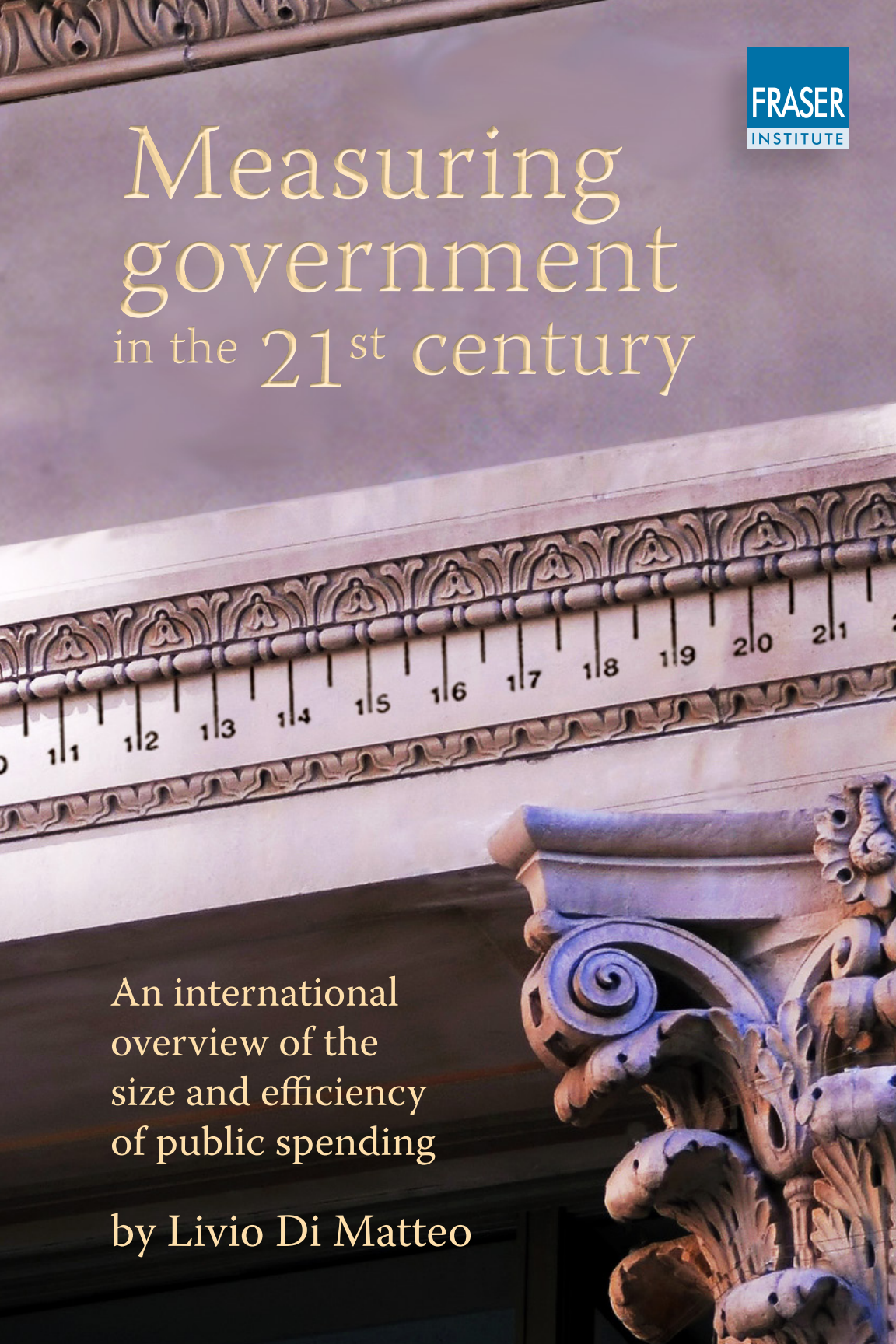
Measuring government in the 21st century



An international overview of the size and efficiency of public spending

by Livio Di Matteo

Measuring Government in the Twenty-first Century

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Contents

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Chapter 1

Introduction

What is government?

Government is the single most pervasive institution of modern life, with all facets affected by public sector activities.[1] Over the last 100 years, government spending around the world has grown in terms of both spending per capita and share of national output. During the twentieth century, the relative size of government grew steadily, with surges during the two world wars. Figure 1.1 shows general government expenditure as a share of national output for the United States, Canada, and the United Kingdom from 1948 to 2011. In 1870, government spending to GDP ratios in these countries were well below 10 percent (Tanzi, 2011: 8), but those ratios had more than tripled by the end of the twentieth century and have continued to grow in the first decade of the twenty-first century.

Government is an institution—that is, an arrangement that people have for dealing with one another. As Douglass C. North (1990: 3) states, "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction." Government is an institution that provides for collective decision making and exercises influence and authority over people in the economy via the mechanisms of taxation, spending, regulation, and borrowing.[2]

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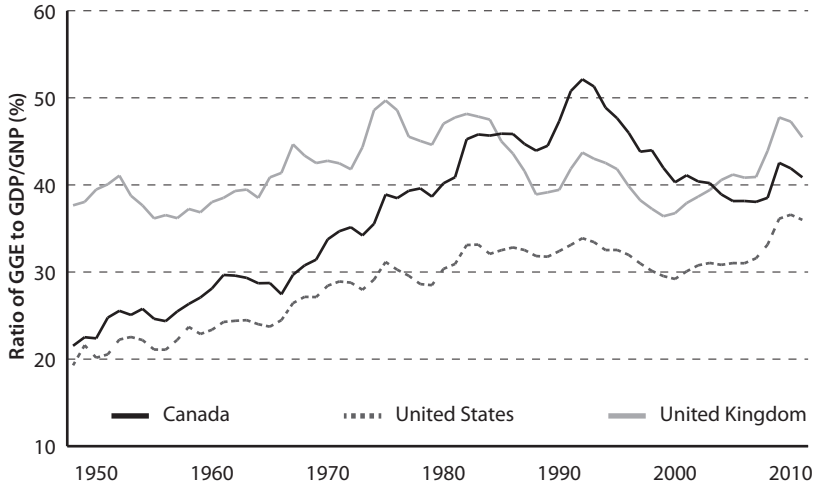
1 Though "government" and "the state" are often used interchangeably, the terms do not have the same meaning. Government is essentially the administrative apparatus of the state, an institution that creates laws and policies. The state is a geographic or territorial entity that has sovereignty and has its laws and policies created and enforced by government.

2 Boadway and Wildasin (1984: 1–10) provide a classic introduction to the public sector and its role.

Figure 1.1: Ratio of general government expenditure (GGE) to national output (GDP/GNP) for Canada, the United States, and the United Kingdom, 1948-2011



Sources: US BEA, 2013; Crawford et al., 2009; Urquhart, 1993; Statistics Canada, 1983.

While many economists see free markets as the ideal mechanism for resource allocation in a society, the reality is that much resource allocation takes place outside the market and is both effected and affected by government. Consequently, it is important to understand why, when, and where such resource allocation decisions take place. Moreover, a fundamental question is, what is the appropriate amount of government involvement in the economic life of its private citizens? What should the economic role of the state be in the twenty-first century?[3]

As well, it is important to understand the effect of government actions and activities on economic growth and efficiency. As government decisions are not based on markets and prices, they have costs in terms of the allocation

3 Tanzi (2005) answers that question quite simply: as markets and economies develop and technology for providing services undergoes innovation, the justification for government intervention should decline. No country needs to spend more than 30 percent of its GDP on public sector activities—indeed, the twenty-first century state should not be producing goods and services but helping markets become more efficient and transparent.

of resources expended and opportunities foregone. Government also provides and finances many important services and functions that benefit the public, regulates the private sector, and redistributes income and wealth. These actions and activities have consequences for economic growth and affect allocative efficiency.

With this level of involvement, it is very important that those services are provided at the lowest possible cost to taxpayers. The depth of government involvement in the economy gives rise to one common denominator for measuring government activity: is it efficient? Efficiency in government spending is a benefit that generates value for taxpayers, ensures that the costs of taxation and government intervention for economic growth and market performance are minimized, and demonstrates stewardship on the part of political leaders for their nation.

Concepts of government size

The size of the public sector is related to how a society's reliance on markets and private institutions has evolved, which in turn can be driven by differences across economic philosophies concerning the role of government. While there are a number of competing views on the role of the public sector, they are bounded by two polar roles, as noted by Vito Tanzi (2011), that can be described as the minimum and maximum roles of government. Given the economic complexity of the modern world, most governments today can be expected to lie somewhere between these two poles, and which direction they lean is "inevitably affected by the prevailing intellectual winds" (Tanzi, 2011: 42).

In the minimalist role, commonly associated with the work of Adam Smith, "the responsibilities of the government or the state are limited because the citizens themselves, with the help of presumably well-functioning markets, and with the use of their own efforts and incomes, are expected to take care of their needs, both personal and social" (Tanzi, 2011: 42–43). The result is that public sector provides the basic legal machinery of government and assumes a "night watchman" role. The alternative and polar opposite role, commonly associated with the work of Karl Marx, is one in which "most economic decisions are made largely by political representatives of the people or of the working class, who presumably act for the

state" (Tanzi, 2011: 43), and economic decisions are made via centralized planning.[4]

Actually measuring government size is complex as there is no single quantitative measure that conveniently summarizes the entire impact of government on the economy. Government in the economy operates as a producer of goods and a consumer of resources, as well as an employer of labour and an investor of capital. Governments also transfer resources via subsidies and entitlement payments. In addition, government has an important impact on the economy via its regulatory activities in terms of both corporate and individual activity. The tax revenues raised to finance these activities also have an economic impact through incentives and distortions. Economic measures of government size attempt to relate the influence of government to its control over economic resources.

A specific definition of government spending such as government expenditures on goods and services has the advantage of reflecting the current policy choices of government.[5] However, such a measure omits transfers and only provides information about the role of the government as a consumer or spender in the economy.[6] As a result, when studying the growth of the public sector more general measures of total government revenues and expenditures are preferable.

Since most measures of public sector growth have demonstrated an upward trend over time, any attempt to account for changes in the size of the public sector need not be too preoccupied with which measure is used, provided it focuses on resource use. Two of the most common measures are government spending as a share of national output (GDP) and government revenues as a share of GDP. Other measures may include government spending per capita, the number of public sector employees, or public sector employment as a share of total employment. Government spending as a share of GDP is a relatively simple view of the effect of government on the economy given the effects, not only of spending, but also of regulation,

4 See Appendix 1 for a more detailed overview of the role of government.

5 Brown and Jackson (1990: 118) also draw a distinction between broader and narrower measures of government expenditure. Regulations and rules introduced by government also result in private sector resource expenditure.

6 In Canada, government has also had a role as an investor, accounting for 15 to 20 percent of gross fixed capital formation in the years after the Second World War (Bird, 1970: 24).

income redistribution, and indirect spending via tax expenditures (Peltzman, 1980: 209).

Pathirane and Blades (1982) argue that a measurement of the size of government should also take into account public enterprises and that a number of measures need to be used, including total final demand by the public sector, value added, public sector employment, and net lending. Different measures of government size may lead to different conclusions. For example, they argue that when making international comparisons, the United States has a relatively smaller public sector if total public sector employment or final demand is used, but a relatively larger one if government employment[7] or consumption expenditure is used.[8]

In a study of European public sector size, Handler et al. (2005: 3) argue that the public sector is difficult to measure with only one indicator and suggest using a number of indicators. They use public employment as a proxy for the production of public services by government, the ratio of government expenditure to GDP as a measure of the volume of transactions that involve the public sector, and the ratio of total taxes to GDP as a reflection of the financing side of the size of government. Baskaran (2011: 494) uses total government expenditure as a share of GDP in a study of the relationship between public sector size, ideology, and fiscal decentralization.

The effects of government on the economy are much broader and more pervasive than simple measures of government size that relate government spending to GDP are capable of showing. Yet ratios of government spending or revenues to GDP are important in any study of public sector size because the data is more readily available and more easily quantifiable than measures such as regulatory burden or tax expenditures. Moreover, much of the literature to date has focused on these types of measures and, therefore, for the sake of comparability, any study of public sector size must use these basic measures.

