case. Their results therefore appear robust to a number of potentially complicating factors.

The overall implications of this recent international evidence is that a higher tax burden (particularly through direct taxes), higher government transfers and, to a lesser extent, higher government consumption expenditures (excluding education and health[23]) are all associated with poorer growth outcomes. Government investment expenditures (e.g. infrastructure and education) contribute positively to a country's growth rate if (and only if) financed by non-distortionary taxation or through cuts to unproductive expenditures.

In order to translate these findings to an interpretation of the impact of New Zealand budgetary settings on growth, we have obtained data for government revenues and expenditures (outlays) from the IMF's 2002 *Government Finance Statistics Yearbook* (GFSY) and its accompanying *Supplement*. This source provides consistent and up-to-date data on aggregate and disaggregated fiscal flows for New Zealand and for 20 other OECD countries (plus many non-OECD countries). It is used to ensure that we compare "like with like" in making international comparisons of budgetary settings. In each case, figures are obtained for general government[24], being the sum of central,

[23] BGK include education and health expenditures in their list of "productive" expenditures, finding that their effects on growth are almost identical to those of other productive expenditures.

[24] Data for all countries other than Canada, New Zealand, Norway and United States are obtained from the *GFSY Supplement* for the aggregated general government grouping. Data for the four named countries are obtained from the *GFSY Yearbook* for each level of government and these data are summed to form the general government totals. In a small number of cases, expenditure and/or revenue shares from previous years were applied to latest aggregate data to form estimates of revenues or expenditures in specific categories.

state/provincial (where applicable) and local government revenues and expenditures for the most recent available year. Given the significance of different levels of government in different countries (e.g. state governments in Australia and the United States) it is important to concentrate on general government rather than on central government expenditures in making comparisons across countries.

Table 4 presents two measures, based on the IMF data, of the "total share of government" in GDP: the total revenue share and the total outlays (expenditure) share. It also details the year of coverage (which is identical to the years used in Tables 5, 6 and 7). The "OECD" figure is an aggregate of the 21 countries (excluding Switzerland)[25], weighted according to size, after converting their data in each case into US dollars.

[Table 4 about here]

IMF and OECD-sourced data on aggregate government outlays and revenues differ from each other even for identical countries and years.[26] For comparison, we also present the corresponding OECD-sourced data for the same countries (excluding Switzerland for which OECD-sourced data is not available) plus Ireland and Japan (for which OECD-sourced data is available). The correlation coefficient between the two revenue series is 0.94; that between the two outlay series is 0.89. Thus while the OECD-sourced government shares are generally smaller than indicated by the IMF data, the patterns are similar. New Zealand is the only country for which the IMF data

---

Recent data was not available from this source for Ireland or Japan, so these countries are omitted from the analysis.

[25] We exclude Switzerland here so we can compare aggregated IMF and OECD-sourced data. Switzerland **is** included in all remaining analysis.

[26] We cannot ascertain the sources of these differences. One possible source is the treatment of tax-based relief to low income families which, *prima facie*, lowers the government revenue to GDP ratio. If, instead, this tax relief is treated as an expenditure item, the government (revenue and expenditure) share is raised. A second possible source is the treatment of indirect taxes payable by government on its inputs; New Zealand is unusual in its imposition of GST on intra-government services. A third possible source is differences between accrual and cash-flow (or other) accounting treatments of expenditure. Further work is required to investigate the relevance of these potential sources of differences in the data.

indicate a smaller government share than the corresponding OECD-sourced data.

Whichever series is used, Table 4 indicates that New Zealand is ranked as having a relatively small government sector. On the basis of IMF data, the government share in New Zealand comprises approximately 35% of GDP, whether measured by expenditure or revenues. This share is approximately 7 percentage points less than the “OECD” weighted average and is smaller than any of the other 20 countries listed. While Australia, the United States and some other countries have smaller central government shares than New Zealand, the high degree of centralisation of New Zealand government activity means that a comparison of government shares that omits lower levels of government will give rise to a misleading comparison of relative government size. (New Zealand, Australian and United States central government expenditure shares are 30.6%, 26.7% and 19.1% respectively ; the United States central plus state government share, at 29.7%, is also less than the New Zealand central government share.)

On the basis of OECD data, the New Zealand revenue share is ranked fourth lowest of 20 countries (and sixth lowest of 22 countries, including Ireland and Japan); the New Zealand outlay share is ranked fourth lowest of 20 countries (and fifth lowest of 22 countries). On a weighted average basis, given USA's large size and low government share in this set of figures, New Zealand's shares are just above the "OECD" average. Consistent with its ordinal ranking, however, New Zealand's revenue and outlay shares are approximately 5 percentage points below the unweighted OECD averages[27], based on this data. In the following analysis, the IMF data is used since it is available on a disaggregated functional basis.