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7 Public sector employment includes employment in general government as well as institutions of the broader public sector. Government employment is simply direct employment by government. In the United States, general government employment represents almost all public sector employment.

8 Pathirane and Blades conclude that, "In general, the growth of public sector final demand shares has been leveling off since 1975 in Organisation for Economic Co-operation and Development (OECD) countries, and there have been actual declines in several countries. This was due mainly to slower growth or declines in gross capital formation, especially of general government" (1982: 282).

The growth of government and why government size matters

During the twentieth century, and particularly after the Second World War, the public sector grew dramatically in most developed and industrialized countries. Tanzi and Schuknecht (1997a) note that public sector expenditure growth from the 1870s to the 1990s was the result of strong intellectual justifications for more spending. For example, in the wake of the Great Depression, Keynes (1936) with his General Theory provided a justification for a stabilization role for government in the economy through increased public spending, while documents such as the Beveridge Report[9] in the United Kingdom laid out the basic framework for a larger and more comprehensive welfare state.

Indeed, the role of the state changed dramatically over the course of the twentieth century as government assumed responsibilities in the areas of public pensions, health services, education, housing, unemployment assistance, and business subsidies. Government also came to take on a major role in income redistribution and the regulation of economic and social life (Tanzi, 2011: 6–8). The institution of universal suffrage in the early twentieth century was a factor in the expansion of the state: as populations were given a greater voice, they invariably used that voice to implement programs and transfers that were to their benefit.[10] By the mid-1990s, social transfers as a percentage of GDP in OECD countries ranged from a low of 12 percent in Japan to a high of 32 percent in Finland.[11] Indeed, the pervasive role of government has made reform difficult as "many individuals depend on government programs for their livelihoods" (Tanzi, 2005: 637).

The average level of public spending expressed as a share of GDP for a set of 13 industrialized countries[12] rose from 12.3 percent in 1913 to 27.9 percent by 1960, reaching 43 percent in 1990 (Tanzi and Schuknecht, 1997a: 165; 1997b). Tanzi and Schuknecht (1997a, b) argue that the level of public spending in many industrialized countries has begun to exceed the efficient

9 Formally known as *Report of the Inter-Departmental Committee on Social Insurance and Allied Services*, it was chaired by William H. Beveridge.

10 For an overview of the growth of spending and taxation in the twentieth century, see chapter 4 of Tanzi (2011).

11 Social transfers are defined as welfare, unemployment benefits, pensions, health subsidies, and housing subsidies.

12 The 13 countries are Australia, Austria, Canada, France, Germany, Ireland, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States.

level as larger governments do not necessarily show superior performance when it comes to assorted economic performance and social indicators. Florio and Colautti (2005) note that the ratio of government expenditure to national income in the second half of the nineteenth century ranged from 5 to 10 percent for many countries; by the end of the twentieth century it ranged from 35 to 55 percent.

Two traditional explanations as to why the public sector has grown over time are Wagner's Law of Expanding State Activity (Peacock and Scott, 2000; Wagner, 1883, 1892-94) and the Peacock-Wiseman Displacement Hypothesis (Peacock and Wiseman, 1961).[13] Wagner's Law states that government expenditure can be expected to grow faster than output in industrializing countries because government expenditures for general government, protection, culture, welfare, and provision of services are highly income elastic—that is, the ratio of the percentage responsiveness of government expenditures to a given percentage change in income is greater than one (Auld and Miller, 1982: 74). While empirical evidence concerning the relationship between output and government spending broadly supports this hypothesis, it is entirely demand-side oriented with no explanation as to why government revenues would continue to grow to accommodate the rising demand.

Peacock and Wiseman dealt with the supply side by arguing that the rate of growth of public expenditures is driven by what taxpayers consider to be tolerable levels of taxation and that this tolerance is greater during times of national or social crisis. Thus, the public sector has grown in a step-like fashion of abrupt jumps and long plateaus driven by crises such as war. While this approach takes the revenue side of government spending into account, it still does not explain why taxpayers would tolerate higher taxes and spending after the crisis period has ended (Auld and Miller, 1982: 75–76).

Peacock and Scott (2000) review much of the literature dealing with the econometric testing of Wagner's Law and the growth of public expenditure and argue that most studies have not understood Wagner's definition of state activity, which included state enterprises, nor that fact that even

13 Other explanations have involved the role of voting mechanisms and median voters, and how democracies create environments where the state is expanded via redistribution (Downs, 1957; Meltzer and Richard, 1981). Additional explanations include fiscal illusion as to the marginal cost of public spending (Goetz, 1977), interest group or bureaucratic capture (Niskanen, 1971), and cost disease (Baumol, 1967, 1993; Baumol and Bowen, 1966).

Wagner himself insisted that he was not engaged in predicting public sector size. Indeed, Peacock and Scott argue that "the apparently simple nature of the law does not seem to merit the use of the heavy machinery of econometrics … the 'law' is misspecified and much of the econometric analysis over elaborate" (2000: 2).

Florio and Colautti (2005) examine the long-term trend of public expenditures in five countries (the United States, United Kingdom, France, Germany, and Italy) and reject Wagner's Law on the grounds that it disregards the role of ever-increasing taxation distortions. They present econometric estimates supporting the growth of government spending as a logistic S-shaped curve, which they argue is more consistent with observed data. This suggests that the growth rate of government declines over time and its size may be converging to a steady state. On the other hand, Legrenzi (2004) tests for the Peacock-Wiseman displacement effect using Italian historical data and finds that the long-term equilibrium of government spending is driven entirely by GDP and is unaffected by either the method of financing or displacement factors as captured by shifts in intercept and slope coefficients.

While understanding the role and function of the public sector is an important foundation for analyzing its size, this analysis is also important in its own right. The public sector, through taxation and expenditure, affects resource allocation in the economy. This raises a number of questions concerning the impact of government on resource allocation in the economy and, specifically, on economic growth. Buchanan, for example, argues that a larger public sector ultimately means more rent-seeking activity in the form of resources devoted to economic regulation and licensing, which has harmful effects on the economy (Scully, 1989: 150). If government provides goods and services in the economy, are taxpayers getting value for money? Is a larger public sector correlated with more and better public services? How cost-effective is government spending in terms of the outcomes it is supposed to provide? In other words, how is government size related to public sector performance and public sector efficiency?[14]

14 Afonso, Schuknecht, and Tanzi (2005) define public sector performance (PSP) as "the outcome of public sector activities" and public sector efficiency (PSE) as "the outcome relative to the resources employed."

Chapter 2

Literature Review

Research on size of government and economic performance

A key economic performance variable is the rate of economic growth. In understanding the relationship between public sector size and economic growth, a good starting point is Bergh and Henrekson (2011), which provides an overview of economic growth theories and the role of government in affecting that growth. They divide the approaches to economic growth into neoclassical, endogenous, and institutional. Neoclassical economic growth relates per capita output to per capita capital stock (Solow, 1956; Swan, 1956) with government tax and expenditure policies affecting saving, capital formation, and labour supply, which in turn affect economic growth. Endogenous growth theory (Romer, 1986; Barro, 1990) relates economic growth to shocks in innovation and technological change and human capital investment. Government tax and expenditure policies that limit innovation are seen as growth reducing, while increasing the quantity and quality of education and training is growth enhancing. Economic historians such as Douglass North (1987, 1990) have focused on the important role of governmental institutions, such as the rule of law and well-functioning property rights (see also Rodrik, 2007, and Rodrik et al., 2004). Economic freedom, trust, low levels of corruption, and well-functioning bureaucracies have also been examined as institutional factors that determine economic growth.[1]

While these theories all provide a role for government in influencing economic growth, there is no specific theory relating the size of the public sector and economic growth. The relationship known as the Armey Curve (Armey,

1 See Ali (2003), Asoni (2008), and Sturm and De Haan (2001). The central roles of trust and social capital are explored in Fukuyama (1996) and Knack and Keefer (1997).

1995) posits a hump-shaped relationship between government size and economic growth. At first, as the public sector expands, it has a positive effect on economic growth as the state develops and provides infrastructure to complement private sector growth.[2] However, beyond a certain point, the public sector grows and diverts resources into less productive uses such as rent-seeking, while the higher taxes financing the expanding state reduce growth. Buchanan (1980) argues that rent-seeking and the resources devoted to this practice are directly related to the size of the public sector. The cost-disease view of the expanding public sector espoused by Baumol[3] suggests that a larger public sector generates lower economic productivity and lower economic growth.

Ultimately, whether a large public sector—and by extension a large tax burden—has a positive or negative effect on economic growth is an empirical question and numerous studies have examined the relationship.[4] Given the volume and span of the literature, only a few of the studies will be discussed here so as to provide an overview of the main results. Most of these studies define government size as the ratio of expenditure to GDP and examine the impact on economic growth rates.[5]

An early study by Landau (1983) covering the period of 1960 to 1980 finds that size of government is negatively correlated with the growth of per capita GDP for less developed countries. Marlow (1986) also finds a negative relationship between the size of the public sector and economic growth over the period of 1960 to 1970 for a set of industrialized countries. Grier and Tullock (1989) use a data set for 113 countries to examine post-war economic

2 The relationship between government size and economic growth has also been referred to as the BARS (Barro, Armey, Rahn, and Scully) Curve (see Forte and Magazzino, 2010). This curve implies that there is an optimal size of government for maximizing economic growth.

3 The cost-disease view argues that the production of government output is labour intensive and lowers productivity, while the demand for government output is income elastic. Therefore, as income rises, government production grows and absorbs a rising share of national output, but output grows at a slower rate (see Baumol, 1967, 1993; Baumol and Bowen, 1966).

4 If a smaller public sector is associated with higher economic growth, by extension a lower tax to GDP ratio should also be associated with higher economic growth. For example, in an examination of the United States economy, Engen and Skinner (1996) find that there are indeed differences in growth rates in response to tax reforms that lower taxes.

5 Some also look at the relationship between government size and other performance variables. For example, using data from 52 developing countries, Feldmann (2009a) finds that a large government sector is likely to increase the ratio of the long-term unemployed to the total number of unemployed.

growth and find that government consumption expenditures negatively correlated with economic growth in three out of four of their sub-samples, including OECD countries.

Using time-series data for the United States, Grossman (1988) examines the possibility that the relationship between government size and economic growth is non-linear. He finds that negative effects on economic growth are created by the revenue raising and spending mechanisms of government and the increasing diversion of resources into "unproductive" rent-seeking activities, and that these effects are likely to grow with increases in the relative size of government.

Scully (1989) uses economic growth data for 115 economies between 1960 and 1980 and finds that nations with relatively large government in 1960 generally grew more slowly than nations with relatively small public sectors. Moreover, regression analysis reveals that the size of government regression coefficients were sufficiently large to have a substantial depressing effect on economic growth. As well, Scully finds that nations with relatively large public sectors produced less output per capita with the same input ratio than nations with relatively small government sectors.

Scully (1991) looks at the relationship between government size—this time measured as the ratio of taxation to GDP—and economic growth for 103 countries between 1960 and 1980 and finds that rates of economic growth are maximized when government size is approximately 19 percent of GDP. Scully's research has lead to a Scully Curve similar to the Armey Curve, except that Scully's work maintains that the peak of the hump-shaped curve is the optimal size of government to maximize economic growth.[6]

Barro (1990) argues that government spending is beneficial for the economy when directed towards institutional infrastructure such as property rights, but as spending levels rise, economic growth rates eventually decline as spending increases on less productive activities such as the consumption of goods and services. Barro (1991) examines the growth rate of real per capita GDP in 98 countries between 1960 and 1985 and finds that economic growth is inversely related to the share of government consumption in GDP

6 See Clemens et al. (2010: 16). Scully (1991) also examines the relationship between tax rates and economic growth and concludes that economic growth is maximized when the tax to GDP ratio is 19.3 percent.