Table 5 lists the share in GDP, for the most recent available year, of each of total taxes and social contributions; the latter category is not included (by IMF) in the tax share. Separate components of taxation are also listed (some

[27] The unweighted averages are 43.4% for revenues and 41.9% for outlays.

components, e.g. grants from supra-national organisations, are not listed separately). New Zealand stands out in several respects. First, New Zealand has a large share of GDP (and an even larger share of government revenues) paid as taxes in forms that are regarded as distortionary in the studies cited above. Individual and corporate tax together comprise 18.3% of GDP in New Zealand compared with an "OECD" average of 14.0%.

[Table 5 about here]

Second, taxation of goods and services is a little above average while property taxes - despite their major role in financing local government in New Zealand - are a little below average; taxation of international transactions (not listed separately in the table), at 0.6% of GDP in New Zealand, is the second highest of any country.

Third, social (security) contributions are a major revenue source in many countries - comprising 9.7% of "OECD" GDP - but are completely absent as a funding source in New Zealand. Social security contributions differ from individual income taxes in that returns to savings are normally exempted from a social security contribution. Further, some countries exempt incomes in excess of a certain threshold from further social security contributions, resulting effectively in a decline in marginal tax rates on earned income above the threshold.[28]

The final line (NZ Ave) in Table 5 (and also in Tables 6 and 7) presents the average of the past 5 years' shares for New Zealand for each item. This average can be compared with the 2001 figure for New Zealand in the table to check that the latest figure is not an outlier by virtue of some year-specific event.[29] There is no substantive difference between the 2001 and average figures for any item in Table 5 that affects the analysis.

[28] See Grimes (2002) for discussion of the Singaporean and Dutch systems in this respect.

Table 6 presents data on key constituent components of outlays. [30] [31] It indicates that New Zealand government outlays for each of economic affairs, health, education and social protection are below the “OECD” average. In proportionate terms, New Zealand is closer to the “OECD” norm for social protection than it is for the other three categories. (New Zealand's five year average social protection share is higher than the (latest) OECD average share, possibly indicating that New Zealand's strong economic position in 2001 relative to many other OECD countries may have biased the comparison towards a lower relative figure for New Zealand.) Significant components of the first three categories may be considered "productive expenditures" in BGK's categorisation and are associated with higher incomes also by BSH. Social protection expenditure is generally found, in disaggregated studies, to be economically unproductive. Relative to Australia, the New Zealand government spends considerably less of GDP on economic affairs, a little less on health, an almost equal share on education and considerably more on social protection.

[Table 6 about here]

Overall, while New Zealand apparently has a relatively small government sector, New Zealand government revenue flows are skewed (relative to the “OECD” average) towards income taxes and expenditures are skewed away from productive expenditures. Both features, according to BSH and BGK, may be detrimental for economic performance.

---

[29] We have not produced comparable 5 year average "OECD" figures due to data limitations, but the range of countries (and dates) mitigates the likelihood that any single year/country event materially affects the aggregate figures.

[30] The expenditure break-down is available for every level of government for each country other than for New Zealand local authorities. Based on data collected by Motu on Territorial Local Authorities' expenditures, we have allocated 23.4% of New Zealand local government expenditure to the category "Economic Affairs" (TLA expenditure on roading is 20.0% of total TLA expenditure with an estimated further 3.4% on other economic affairs) and 3.4% to “Social Protection” (based on an estimate of TLA expenditure on social services). The rest of local government expenditure is left unallocated to the listed categories given the very limited local government expenditures in New Zealand on health and education. Given that local government expenditure is only 10% of general government expenditure in New Zealand, the resulting aggregate figures should closely approximate the true New Zealand shares.

[31] "Economic Affairs" includes, *inter alia*, expenditures on agriculture, forestry, fishing, hunting, transport and communications. "Social Protection" largely comprises transfers; it excludes housing.

Table 7 illustrates the skewing of government budgetary flows against production in New Zealand using two different measures. The figure in the first column is based on the assumption that expenditure on economic affairs is of assistance to production and hence to firms, while corporate tax is a direct cost to firms. This column presents the difference between these two series. A positive (negative) figure indicates a net flow towards (away from) productive activity. The second column takes a broader view by presenting the difference between government investment expenditures (interpreted here to cover economic affairs, health and education) and (individual plus corporate) income taxes representing tax on production. Again a positive (negative) figure indicates a net flow towards (away from) productive activity.

[Table 7 about here]

The "OECD" result in the first column indicates an average subsidy towards production of +1.1% of GDP. By comparison, New Zealand's figure is -1.2%, indicating a net tax. Of the 21 listed countries, New Zealand has the fourth highest net tax by this measure.[32] The "OECD" figure in the second column indicates an average subsidy towards production of +2.4% of GDP. By comparison, New Zealand's figure is -5.1%, indicating a considerable net tax. Of the 21 listed countries, New Zealand has the second highest net tax by this measure. New Zealand's performance on both measures hardly changes if five year average data is used in place of the 2001 figure.

## 5. Conclusions

Our reworking of the GHL analysis suggests that size of government *per se* has at most only a minor effect on long-term growth outcomes. This conclusion represents a considerable diminution of the effect derived in the

[32] The Australian tax according to this measure appears artificially inflated by choice of 2001 as the year of analysis. Australian corporate taxes rose by 64% between 1999 and 2001 and

GHL study. Consistent with the findings here on the impact of government size on growth, recent disaggregated studies suggest that the *structure* of the government budget has much more impact on growth outcomes than does the *size* of the budget.

Based on up-to-date comparable international fiscal information for general government, New Zealand has a relatively small government sector. To the extent that government size has a negative effect on GDP growth, this feature should be a positive for New Zealand's growth prospects relative to the OECD average.[33] However, the disaggregated data indicates that the structure of fiscal flows in New Zealand may have a negative effect on growth in this country relative to other OECD countries. New Zealand has a comparatively heavy reliance on individual and corporate income tax to fund government and has relatively low investments in productive government expenditure categories. Both aspects may be negative for New Zealand's growth prospects. Accordingly, the structure of New Zealand's fiscal expenditures and revenues warrants significant attention in any policy package designed to return New Zealand's per capita income to the top half of the OECD.

by 43% between 2000 and 2001, presumably reflecting buoyant corporate profits in the latter year.

[33] To the extent that the change in the government share has an influence on growth, New Zealand's growth prospects should also be enhanced. Using OECD-sourced data, New Zealand's general government outlay share of GDP fell from 45.3% in 1991 to 36.5% in 2001.

**References**

Barro, Robert (1990) “Government Spending in a Simple Model of Endogenous Growth”, *Journal of Political Economy*, 98, S103-S107

Bassanini, Andrea, Stefano Scarpetta and Philip Hemmings (2001) "Economic Growth: The Role of Policies and Institutions. Panel Data Evidence from OECD Countries", OECD Economics Department Working Paper ECO/WKP(2002)9, Paris: Organisation for Economic Cooperation and Development

Bates, Winton (2001) *How Much Government? The Effects of High Government Spending on Economic Performance*, Wellington: New Zealand Business Roundtable

Baumol, William (1986) “Productivity Growth, Convergence, and Welfare: What the Long Run Data Show”, *American Economic Review*, 76(5), 1072-1085

Ben-David, Dan (2002) “Convergence Clubs and Divergent Economies”, CEPR Discussion Paper 922

Bleaney M., N. Gemmell & R. Kneller (2001) "Testing the Endogenous Growth Model: Public Expenditure, Taxation and Growth Over the Long-Run", *Canadian Journal of Economics*, 34, 36-57

Bruno, Michael and Jeffrey Sachs (1985) *Economics of Worldwide Stagflation*, Cambridge MA: Harvard University Press

Business New Zealand (2002) *The Changing Gear Challenge and Scorecard: Ensuring a Sustainable New Zealand*, February, www.businessnz.org.nz/

Clark, Helen (2003) “Address to Knowledge Wave Conference, 19 February, Auckland, www.beehive.govt.nz/ViewDocument.cfm?DocumentID=16079

Easterly, William (2002) *The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics*, Cambridge, Mass: MIT Press

Evans, P. (1996) "Using Cross-Country Variances to Evaluate Growth Theories", *Journal of Economic Dynamics and Control*, 20, 1027-1049

Gemmell N. and R. Kneller (2003) "Fiscal Policy, Growth and Convergence in Europe", mimeo, paper presented to New Zealand Treasury

Grimes, Arthur (2002) "Growing a Healthy Society", in Arthur Grimes (ed.) *Changing Gear: Delivering the Social Dividend*, IPS Policy Paper No.13, Wellington: Institute of Policy Studies