(a measure of public sector size) and insignificantly related to the share of public investment. However, Barro finds that growth rates are positively related to human capital as measured by school enrollments and political stability, and inversely related to market price distortions as measured by purchasing power parity prices for investment goods.

Folster and Henrekson (2001) note that some cross-country examinations of government size and spending and economic growth do not find strong negative relationships between government size and economic growth. However, they argue that there is a minimum threshold size for government that is a function of economic development level and therefore rich countries should be analyzed separately. Conducting an econometric panel study on a sample of rich countries for the period of 1970 to 1995, they find a strong and significant negative relationship between government expenditure and economic growth. The size of the estimated coefficients imply that an increase in the expenditure to GDP ratio by 10 percentage points is associated with a decrease in the growth rate of 0.7 to 0.8 percentage points.

Blanchard and Perotti (2002) examine the effect of government spending shocks on the US economy during the post-war period and find that positive government expenditure shocks have a positive effect on output, while positive tax shocks have a negative effect. However, increases in taxes and in government spending both have a strong negative effect on investment spending. Similarly, Alesina et al. (2002) examine data for 16 OECD countries over the period of 1960 to 1996 and find an inverse relationship between increases in government spending and private sector investment.

Romero-Avila and Strauch (2008) examine 15 European Union countries over the period of 1960 to 2001. Measuring government size as either total expenditure or revenue as a share of GDP, they find that government consumption and direct taxation negatively affect GDP growth rates per capita, while public investment has a positive impact on growth rates.

Bergh and Karlsson (2010) examine the relationship between government size and growth while controlling for institutional quality measures of economic freedom and the impact of globalization. Using data from 29 OECD countries between 1970 and 1995, they find that government size robustly correlates negatively with growth. As well, they find some evidence that countries with a large public sector can use economic openness and market-oriented economic policies to mitigate the negative effects of large government.

Afonso and Furceri (2010) look at the size, composition, and volatility of government revenues and expenditures on growth in OECD and European Union countries for the period of 1970 to 2004. They find that the size and volatility of indirect taxes, social contributions, and government consumption spending have a sizable, negative, and statistically significant effect on economic growth. Specifically, a one percentage point increase in the share of total government revenue (total government expenditure) decreased output by 0.12 and 0.13 percentage points, respectively, for OECD and European Union countries. On the other hand, they find that only the size of subsidies and the volatility of government investment have a negative and significant effect on growth.

Afonso and Jalles (2011) conduct an empirical analysis of 108 countries over the period of 1970 to 2008 that includes variables for government size and institutional quality. They find that the size of government has a negative effect on economic growth while institutional quality has a positive impact. Moreover, they find that institutional quality variables such as regime durability, governance, and extent of democracy have a stronger positive impact on growth when governments are smaller.

Not all studies report a negative relationship between the size of government and economic growth. Making the case for larger government, Atkinson (1995) argues that income transfers such as state pensions are not necessarily an obstacle to economic growth.[7] Ram (1986), using the same data as Landau (1983), concludes empirically that the relationship between public sector size and GDP growth is positive.[8] Using OECD data, Colombier (2009) also finds a positive correlation between government size and economic growth.

Furthermore, studies by Slemrod (1995) and Tanzi and Zee (1997) find a negative relationship between government size and economic growth only beyond a threshold size of government. This is in keeping with the argument of Folster and Henrekson (2001) that countries with very large public sectors

7 For example, the net effects of state pensions on saving and economic growth depend on the determinants of savings and whether or not such saving is automatically translated into investment spending (Atkinson, 1995).

8 But according to Scully (1989: 151), Landau's result is a function of econometric difficulties that include having both the growth rate of the public sector and the growth rate interacted with the size of the public sector as separate regression variables when they are actually closely correlated rather than independent.

devote a smaller share of expenditures to promoting private sector activity relative to countries with smaller governments, and that the negative effects of large public sectors can be greater in non-democratic countries (compared to democratic countries), suggesting that institutional differences can be a factor in the impact of government size on economic growth and performance.

Bergh and Henrekson (2011) argue that studies of government size and economic growth sometimes produce conflicting results because they employ different definitions of government size and use a mix of countries. They propose limiting the focus of studies to rich countries, measuring government size simply as total taxes or total expenditure relative to GDP and relying on panel data estimation. When, as with Folster and Henrekson (2001), they limit their analysis to more highly developed rich countries, they obtain more consistent results that show a significant negative correlation: increasing government size by 10 percentage points is associated with a 0.5 to 1 percent lower annual economic growth rate. Moreover, they note that several countries (i.e., Scandinavian countries) that seem to have high taxes and above-average growth may have institutional compensating factors such as higher social trust levels and market-friendly policies in other areas.

These studies provide three important lessons concerning the relationship between government size and economic growth. First, they demonstrate that it is important to explicitly set out and adhere to consistent definitions of government size and economic growth. However, even with consistent definitions, the choice and availability of data sources ultimately limit the measures of government size that can be used.

Second, they show that the analysis needs to be consistent in terms of the countries and economies being compared. While examining all nations is useful for comparative purposes, more formal analysis should separate countries into groups based on some distinction as to level of economic development. Ideally, developed countries such as the members of the OECD should be considered separately from less developed countries. If all countries are studied together, then an attempt should be made to control for countries at differing levels of economic development.

Third, the studies show that even if there is a negative empirical relationship between government size and economic growth, the relationship may simply be due to reverse causality—that is, lower economic growth reduces resources for government and therefore leads to a smaller public sector. This

would certainly be the case in the short term with business cycle fluctuations. To control for this effect, one could use data over a longer time period and try to include some measure of the business cycle, such as the unemployment rate. One could also find an instrumental variable for government size that is related to government size, but not economic growth, such as a country's economic size as measured by either population or total GDP (Bergh and Henrekson, 2011: 10).

Research on size of government and public spending outcomes

Along with the impact of government size on economic growth, there is an associated literature that examines the relationship between government size and the outcomes of public spending. There is some overlap between studies that examine government size and economic performance and those that look at government size and the efficiency of public sector outcomes. Studies of the latter represent a relatively new and growing field.

An important part of this emerging literature is defining what the outcome measures are to be. According to Handler et al. (2005), the terms "productivity," "efficiency," and "performance" differ somewhat in their meanings, but are often used interchangeably. They note that:

> Performance describes the results of an activity in a specific area (e.g. number of children educated) or aggregated over several or all activity areas of a public body. Performance is measured either in absolute terms or (as an index) in relation to equivalent results of previous periods, other sectors or other countries.
>
> Productivity measures output in terms of units of input (e.g. output per persons employed or per hours worked); productivity differences then capture output differences that are not due to input differences.
>
> Efficiency measures the (quantity) results of a production process in terms of (nominal) resources employed. An efficient production process is one for which the production costs are minimized. Thus, an efficient organization is one that produces a given output with the minimum amount of inputs. "Balanced scoreboards" or "data envelopment" are examples of efficiency indicators. (Handler et al., 2005: 18)

Mandl, Dierx, and Ilzkovitz (2008) illustrate the conceptual framework for efficiency and effectiveness of government spending as a link between inputs of resources, outputs of goods and services, and outcomes in terms of achievement or attainment of goals. Essentially, they argue that "the greater the output for a given input or the lower the input for a given output, the more efficient the activity is" (Mandl et al., 2008: 3).

In an early and key contribution, Tanzi and Schuknecht (1997a) examine the relationship between the size of the public sector and social indicators such as life expectancy, infant mortality, and school enrollment for 17 industrialized countries and find that smaller governments are associated with better outcomes. In another paper, using the Human Development Index (HDI) as a general index for social well-being, Tanzi (2005) examines the performance of OECD countries and finds no identifiable relationship between public sector spending and HDI levels.

Afonso, Schuknecht, and Tanzi (2005) compute public sector performance (PSP) and public sector efficiency (PSE) indicators for 23 industrialized countries. They estimate "opportunity" indicators that take into account administrative, education, and health outcomes; the quality of public infrastructure; support for the rule of law; and a level playing field in a market economy. As well, they estimate other indicators that reflect the standard "Musgravian" government tasks of allocation, distribution, and stabilization. They measure input and output efficiency of public sectors across countries through a non-parametric production frontier technique and find significant differences in performance and efficiency, suggesting potential expenditure savings in many countries. Countries with smaller governments (public spending below 40 percent of GDP in the year 2000) on balance achieved a better economic performance than countries with medium-sized governments (public spending between 40 and 50 percent of GDP) and large governments (public spending above 50 percent of GDP).

Tanzi et al. (2007) use their methodology in a Fraser Institute study that examines 23 industrialized countries and calculates a public sector performance index for each of them based on seven indicators. They find that public sectors in smaller government countries had higher performance levels, as measured by their performance index, than larger government countries. Moreover, countries with smaller governments were more efficient in achieving their public sector performance levels than countries with larger

governments. This study is notable for explicitly linking differences in government size with measures of public sector efficiency.

Clemens et al. (2010) measure the efficiency of government in California by constructing indicators for education performance, health, income distribution, economic performance, and economic stability, and combining them into a Government Performance Index. The authors then compare performance for each indicator with government spending in that area to compute a Government Efficiency Index. They find that California is generally less efficient than the 24-jurisdiction comparison average for each of the five indicators.

Handler et al. (2005) review the size and structure of the public sector in Europe, the United States, and Japan and analyze the evidence concerning size of government and performance. While their results for industrialized countries are not entirely conclusive, they attribute more efficiency to smaller, rather than larger, governments.

Angelopoulos, Philippopoulos, and Tsionas (2008) use a sample of 64 developed and developing countries over the period of 1980 to 2000 and construct an output-input ratio as an estimate of public sector efficiency in each country. They find that there is indeed a relationship between size of government and its efficiency in explaining the relationship between government size and economic growth, but the relationship is non-monotonic—that is, it is not consistently an inverse one. What matters is not the size of government per se, but the interaction between government size and efficiency. Larger public sectors are not as detrimental to economic growth if they are highly efficient in terms of outputs per inputs.

Mandl, Dierx, and Ilzkovitz (2008) provide an analytical framework for examining the effectiveness and efficiency of public spending in the European Union and then apply those concepts to the efficiency of education and research and development spending. They use test subject scores as an outcome indicator for educational systems and conclude that there is no clear link between spending on education and the observable performance of pupils (Mandl et al., 2008: 21). They do find a positive relationship between an innovation index and spending on research and development, but argue that this result is misleading because high levels of spending do not necessarily imply greater innovation, which is related to other institutional factors (Mandl et al., 2008: 27).

Ultimately, analyzing the effectiveness and efficiency of government spending is an exercise in economic evaluation and cost-effectiveness analysis

(CEA). Economic evaluation makes the link between resource costs and outcomes in an effort to ascertain what outcomes provide the best value for money. Widely used in the economic evaluation of health services, CEA is a method for evaluating the outcomes and costs of interventions designed to improve health. With CEA, resource costs are generally measured in monetary terms, while health outcomes are measured in whatever units are appropriate to the issue at hand. In essence, there is a link between costs and consequences. A cost-effectiveness ratio is calculated by taking the ratio of the resource costs to the outcome. Changes in health outcomes are captured in the denominator, while changes in resource use are in the numerator. A lower cost per given outcome is evidence of greater efficiency or cost-effectiveness.[9] In essence, calculating a public sector performance index and combining that index with expenditure or cost data to compute a public sector efficiency index is a way of calculating a cost-effectiveness index.[10]

Other confounding factors: data, expenditure composition, regulation, and tax expenditures

Measuring the relationship between public sector size, economic growth, and public sector outcomes is complicated by other factors, which require some discussion. First, cross-country comparisons can be confounded by the fact that there are data collection differences across countries that make even the best data sets less than ideal for comparisons. As Mandl et al. (2008: 4) note, "Compared to the private sector, the estimation of the actual costs of public sector activities is relatively complicated. While in the private sector, data are available at a very detailed level of activity, public sector accounts are typically designed differently, making it difficult to obtain information on all input costs, in particular at a disaggregated level."[11] As well, Curristine et al. (2007: 4) write, "Making cross-country comparisons of public spend-

9 For a discussion of cost-effectiveness analysis in a health care setting, see Hurley (2010: 104–05) and Drummond et al. (2000: 96–138).