Gwartney, James, Randall Holcombe and Robert Lawson (1998) "The Scope of Government and the Wealth of Nations", *Cato Journal*, 18(2), 163-190

IMF (2002a) *Government Finance Statistics Yearbook*, Washington DC: International Monetary Fund

IMF (2002b) *Supplement to the 2002 Government Finance Statistics Yearbook*, Washington DC: International Monetary Fund

Kolluri, B.R., M.J. Panik and M.S. Wahab (2000) "Government Expenditure and Economic Growth: Evidence from G7 Countries", *Applied Economics*, 32, 1059-1068

McLeod, Robert (2003) *Time for an Economic Debate*, Speech to the Building Industry Federation, February, www.nzbr.org.nz/documents/speeches/

New Zealand Government (2002) *Growing an Innovative New Zealand*, Wellington

Nijkamp, Peter and Jacques Poot (2003) "Meta-Analysis of the Impact of Fiscal Policies on Long-Run Growth", Discussion Paper TI2002-028/3 (March

2003 version), Tinbergen Institute; forthcoming in *European Journal of Political Economy*

NZCCI (2003) *Achieving Faster Growth for New Zealand*, Wellington: New Zealand Chambers of Commerce and Industry

OECD (2003) *Economic Outlook 72*, Paris: Organisation for Economic Cooperation and Development

**Table 1: GDP Growth 1960-1996, 22 Countries (n=88)**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **G/Y** | -0.117*** | -0.103*** | -0.052*** | -0.041*** |
| | (8.62) | (8.47) | (4.16) | (3.02) |
| **DG/Y** | -0.077*** | -0.074*** | -0.097*** | - |
| | (2.81) | (3.11) | (4.63) | |
| **Y/USY** | - | -3.389*** | -3.094*** | -3.126*** |
| | | (5.26) | (5.87) | (5.31) |
| **D70** | - | - | -0.994*** | -1.300*** |
| | | | (3.31) | (3.97) |
| **D80** | - | - | -1.806*** | -1.724*** |
| | | | (5.29) | (4.52) |
| **D90** | - | - | -2.515*** | -2.247*** |
| | | | (6.74) | (5.45) |
| **Constant** | 8.073*** | 9.939*** | 9.269*** | 8.386*** |
| | (13.61) | (15.84) | (17.81) | (15.49) |
| **Adj. $R^2$** | 0.46 | 0.59 | 0.73 | 0.66 |

Notes: The dependent variable is GDP growth (%p.a.) for 22 separate OECD countries over each of 4 decades (where the 1990s decade is 1990-1996). G/Y is government expenditure as % of GDP at start of each decade; DG/Y is change in G/Y during the decade; Y/USY is country per capita income as a ratio of US per capita income at the start of each decade; D70, D80 and D90 are dummy variables to capture decade-specific fixed effects. (All sources described in text.) Estimation is by OLS.
"t-ratios" are in brackets
*** denotes significance at the p=1% level
** denotes significance at p=5%
* denotes significance at p=10%.

## Table 2: GDP Per Capita Growth 1960-1996, 22 Countries (n=88)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **G/Y** | -0.103*** | -0.084*** | -0.037** | -0.027[+] |
| | (6.13) | (5.76) | (2.24) | (1.55) |
| **DG/Y** | -0.065* | -0.062** | -0.094*** | - |
| | (1.93) | (2.16) | (3.45) | |
| **Y/USY** | - | -4.565*** | -4.369*** | -4.400*** |
| | | (5.93) | (6.34) | (6.00) |
| **D70** | - | - | -0.515 | -0.814** |
| | | | (1.31) | (1.99) |
| **D80** | - | - | -1.419*** | -1.340*** |
| | | | (3.18) | (2.82) |
| **D90** | - | - | -2.390*** | -2.129*** |
| | | | (4.90) | (4.15) |
| **Constant** | 6.809*** | 9.322*** | 8.677*** | 7.817*** |
| | (9.29) | (12.43) | (12.75) | (11.60) |
| **Adj. $R^2$** | 0.29 | 0.49 | 0.60 | 0.55 |

Notes: The dependent variable is per capita GDP growth (%p.a.) for 22 separate OECD countries over each of 4 decades (where the 1990s decade is 1990-1996). G/Y is government expenditure as % of GDP at start of each decade; DG/Y is change in G/Y during the decade; Y/USY is country per capita income as a ratio of US per capita income at the start of each decade; D70, D80 and D90 are dummy variables to capture decade-specific fixed effects. (All sources described in text.)
Estimation is by OLS.
"t-ratios" are in brackets
*** denotes significance at the p=1% level
** denotes significance at p=5%
* denotes significance at p=10%.
[+] p=12.4%

## Table 3: GDP Per Capita Growth 1960/70-1996, 22 Countries

| | (1)[#] | (2)[#] | (1a)^ | (2a)^ | (3)^ | (4)^ |
|---|---|---|---|---|---|---|
| **G/Y** | -0.019 | -0.007 | -0.002 | 0.011 | 0.037** | - |
| | (1.14) | (0.42) | (0.12) | (0.61) | (2.08) | |
| **DG/Y** | -0.085*** | - | -0.083*** | - | - | - |
| | (3.24) | | (3.02) | | | |
| **LDG/Y** | - | - | - | - | -0.112*** | -0.089*** |
| | | | | | (3.83) | (3.20) |
| **Y/USY** | -4.471*** | -4.530*** | -4.622*** | -4.581*** | -5.141*** | -4.883*** |
| | (6.85) | (6.56) | (5.79) | (5.38) | (6.59) | (6.17) |
| **D70** | -0.647* | -0.930** | 2.234*** | 1.798*** | 2.386*** | 1.862*** |
| | (1.74) | (2.43) | (5.27) | (4.22) | (5.78) | (5.54) |
| **D80** | -1.659*** | -1.623*** | 1.089*** | 0.944** | 1.613*** | 1.346*** |
| | (3.88) | (3.59) | (3.17) | (2.60) | (4.35) | (3.76) |
| **D90** | -2.681*** | -2.493*** | - | - | - | - |
| | (5.71) | (5.06) | | | | |
| **DNZ** | -1.384** | -1.244** | -1.327** | -1.151[+] | -1.158* | -1.076* |
| | (2.35) | (2.00) | (2.01) | (1.64) | (1.84) | (1.66) |
| **DICE** | 1.261** | 1.608** | 2.576*** | 2.877*** | 2.863*** | 2.602*** |
| | (2.08) | (2.54) | (3.72) | (3.94) | (4.36) | (3.92) |
| **DJAP** | 1.242** | 1.444** | 0.838 | 0.951 | 1.087[++] | 0.634 |
| | (1.99) | (2.19) | (1.21) | (1.29) | (1.63) | (0.98) |
| **Cnst** | 8.154*** | 7.298*** | 4.768*** | 3.961*** | 3.635*** | 5.077*** |
| | (12.03) | (11.04) | (4.72) | (3.80) | (3.87) | (7.78) |
| **Adj. $R^2$** | 0.65 | 0.61 | 0.54 | 0.48 | 0.58 | 0.55 |

Notes: The dependent variable is per capita GDP growth (%p.a.) for 22 separate OECD countries over each of 3 or 4 decades as indicated. G/Y is government expenditure as % of GDP at start of each decade; DG/Y is change in G/Y during the decade; LDG/Y is DG/Y lagged one decade; Y/USY is country per capita income as a ratio of US per capita income at the start of each decade; D70, D80 and D90 are dummy variables to capture decade-specific fixed effects; DNZ, DICE, DJAP are country-specific dummy variables to capture fixed effects associated with New Zealand, Iceland and Japan respectively. (All sources described in text.)
Estimation is by OLS.
"t-ratios" are in brackets
*** denotes significance at the p=1% level
** denotes significance at p=5%
* denotes significance at p=10%.
[#] 1960-1996; 88 observations
^ 1970-1996; 66 observations
[+] p=10.6%
[++] p=10.8%