10 Barua (2013) uses such an approach to compute indexes of cost and outcomes for health care across Canadian provinces and provide a ranking of value for money—essentially, a cost-effectiveness measure.

11 They also note that Estache et al. (2007) stress that public budgets are not designed to track down specific sectoral expenditures.

ing efficiency requires corresponding measures of the value of public service outputs and inputs. On the input side, even the public spending data available from the national accounts—which are the best internationally comparable source—are fraught with problems. Cross-country comparisons based on public spending-to-GDP ratios suggest significant differences across OECD countries. However, many of these variations reflect the different approaches to delivering public goods and providing social support rather than true differences in resources spent on public services." Of course, this is further complicated by the measurement of public spending outputs where the coverage and scope of services, as well as their measurement, reflect societal priorities as well as efficiency differences.

Second, measuring the relationship between public sector size, economic growth, and public sector outcomes can be confounded by the composition of government spending and its effects on economic growth and the efficiency of public sector services and social outcomes. For example, Tsouhlou and Mylonakis (2011) examine public expenditure, public sector size, spending composition, and economic growth for the European Union between 1996 and 2007. They find an inverse relationship between public sector size and economic growth. Their results show that the average rate of growth in countries with large public sectors (public spending as a share of GDP exceeding 50 percent) ranged from 1.4 to 3 percent, while in countries with small public sectors (public spending as a share of GDP below 40 percent) it ranged from 3 to 7 percent. As well, they find that health and social protection expenditures for countries with large and medium-sized public sectors tend to be larger shares of spending than for countries with smaller public sectors.

Third, government intervention in the economy goes beyond simply taxing and spending, as government also has the powerful tools of borrowing and regulation.[12] Indeed, regulation can be a substitute for taxing or spending in achieving policy or social objectives.[13]

12 Boadway and Wildasin (1984: 1) provide the classic summary of the four tools of government policy.

13 Tanzi (2011: 213) provides the example of how government can boost the employment of people with disabilities by mandating workplace regulations that require enterprises to include in their workforce a given proportion of individuals who have been designated as handicapped.

The degree of regulation in an economy is correlated with size of government and can affect economic growth, yet standard measures of government size such as expenditure or revenue to GDP ratios do not necessarily capture regulation's impact. The effects of regulation on the economy can be quite complex. While there are direct effects on individuals and firms, there can also be indirect general equilibrium effects that emerge from the interaction of regulated sectors with non-regulated ones. The extent to which an economy promotes economic freedom, in terms of free competition and voluntary exchange with a minimal or limited regulatory burden, can also affect economic growth (Berggren, 2003).

Many regulations are put in place to protect the public against risks, but they nevertheless have an economic impact. Occupational health and safety regulations, for example, can increase safety for workers but also increase costs that decrease both wages and profits. Other examples of regulations that can have an impact on economic growth include rent controls (via their impact on housing markets and new construction), minimum wages (via their effects on employment), and training and licensing requirements (by increasing the length of time and cost required to acquire a certification).[14]

Labour regulations of assorted types can have unemployment effects. For example, Feldmann (2009b), using data for 73 economies between the years 2000 and 2003, shows that tighter hiring and firing rules and military conscription seem to have the largest effects on increasing unemployment, particularly among young people.

Variations in regulation across industries can also affect employment. If regulation is more burdensome in one industry than in another, then this can affect the operating business environment and encourage migration of resources from more regulated to less regulated industries, affecting output and efficiency (Bartel and Thomas, 1985: 3).

The value of tax expenditures can also indicate government resource and policy priorities that are not reflected in explicit spending and forgone revenues. Tax expenditures are defined as "provisions of tax law, regulation or practices that reduce or postpone revenue for a comparatively narrow population of taxpayers relative to a benchmark tax" (OECD, 2010: 13). Though not explicit expenditures, they represent a reduction in tax liability for taxpayers

14 For a more detailed exposition, see Tanzi (2011: 213–16).

and a revenue loss for government. They can take the form of allowances, exemptions, rate relief, or tax deferral, and they represent a setting of public priorities and a transfer of public resources (OECD, 2010: 14).

Tax expenditures can differ substantially across countries and are difficult to measure. As a percentage of all tax revenues, the estimated value of tax expenditures varies greatly among the major OECD countries, from a high of nearly 45 percent of total tax revenue in Canada[15] to 5 percent in the Netherlands (OECD, 2010: 236). Given their variation and non-explicit nature, it is difficult to configure tax expenditures in a consistent fashion across countries when constructing measures of government size. Nevertheless, it is important to acknowledge their potential effects and the extent to which their presence qualifies any study of government size.

15 These values would be higher if the tax expenditure were compared with the specific revenue category to which it applied—e.g., personal income tax expenditures compared with personal income tax revenues.

Chapter 3

Empirical Analysis

Data and methodology

The data for the empirical analysis in this study comes from two major sources. First, there is the World Economic Outlook Database 2012 (WEO 2012), produced by the International Monetary Fund (IMF), which provides economic and fiscal variables including general government total revenues[1] and total expenditures, as well as GDP, net debt, total investment spending as a percentage of GDP, population, unemployment rate, and employment levels for 186 countries over the period of 1980 to 2011. However, this data set has gaps for some of the countries and for some of these variables at various points in time. As well, the WEO 2012 database has a conversion rate to put valuations into US purchasing power parity dollars. Appendix 2 provides a list of the variables and the source for the WEO 2012 variables used in this study.

Second, there are data for the 34 countries that are members of the Organisation for Economic Co-operation and Development (OECD).[2] This data covers a larger set of variables over the period of 1960 to 2011, but there are not annual observations for the entire time period for all countries or all variables, which is a limitation of the data. Along with output, population, employment, and total government expenditure and revenue variables, there are also population age distribution variables, government spending by

1 The government expenditure data reported by the IMF is for general as opposed to central government and therefore should include expenditure by subnational units.

2 At present, the members of the OECD are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

category, and an assortment of socioeconomic indicators. Appendix 2 also provides a listing and sources for these variables.

Institutional variables were collected for governance and economic freedom from the World Bank's World Governance Indicators for 2012 and the Fraser Institute's Economic Freedom of the World Index (see Gwartney et al., 2010). There is an extensive literature linking economic freedom with measures of economic performance. Most recently, Jong-A-Pin and De Haan (2011) show that accelerations in economic growth are preceded by periods of economic liberalization. As well, Faria and Montesino (2009) find a positive, statistically and economically significant relationship between growth, income level, and economic freedom.

An average annual governance index variable for the period of 1996 to 2011 was constructed by taking the average across the five governance categories[3] for each country in the WEO 2012 data set. Consecutive annual values for the governance variables were provided beginning in 2002, with values provided every two years prior to that. An annual summary economic freedom value calculated by the Fraser Institute's Economic Freedom of the World Index, available for the years 2000 to 2010, was used.[4]

The empirical methodology for the remainder of this study proceeds as follows. The first phase will be a data exploration exercise focusing on visual plots that occupy two dimensions. First, there will be international data comparisons using the WEO and OECD data sets to establish the size and range of government, both in the recent past and in the first decade of the twenty-first century. Second, there will be an examination and international comparison of basic economic performance indicators, including growth rates of GDP, and an effort to relate differences in these measures to differences in public sector size. The analysis will include a discussion of the composition of government expenditures in OECD countries, for which more detailed expenditure information is available. As well, there will be an examination of the relationship between government size and a number

3 The categories are voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, and control of corruption (see World Bank Group, 2013a)..

4 The index is constructed from 42 data points for each country and the summary index is composed of indexes in five areas: size of government (expenditures, taxes, and enterprises), legal structure and security of property rights, access to sound money, freedom to trade internationally and regulation of credit, labour, and business (see Gwartney et al., 2010).

of societal outcome indicators. These comparisons are ultimately limited by the availability, comprehensiveness, and comparability of the data. Yet they provide some interesting visual insights into patterns of government spending and societal outcomes that suggest more government spending does not always generate better outcomes.

The second phase will be a more detailed empirical analysis utilizing regression techniques to estimate the relationship between public sector size and economic growth. Multivariate regression models of the determinants of economic growth will be estimated, including public sector size as a variable, while controlling for other determinants of economic growth. As well, public sector performance and efficiency indexes will be computed and a cost-effectiveness index calculated and used to rank performance across countries. The relationship between public sector size and performance will also be examined.

International data comparisons

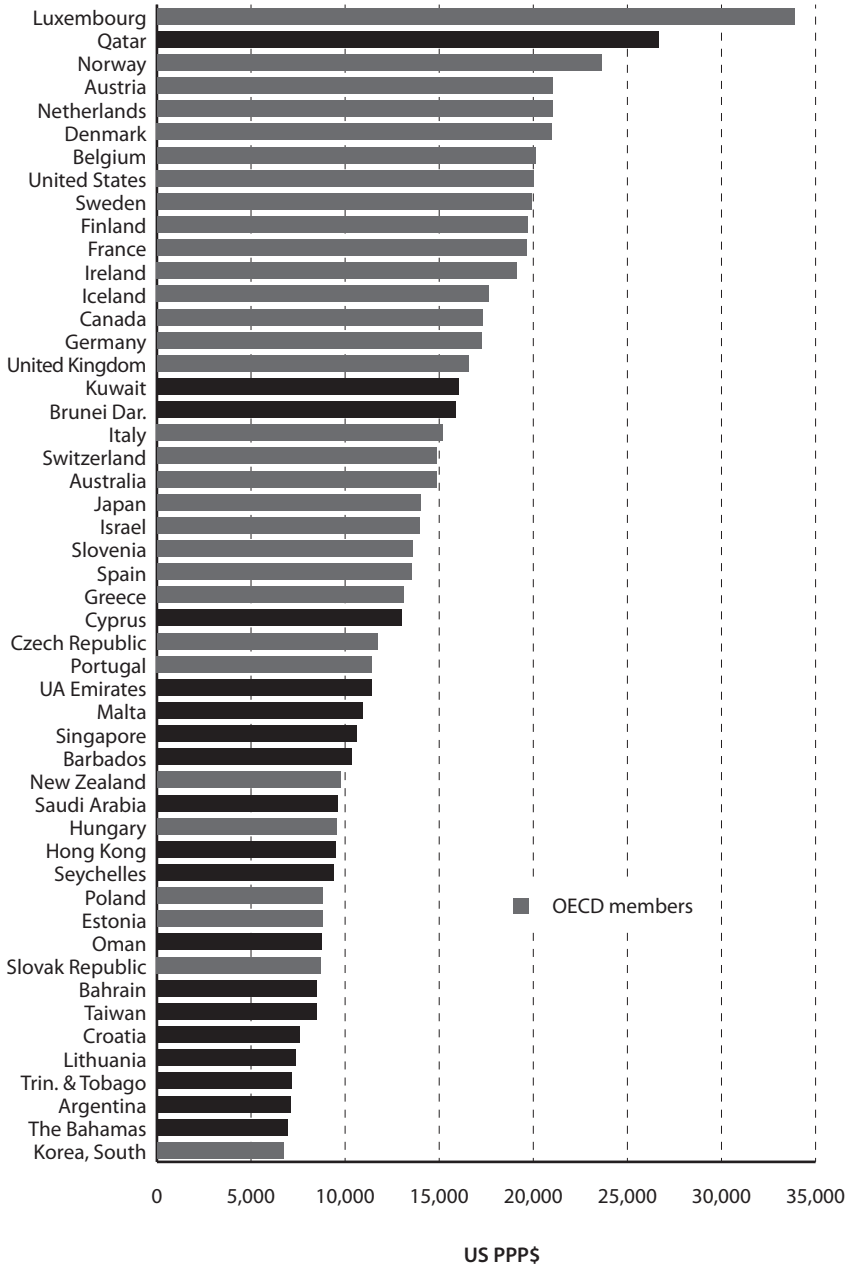
Size and composition of government spending

The IMF World Economic Outlook 2012 Database (IMF, 2012) provides the basis for Figures 3.1 to 3.5, which provide measures of public sector size and spending. Figure 3.1 ranks government expenditures per capita in US purchasing power parity dollars (US PPP$) for the 50 highest-spending countries, while figure 3.2 does so for the 50 lowest-spending countries. This measure ranks countries based on government spending per person, adjusted for price differences and exchange rates. While the measure is useful, it is limited by the fact that it is in absolute dollars per person and is not relative to the size of the economy.