## Table 4: General Government Share of GDP (%)

| Country | Year | IMF Data | | OECD Data | |
|---|---|---|---|---|---|
| | | Revenues | Outlays | Revenues | Outlays |
| Australia | 2001 | 37.0 | 36.4 | 32.7 | 32.7 |
| Austria | 2000 | 50.8 | 51.9 | 47.3 | 49.0 |
| Belgium | 2000 | 49.5 | 49.3 | 46.8 | 46.7 |
| Canada | 2001 | 42.9 | 48.3 | 39.8 | 38.0 |
| Denmark | 2000 | 55.7 | 50.7 | 53.1 | 50.6 |
| Finland | 2000 | 55.7 | 48.7 | 50.7 | 43.6 |
| France | 2000 | 51.1 | 52.4 | 47.4 | 48.7 |
| Germany | 2000 | 45.7 | 48.5 | 44.4 | 43.3 |
| Greece | 2000 | 50.6 | 51.7 | 42.9 | 44.7 |
| Iceland | 2000 | 45.6 | 43.1 | 41.4 | 39.0 |
| Italy | 2000 | 46.2 | 46.5 | 44.2 | 44.8 |
| Luxembourg | 2000 | 45.6 | 39.6 | 43.7 | 38.0 |
| Netherlands | 2001 | 46.8 | 46.7 | 42.1 | 42.0 |
| **New Zealand** | **2001** | **34.5** | **34.3** | **38.2** | **36.5** |
| Norway | 1999 | 50.8 | 53.8 | 50.8 | 44.7 |
| Portugal | 1999 | 43.3 | 45.7 | 38.5 | 40.9 |
| Spain | 2000 | 39.5 | 39.8 | 37.3 | 37.9 |
| Sweden | 2000 | 62.8 | 59.0 | 56.3 | 52.6 |
| Switzerland | 2000 | 44.4 | 41.5 | - | - |
| UK | 2000 | 41.2 | 39.6 | 38.7 | 34.7 |
| USA | 2000 | 36.5 | 38.5 | 31.6 | 30.1 |
| **"OECD"[+]** | **-** | **41.0** | **42.4** | **37.2** | **35.9** |
| Ireland | 2001 | - | - | 31.7 | 29.9 |
| Japan | 2001 | - | - | 29.6 | 36.7 |

Notes: IMF data sourced from IMF: *2002 Government Finance Statistics Yearbook*, and *Supplement to the 2002 Government Finance Statistics Yearbook* (General Government Total Revenue and General Government Total Expenditure), GDP data (other than for New Zealand) sourced from *Supplement to the 2002 Government Finance Statistics Yearbook* and *IMF International Financial Statistics;* New Zealand GDP data sourced from Statistics New Zealand: Expenditure on Gross Domestic Product (June years) series S1NB15.

OECD data sourced from OECD: 2003 *Economic Outlook* (General Government Total Outlays as % of Nominal GDP - Annex 26; and General Government Current Tax and Non-Tax Receipts as % of Nominal GDP - Annex 27).

[+]Weighted average of 20 countries (weighted by GDP, expressed in USD, of the 21 countries listed above, excluding Switzerland). The "OECD" averages for the first two columns, including Switzerland, are 41.1 and 42.4 respectively. "OECD" in Tables 5-7 are for 21 countries including Switzerland.

## Table 5: Government Revenue Sources as Share of GDP (%)[+]

| Country | Taxation[+] | | | | | Social Contrib. |
|---|---|---|---|---|---|---|
| | Total | Indiv. Income | Corp. Income | Property | Goods & Services | |
| Australia^ | 30.8 | 11.2 | 6.1 | 2.7 | 8.2 | 0.0 |
| Austria* | 27.9 | 10.3 | 2.2 | 0.6 | 12.2 | 17.2 |
| Belgium* | 30.9 | 13.3 | 3.3 | 2.8 | 11.2 | 16.1 |
| Canada^ | 35.5 | 12.9 | 2.3 | 3.6 | 8.5 | 5.3 |
| Denmark* | 46.4 | 25.7 | 2.4 | 2.4 | 15.2 | 3.3 |
| Finland* | 34.9 | 14.6 | 5.8 | 1.2 | 13.3 | 12.2 |
| France* | 28.2 | 8.4 | 2.9 | 3.8 | 11.3 | 18.1 |
| Germany* | 23.2 | 10.2 | 0.6 | 0.8 | 10.5 | 18.6 |
| Greece* | 27.4 | 6.3 | 3.6 | 1.8 | 14.5 | 14.2 |
| Iceland* | 36.1 | 13.6 | 1.4 | 3.4 | 16.3 | 3.0 |
| Italy* | 29.9 | 11.9 | 2.3 | 0.9 | 12.8 | 12.7 |
| Lux.* | 30.2 | 7.6 | 7.4 | 2.2 | 13.0 | 11.3 |
| Neth^ | 25.1 | 6.5 | 4.1 | 1.8 | 12.3 | 15.4 |
| **NZ^** | **31.4** | **14.4** | **3.9** | **1.8** | **8.6** | **0.0** |
| Norway[#] | 39.6 | 11.4 | 3.1 | 1.0 | 14.7 | 9.2 |
| Portugal[#] | 25.4 | 6.1 | 4.1 | 0.5 | 14.0 | 11.5 |
| Spain* | 22.6 | 7.2 | 2.9 | 0.0 | 11.7 | 13.3 |
| Sweden* | 36.9 | 18.5 | 3.1 | 1.7 | 10.8 | 15.8 |
| Switz.* | 23.7 | 10.9 | 1.2 | 2.9 | 6.8 | 12.0 |
| UK* | 30.6 | 11.4 | 3.4 | 2.0 | 11.6 | 7.6 |
| USA* | 29.1 | 12.4 | 2.1 | 2.9 | 4.4 | 6.7 |
| **"OECD"** | **28.9** | **11.6** | **2.4** | **2.4** | **7.7** | **9.7** |
| **NZ Ave** | **32.4** | **14.7** | **3.7** | **1.9** | **9.2** | **0.0** |

Notes: Fiscal data sourced from IMF: *2002 Government Finance Statistics Yearbook*, and *Supplement to the 2002 Government Finance Statistics Yearbook*; GDP data sourced as per notes to Table 4. "OECD" is weighted average of 21 countries (weighted by GDP, expressed in USD). NZ Ave is average share for the 5 years 1997-2001.

[+] Some categories are omitted for clarity

^ 2001 data

* 2000 data

[#] 1999 data

## Table 6: Government Outlays as Share of GDP (%)[+]

| Country | Economic Affairs | Health | Education | Social Protection |
|---|---|---|---|---|
| Australia^ | 4.4 | 5.9 | 5.1 | 10.2 |
| Austria* | 4.4 | 8.0 | 5.9 | 21.2 |
| Belgium* | 4.7 | 6.4 | 6.0 | 17.2 |
| Canada^ | 4.6 | 7.1 | 8.4 | 13.1 |
| Denmark* | 3.8 | 5.2 | 8.0 | 23.4 |
| Finland* | 4.8 | 5.8 | 6.3 | 20.5 |
| France* | 4.2 | 9.4 | 4.7 | 18.3 |
| Germany* | 4.3 | 6.4 | 4.2 | 22.0 |
| Greece* | 6.7 | 3.6 | 5.7 | 9.3 |
| Iceland* | 6.8 | 8.1 | 6.8 | 9.1 |
| Italy* | 2.6 | 5.9 | 4.9 | 17.7 |
| Lux.* | 4.2 | 4.0 | 4.7 | 17.1 |
| Neth^ | 5.8 | 4.2 | 4.8 | 17.5 |
| **NZ^** | **2.8** | **5.4** | **5.0** | **11.7** |
| Norway[#] | 4.9 | 7.7 | 6.4 | 17.4 |
| Portugal[#] | 5.8 | 6.4 | 7.0 | 13.1 |
| Spain* | 3.2 | 4.4 | 3.2 | 11.2 |
| Sweden* | 4.0 | 6.3 | 6.9 | 24.5 |
| Switz.* | 5.0 | 7.5 | 5.4 | 13.7 |
| UK* | 2.0 | 4.7 | 3.6 | 13.8 |
| USA* | 3.0 | 7.0 | 7.5 | 8.0 |
| **"OECD"** | **3.4** | **6.7** | **6.2** | **12.4** |
| **NZ Ave** | **2.8** | **5.4** | **5.1** | **12.7** |

Notes: Fiscal data sourced from IMF: *2002 Government Finance Statistics Yearbook*, and *Supplement to the 2002 Government Finance Statistics Yearbook*; GDP data sourced as per notes to Table 4. "OECD" is weighted average of 21 countries (weighted by GDP, expressed in USD). NZ Ave is average share for the 5 years 1997-2001.

[+] Some categories are omitted for clarity

^ 2001 data

* 2000 data

[#] 1999 data

## Table 7: Subsidies (Taxes) to Production (% of GDP)[+]

| Country | Economic Affairs - Corporate Income Tax | Productive Expenditures - Income Tax |
|---|---|---|
| Australia^ | -1.7 | -1.9 |
| Austria* | 2.1 | 5.7 |
| Belgium* | 1.4 | 0.5 |
| Canada^ | 2.3 | 4.9 |
| Denmark* | 1.5 | -11.0 |
| Finland* | -1.0 | -3.5 |
| France* | 1.3 | 7.1 |
| Germany* | 3.8 | 4.1 |
| Greece* | 3.1 | 6.2 |
| Iceland* | 5.4 | 6.6 |
| Italy* | 0.3 | -0.8 |
| Lux.* | -3.2 | -2.1 |
| Neth^ | 1.6 | 4.1 |
| **NZ^** | **-1.2** | **-5.1** |
| Norway[#] | 1.8 | 4.5 |
| Portugal[#] | 1.8 | 9.0 |
| Spain* | 0.3 | 0.7 |
| Sweden* | 0.9 | -4.4 |
| Switz.* | 3.8 | 5.7 |
| UK* | -1.5 | -4.5 |
| USA* | 0.9 | 3.0 |
| **"OECD"** | **1.1** | **2.4** |
| **NZ Ave** | **-0.9** | **-5.1** |