Government spending per capita in 2011 (in US PPP$) ranged from $101 to $33,878, with an average of $5,333. For the 50 highest-spending countries, spending ranged from a low of $6,744 per capita for South Korea to a high of $33,878 for Luxembourg.[5] The high spenders are invariably marked by membership in the OECD. On this list, the United States ranks eighth, Canada

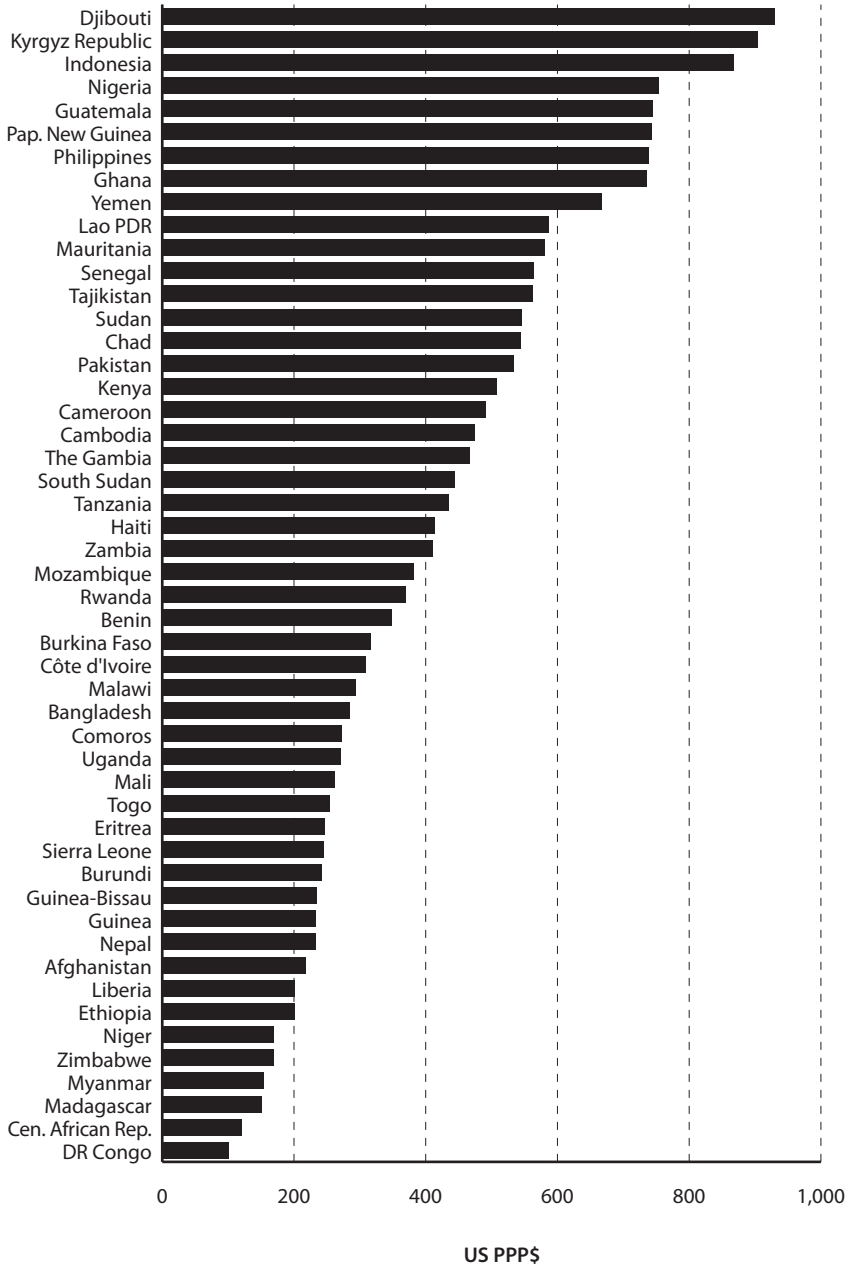
5 Luxembourg is unique in these types of per capita calculations given that a large proportion of its workforce lives in other countries.

Figure 3.1: Government expenditures per capita, 50 highest-spending countries, 2011 (US PPP$)



Source: IMF, 2012.

Figure 3.2: Government expenditures per capita, 50 lowest-spending countries, 2011 (US PPP$)



Source: IMF, 2012.

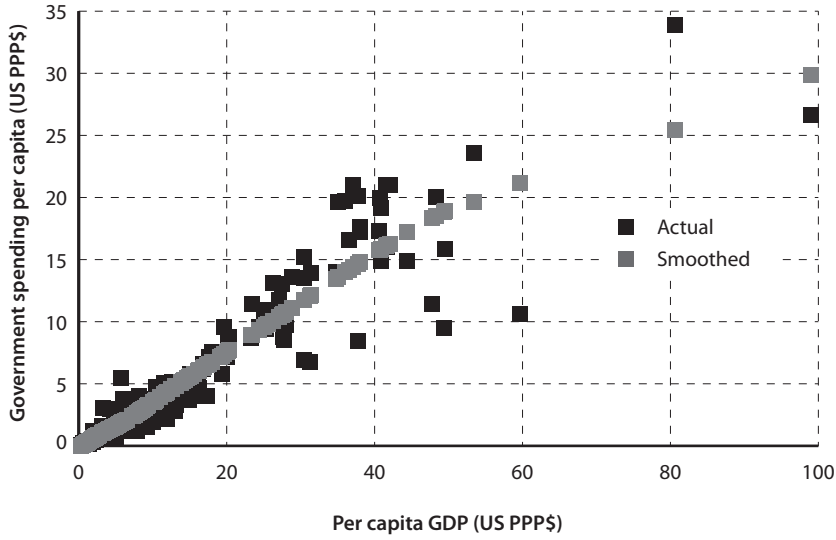
14th, and the United Kingdom 16th. For the 50 lowest-spending countries (figure 3.2), spending per capita ranges from a low of $101 for the Democratic Republic of the Congo to a high of $929 for Djibouti. For the most part, the low per capita spenders tend to be economically less developed countries, with no members of the OECD among them. Within the top 50 high-spending countries, the expenditure range between the highest- and lowest-spending country is $27,134, while in the bottom 50 countries the range is $828. Among the 50 highest spenders, lowest spender South Korea spends 20 percent of what highest spender Luxembourg spends. Among the 50 lowest spenders, lowest spender Democratic Republic of Congo spends 11 percent of what top spender Djbouti spends.

Figure 3.3 plots per capita government expenditure in 2011 against per capita GDP with both variables in US PPP$. Along with the plot, a visual data smoothing technique known as LOWESS[6] is used to fit a curve that provides an average relationship between per capita government spending and per capita GDP. The figure illustrates that higher levels of government spending can be partially explained by the fact that more developed and higher income countries can simply afford more government spending. The smoothed fitted curve suggests that, on average, every dollar increase in per capita GDP is associated with an increase of about 33 cents in per capita government spending. Another interpretation is that this figure is a potential illustration of Wagner's Law of expanding state activity that relates public sector growth to national output growth. The observation that higher income countries can afford more per capita government spending limits the usefulness of per capita government spending as a measure of public sector size, making government expenditure to GDP a more suitable measure.

Figures 3.4 and 3.5 provide comparisons of government size in terms of expenditure to GDP ratios, which provide a measure of the size of government relative to the economy. The expenditure to GDP ratio is preferable to

6 LOWESS is a non-parametric regression technique, which estimates a line of best fit without assuming a specific functional form and is not as sensitive to the presence of outliers in the data. In fitting LOWESS curves, the crucial decision involves the size of the smoothing parameter or bandwidth over which the locally weighted regressions used in the estimation process are estimated. Larger bandwidths provide greater degrees of smoothing while smaller bandwidths provide more variation in the final smoothed curve. For more on LOWESS, see Cleveland (1979, 1985, and 1993).

Figure 3.3: LOWESS smooth of international per capita government expenditure versus per capita GDP (bandwidth=0.8), in thousands, 2011 (US PPP$)



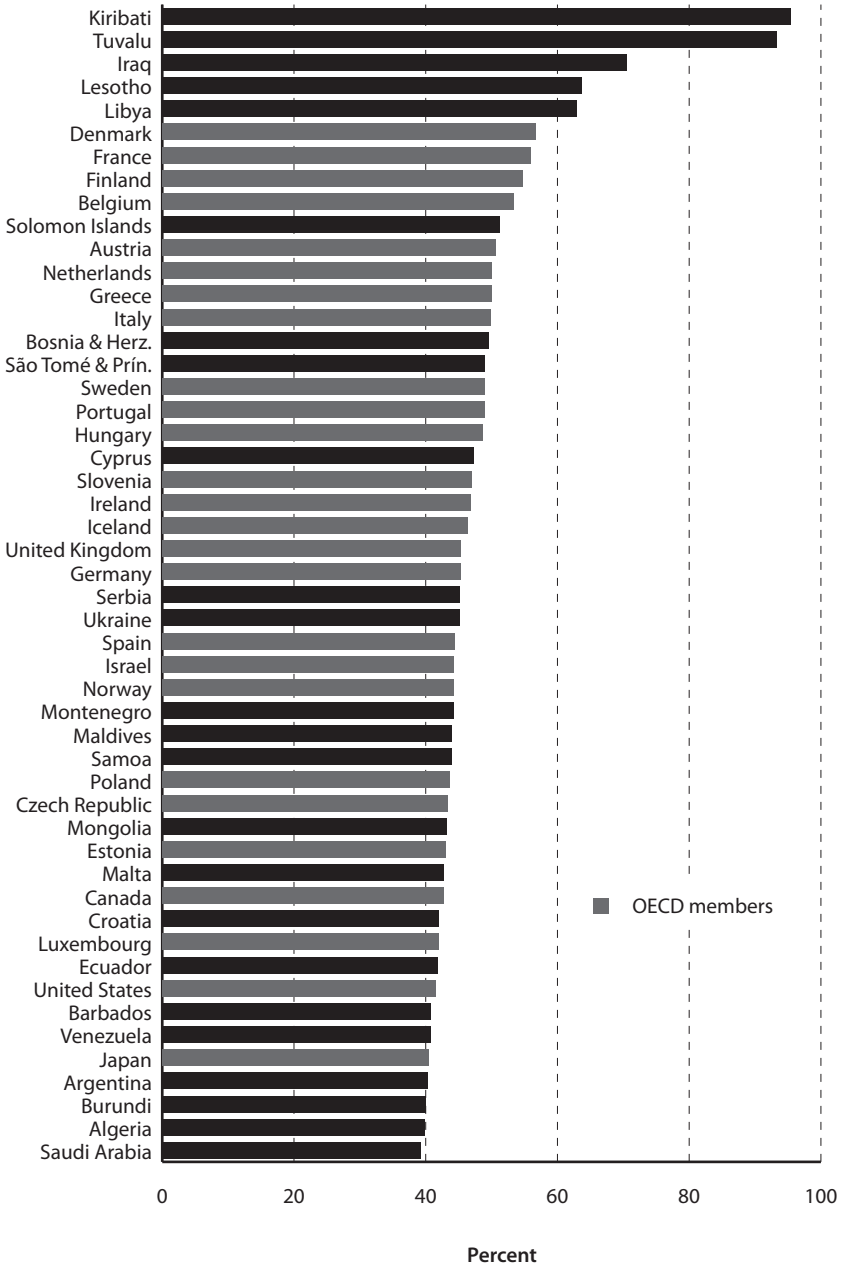
Source: IMF, 2012.

using the government revenue to GDP ratio because governments can run deficits to finance their activities and therefore the revenue to GDP ratio is deficient in reflecting this additional resource capture. Figures 3.4 and 3.5 display the 50 largest and 50 smallest public sectors in terms of total expenditure to GDP ratios. Government expenditure to GDP ratios for the top 50 countries range from a low of approximately 40 percent to a high of 95 percent,[7] while for the bottom 50 the ratios range from approximately 12 percent to approximately 35 percent.