Notes: Fiscal data sourced from IMF: *2002 Government Finance Statistics Yearbook*, and *Supplement to the 2002 Government Finance Statistics Yearbook*; GDP data sourced as per notes to Table 4. "OECD" is weighted average of 21 countries (weighted by GDP, expressed in USD). NZ Ave is average share for the 5 years 1997-2001. All data in this table can be sourced from Tables 5 and 6.

[+] "Productive" expenditures are expenditures on Economic Affairs + Health + Education; Income tax is Individual Income Tax + Corporate Income Tax. A positive (negative) figure in each column indicates a net subsidy (tax) towards production.

^ 2001 data

* 2000 data

[#] 1999 data

## APPENDIX: 1960-1999 ESTIMATES

### Table A1: GDP Growth 1960-1999, 22 Countries (n=88)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **G/Y** | -0.107*** | -0.092*** | -0.052*** | -0.042*** |
| | (8.12) | (8.00) | (4.07) | (3.09) |
| **DG/Y** | -0.081*** | -0.078*** | -0.088*** | - |
| | (3.06) | (3.46) | (4.15) | |
| **Y/USY** | - | -3.478*** | -3.152*** | -3.182*** |
| | | (5.69) | (5.87) | (5.42) |
| **D70** | - | - | -1.102*** | -1.292*** |
| | | | (3.31) | (3.95) |
| **D80** | - | - | -1.780*** | -1.706*** |
| | | | (5.12) | (4.49) |
| **D90** | - | - | -1.839*** | -1.594*** |
| | | | (4.84) | (3.88) |
| **Constant** | 7.871*** | 9.786*** | 9.247*** | 8.441*** |
| | (13.69) | (16.43) | (17.45) | (15.64) |
| **Adj. $R^2$** | 0.42 | 0.58 | 0.68 | 0.62 |

Notes: The dependent variable is GDP growth (%p.a.) for 22 separate OECD countries over each of 4 decades (where the 1990s decade is 1990-1999). G/Y is government expenditure as % of GDP at start of each decade; DG/Y is change in G/Y during the decade; Y/USY is country per capita income as a ratio of US per capita income at the start of each decade; D70, D80 and D90 are dummy variables to capture decade-specific fixed effects. (All sources described in text.) Estimation is by OLS.
"t-ratios" are in brackets
*** denotes significance at the p=1% level
** denotes significance at p=5%
* denotes significance at p=10%.

## Table A2: GDP Per Capita Growth 1960-1999, 22 Countries (n=88)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **G/Y** | -0.092*** | -0.072*** | -0.035** | -0.026[+] |
| | (5.65) | (5.27) | (2.17) | (1.56) |
| **DG/Y** | -0.069** | -0.066** | -0.085*** | - |
| | (2.13) | (2.45) | (3.14) | |
| **Y/USY** | - | -4.669*** | -4.439*** | -4.468*** |
| | | (6.46) | (6.48) | (6.19) |
| **D70** | - | - | -0.542 | -0.812** |
| | | | (1.39) | (2.02) |
| **D80** | - | - | -1.410*** | -1.338*** |
| | | | (3.18) | (2.87) |
| **D90** | - | - | -1.710*** | -1.474*** |
| | | | (3.53) | (2.92) |
| **Constant** | 6.571*** | 9.142*** | 8.627*** | 7.849*** |
| | (9.30) | (12.98) | (12.75) | (11.84) |
| **Adj. $R^2$** | 0.26 | 0.50 | 0.56 | 0.51 |

Notes: The dependent variable is per capita GDP growth (%p.a.) for 22 separate OECD countries over each of 4 decades (where the 1990s decade is 1990-1999). G/Y is government expenditure as % of GDP at start of each decade; DG/Y is change in G/Y during the decade; Y/USY is country per capita income as a ratio of US per capita income at the start of each decade; D70, D80 and D90 are dummy variables to capture decade-specific fixed effects. (All sources described in text.)
Estimation is by OLS.
"t-ratios" are in brackets
*** denotes significance at the p=1% level
** denotes significance at p=5%
* denotes significance at p=10%.
[+] p=12.4%