Unlike with the case of per capita government expenditure, there is more overlap between higher and lower income countries across the 50 largest and 50 smallest public sectors. The largest government expenditure to GDP

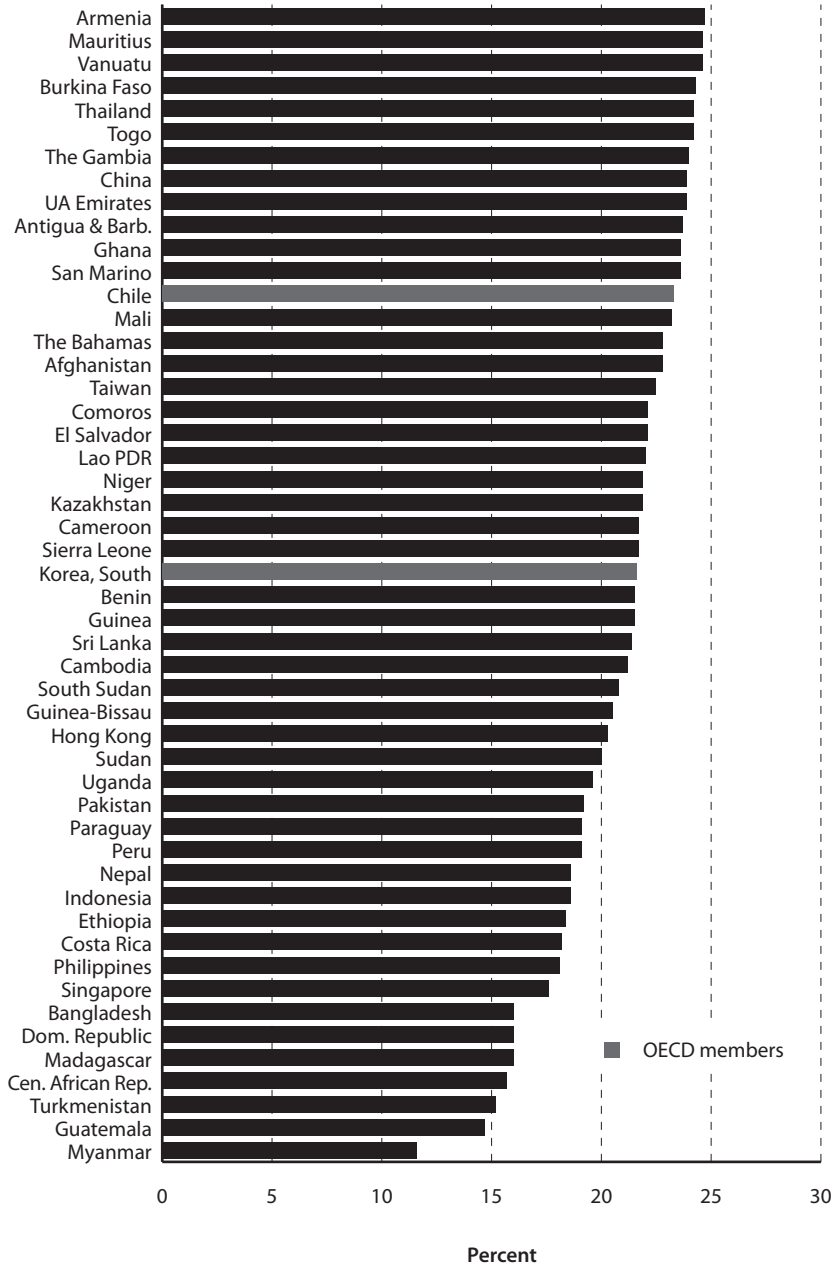
7 The three highest government expenditure to GDP ratios in 2011, according to the IMF data, belong to Kiribati (95%), Tuvalu (93%), and Iraq (71%). Kiribati and Tuvalu are Pacific island nations with limited development that are facing major challenges as a result of climate change and population pressure. Their government expenditure to GDP ratios should be interpreted as outliers.

Figure 3.4: Government expenditures to GDP ratios, 50 highest-spending countries, 2011



Source: IMF, 2012.

Figure 3.5: Government expenditures to GDP ratios, 50 lowest-spending countries, 2011

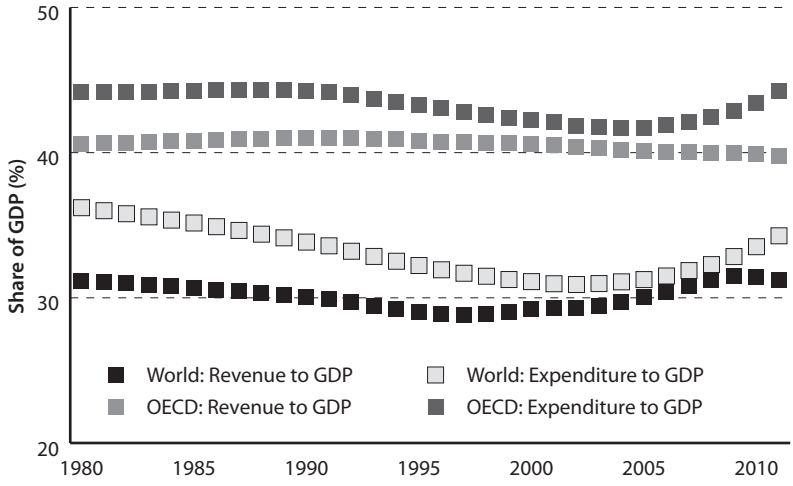


Source: IMF, 2012.

ratios in 2011 include the economies of less developed and highly developed countries. Along with Denmark and France, Lesotho and Libya are among the top countries in the world in terms of government size in relation to GDP. The list of countries with the lowest government size to GDP ratios is dominated by developing or less developed countries, with some notable exceptions being Hong Kong, Taiwan, South Korea, and Singapore, which are economically advanced. OECD membership is more common among the countries with the 50 largest public sectors.

While estimates at a particular point in time are of interest, long-term trends are also of value. Figure 3.6 provides LOWESS smooths of government size for the period of 1980 to 2011 for the world as a whole and for OECD countries, and for variables based on both revenue and expenditure. Whether revenue or expenditure measures are used, public sector size is larger in OECD countries than in the world overall. The OECD countries are collectively more economically developed, with more developed revenue collection mechanisms and with higher per capita incomes, and therefore are able to support larger public sectors.

Figure 3.6: Government as a share of GDP, LOWESS smooths (bandwidth=0.8), 1980-2011



Source: IMF, 2012.

Figure 3.6 also shows that between 1980 and the late 1990s there was a leveling off and then a reversal of the historical trend towards larger government. After growing for much of the twentieth century, public sectors actually declined in size after 1980. In 1980, the world average revenue to GDP ratio was 30 percent and the expenditure to GDP ratio was 36 percent. By 1999, the revenue to GDP ratio for the world had declined to 28 percent, while the expenditure to GDP ratio declined to 31 percent. However, the first decade of the twenty-first century saw a reversal of this trend with new growth in public sector size. While some of this is the result of the 2009 global downturn, the trend appears to have been underway well before this. By 2011, the average government expenditure to GDP ratio for the world had climbed back to 33 percent and the revenue to GDP ratio increased to 31 percent.

Public spending per capita has grown over time. In 1980, per capita government spending in OECD countries was $4,006 (US PPP$), whereas by 2011 it was $14,977. For the world as a whole, the comparable figures for 1980 and 2011 are $2,153 and $5,333.[8] Along with growing per capita government spending, there are some changes in the composition of that spending. The average composition of government spending in OECD countries[9] in 1996 and 2010 is shown in figure 3.7. In both years, social protection, education, and health care accounted for the bulk of government spending. In 1996, these three categories accounted for 57 percent of government spending, while by the year 2010 their share increased to 62 percent. Between 1996 and 2010, there were declines in the share of government spending on general public services and defense.

Government size, spending, performance, and outcomes

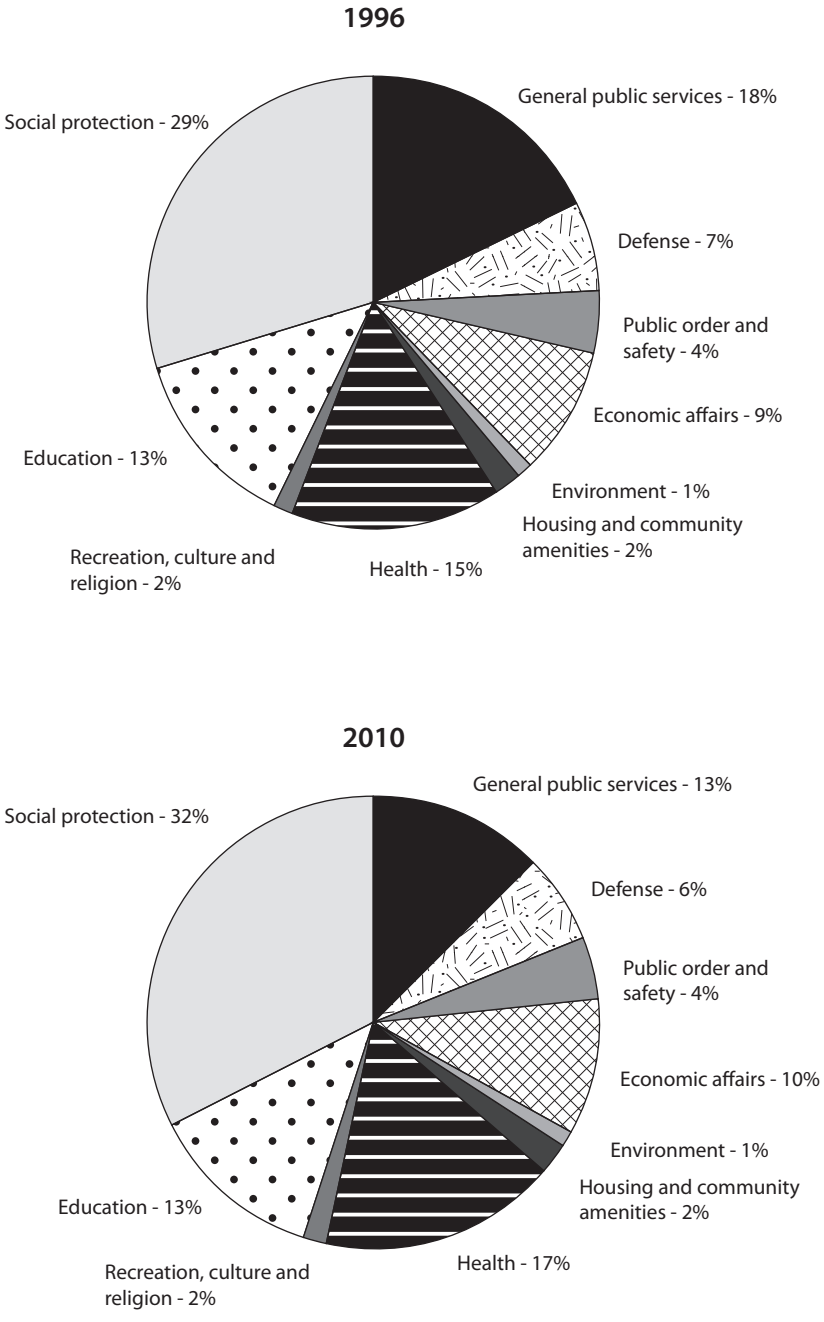
This section looks at some of the outcome and performance indicators that are available for OECD countries[10] and provides some simple comparisons to

8 These figures are calculated using the IMF WEO 2012 database (IMF, 2012). Coverage is not complete but expands over time. For 1980, government spending data is available for 12 OECD countries and 25 countries in the world overall. For 2011, there is data for all 34 OECD countries and 182 countries overall.

9 The coverage of the OECD statistics varies across the years. In 1996, there are 22 countries with detailed expenditure data by category, while in 2010 there is data for 28 countries.

10 The OECD countries alone are used in this analysis because of the ready availability of a large number of indicators, and because using world data would mix too great a range of developed

Figure 3.7: Composition of spending in OECD countries, 1996 and 2010



Source: OECD, 2013a.

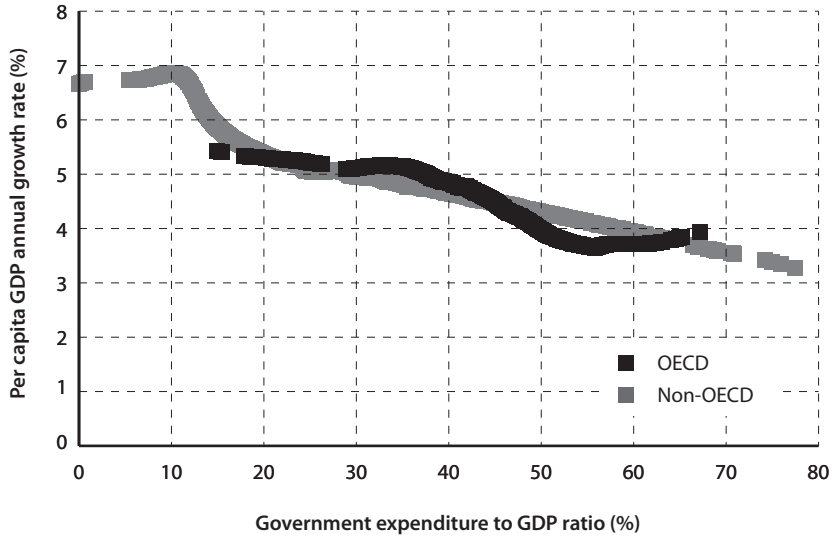
government size in an effort to see the relationships between public sector size, outcomes, and general performance. For example, in figure 3.8, the annual growth rates of per capita GDP (in US PPP$) are plotted against government expenditure to GDP ratios, along with a LOWESS smooth, using data for 1980 to 2011. The results show an inverse relationship—higher economic growth accompanied by smaller public sector size—of similar magnitude for both non-OECD and OECD countries. While this relationship does not control for any other confounding factors, it provides a stark and simple illustration that more government expenditure in relation to the size of the economy does not appear to be accompanied by higher rates of per capita GDP growth. When broken down by public sector size ranges, the average annual per capita GDP (in US PPP$) growth rates are 5.2 percent for expenditure to GDP ratios below 30 percent, compared to 4.8 percent in the 30 to 50 percent range and 4.4 percent for ratios above 50 percent.

Any society will also have outcomes that can be measured by assorted indicators, which can then be examined in conjunction with the level of public sector spending to gauge whether there is a positive correlation between public expenditure and these outcomes. For example, does a larger public sector lead to more public goods or positive public and social outcomes? Does a larger public sector lead to better health or lower crime rates? A quick overview of public sector size compared to health, education, and social outcomes suggests that the relationships are not simple.

Figure 3.9 presents a ranking of average life expectancy at birth for OECD countries for the period of 2000 to 2011. While all of the OECD countries are characterized by high life expectancies, even among these economically advanced countries there is a substantial range in average annual life expectancies at birth, ranging from a low of 72.6 years for Estonia to a high of 82.2 for Japan. Figures 3.10 and 3.11 display the average real per capita government expenditure (in US PPP$) and government expenditures as a share of GDP for the period of 2000 to 2011. Average per capita government spending ranges from a low of $2,862 for Mexico to a high of $29,280 for

and developing countries. For some of the countries, averages are based on the observations available for the period of 2000 to 2011. The data for Chile in the OECD figures has some gaps with respect to government expenditure and has been supplemented with data from the IMF (2012) where possible (figures 3.9 to 3.11). For the LOWESS smooths in figures 3.12 to 3.19, OECD data was used exclusively and Chile was not included in the analysis.

Figure 3.8: LOWESS smooths of per capita GDP (US PPP$) growth versus government expenditure to GDP ratio (bandwidth=0.8), 1980-2011



Source: IMF, 2012.

Luxembourg. Meanwhile, the country with the largest public sector relative to GDP is Denmark (54.3 percent) and the smallest is Mexico (21.1 percent).

Japan ranks first in terms of life expectancy but ranks 16th out of 33 for per capita government spending and eighth out of 33 for government expenditure as a share of GDP.[11] In figure 3.12, the relationship between life expectancy and government size is expressed in terms of a relationship between life expectancy at birth and the ratio of government expenditure to GDP.[12] Here, the LOWESS smooth indicates more of an overall positive

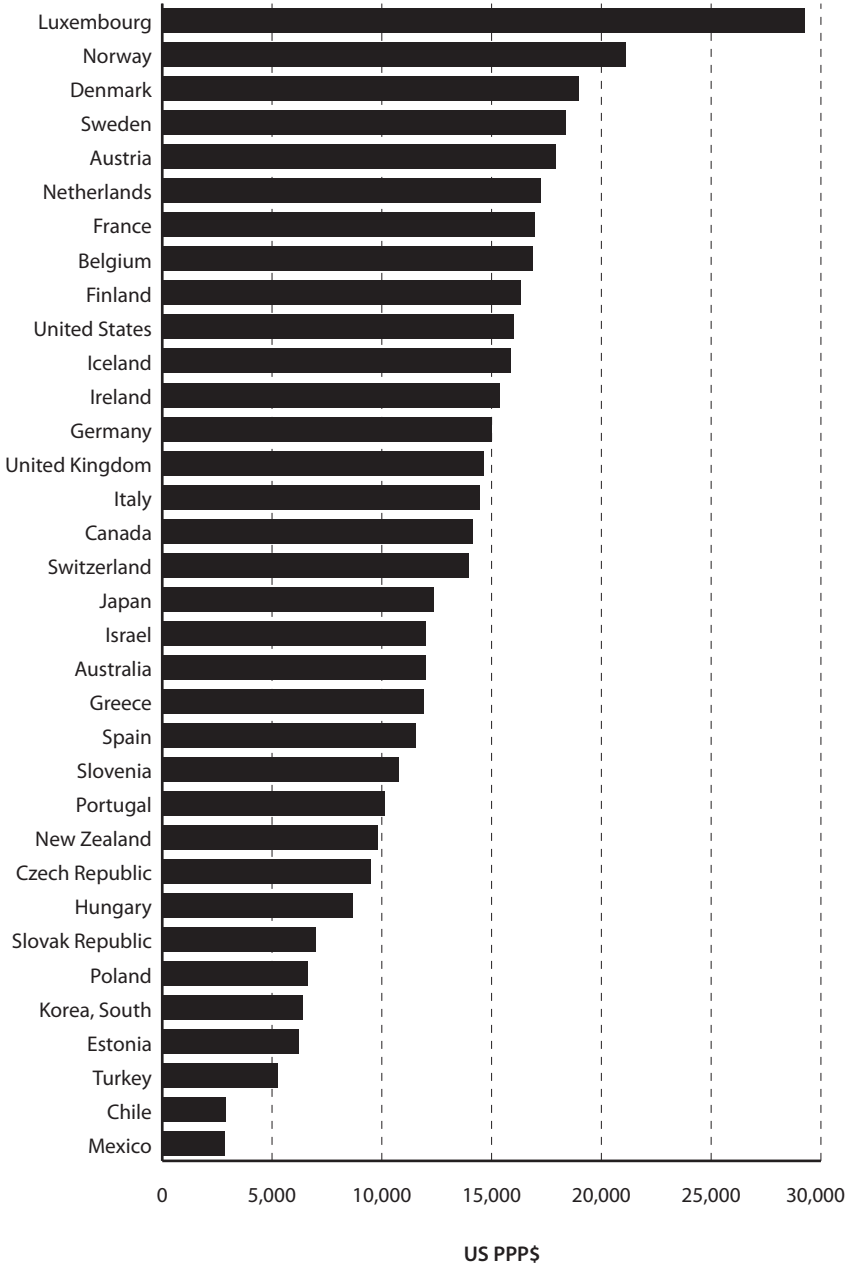
11 It should be noted that using health status measures such as life expectancy and infant mortality is by no means uncontroversial. Accord to Atlas (2011), both life expectancy and infant mortality are more complicated as measures than one might assume. For example, wide variations in life expectancy can exist within population subgroups. As well, calculation methods of life expectancy estimates can vary across countries.

12 The health economics literature has also more explicitly documented the relationship between health care spending in general and health outcomes. Using panel data and a fixed effects model for 15 members of the European Union between 1980 and 1995, Nixon and Ulmann (2006) find

Figure 3.9: Average annual life expectancy at birth in OECD countries, 2000-2011

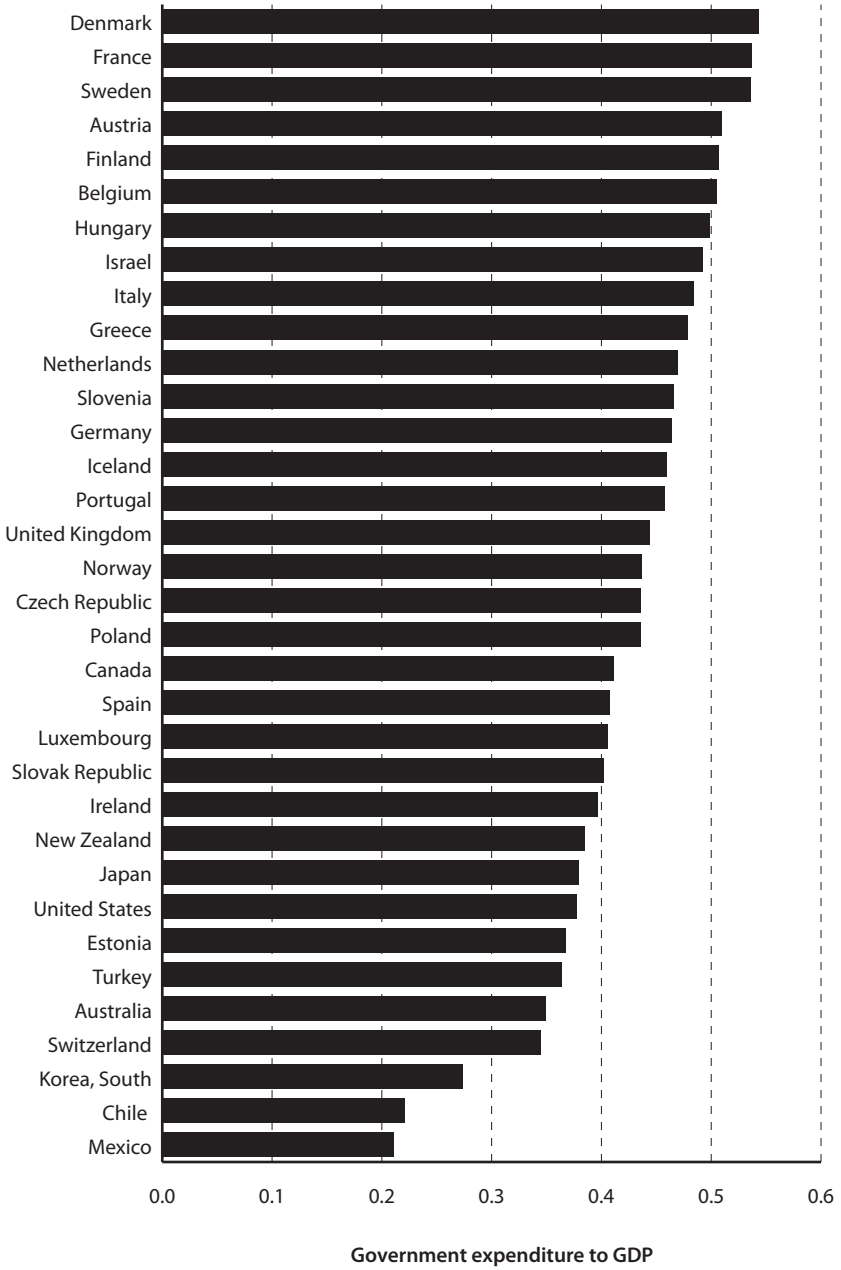
Source: OECD, 2013a.

Figure 3.10: Average annual per capita government expenditure in OECD countries, 2000-2011 (US PPP$)



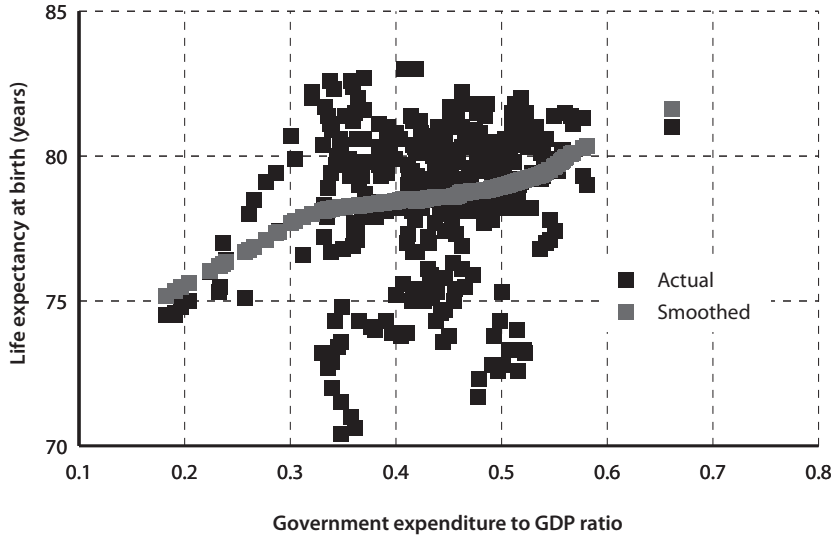
Source: OECD, 2013a.

Figure 3.11: Average annual government expenditure to GDP ratios in OECD countries, 2000-2011



Source: OECD, 2013a.

Figure 3.12: LOWESS smooth of life expectancy at birth versus government expenditure to GDP ratio in OECD countries (bandwidth=0.8), 2000-2011



Source: OECD, 2013a.

relationship between public sector size and life expectancy, but most of the gains are again up front, with an average of three additional years of life expectancy at birth gained as the government expenditure to GDP ratio rises from 0.2 to 0.3—that is, as the public sector increases from 20 to 30 percent of GDP. One would expect that there are benefits from public spending and public sector size on life expectancy and health in general as the public sector expands and provides public infrastructure. However, as the public sector grows from 30 to 50 percent of GDP, only another year of life expectancy, on average, is associated with this substantial increase, though an additional year is obtained when the public sector expands beyond 50 percent. Overall, this

that increases in health care spending are significantly linked to improvements in infant mortality but not to life expectancy. They also provide an excellent overview of studies in this area. Joumard et al. (2008) estimate models and conclude that a 10 percent increase in total health spending would only increase life expectancy by about three to four months.

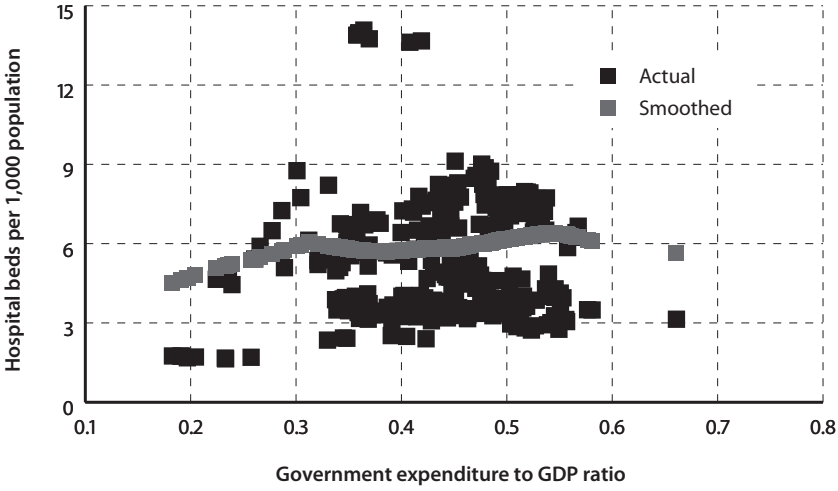
suggests relatively slower growing health benefits from increased public sector size and spending beyond a public sector size of approximately 30 percent.

Another way of looking at the impact of the size of the public sector and public sector spending is their association with the provision of specific public goods. Most countries have health care systems with substantial roles for the public sector, either in terms of provision or financing. Public sector health expenditure as a share of GDP for 17 OECD countries ranges from a high of 9.8 percent for Denmark to a low of 5.9 percent for Australia (CIHI, 2011: 9). Naturally, the expectation would be that more government spending in general should be associated with increases in health care resources. Yet, as figure 3.13 illustrates, the relationship is not strictly linear. The relationship between government spending as a share of GDP and hospital beds per 1,000 of population is positive up to a ratio of 30 percent and then is essentially flat.[13] Of course, it can be argued that the number of hospital beds is not a very broad indicator of health care resources available, so figure 3.14 plots a LOWESS smooth between total health spending (both public and private) per capita (in US PPP$) and the government expenditure to GDP ratio.[14] While a larger public sector is associated with more total health spending per capita, most of the increase in per capita health spending is for a public sector size ranging from 20 to 35 percent of GDP.

Outcomes may also be affected by the composition of government spending, as opposed to the absolute per capita amount or the size of government spending in relation to GDP. To this effect, figures 3.15 and 3.16 show LOWESS smooths of the relationship between life expectancy and infant mortality rates and the share of total government expenditure devoted to health care spending. In the case of life expectancy at birth over the period of 2000 to 2011, there is indeed a positive relationship between the share of total government spending devoted to health and life expectancy. However, this relationships peaks at about 15 percent and then there is actually a small decline. Similarly, the infant mortality rate declines as health spending rises until it reaches about 15 percent of government spending and then the infant

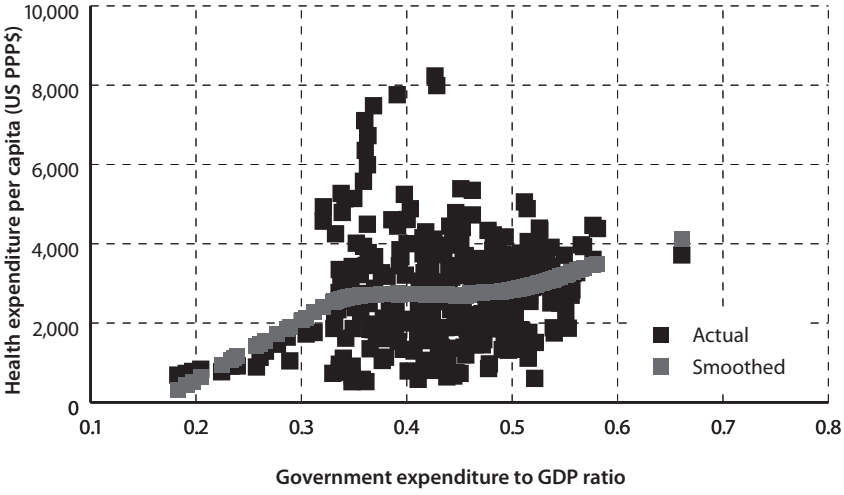
13 It should be noted that these OECD figures are for total hospital beds and not public health care sector hospital beds. These beds include those for general hospitals, as well as mental health, substance abuse, and other specialty hospitals, and include both occupied and unoccupied beds.
14 Again, total health dollars spent per capita is an imperfect measure of health care resources available as the figure says nothing about where or how the money is spent.

Figure 3.13: LOWESS smooth of hospital beds per 1,000 population versus government expenditure to GDP ratio in OECD countries (bandwidth=0.8), 2000-2011



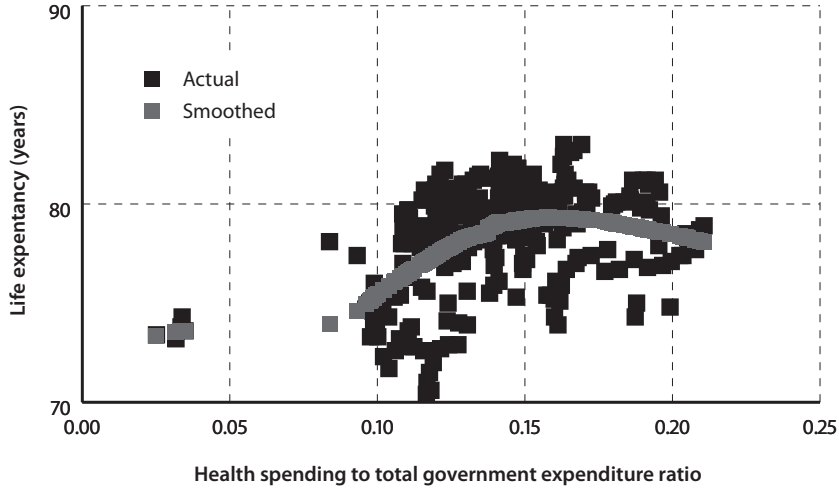
Source: OECD, 2013a.

Figure 3.14: LOWESS smooth of total health expenditure per capita (US PPP$) versus government expenditure to GDP ratio in OECD countries (bandwidth=0.8), 2000-2011



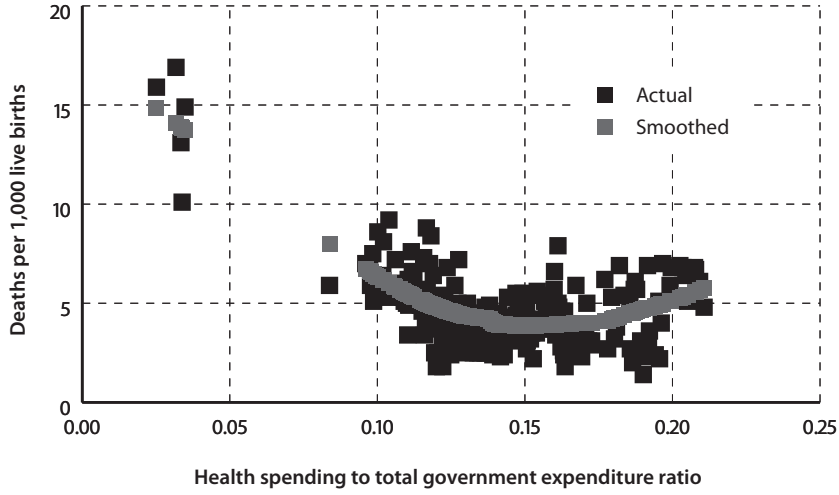
Source: OECD, 2013a.

Figure 3.15: LOWESS smooth of life expectancy versus health spending as a share of total government expenditure in OECD countries (bandwidth=0.8), 2000-2011



Source: OECD, 2013a.

Figure 3.16: LOWESS smooth of infant mortality rate versus health spending as a share of total government expenditure in OECD countries (bandwidth=0.8), 2000-2011



Source: OECD, 2013a.

mortality rate stops decreasing. Again, the implication is that much of the gains in life expectancy and reduced infant mortality as the health share of government spending rises occur during the early phase of the relationship.

In the case of social indicators, a larger public sector is also not necessarily associated with less crime or a larger proportion of university-educated population. Figure 3.17 plots the relationship between the homicide rate[15] and the government expenditure to GDP ratio. The curve shows the homicide rate declining as the government expenditure to GDP ratio rises. However, most of the decline in homicide rates occurs in the early part of the relationship, which is followed by a flattening curve that suggests little impact on homicide rates above a certain level of public sector size. Homicide rates decline rapidly as the public sector grows from 20 to 30 percent of GDP and then diminishes much more slowly up to 40 percent, after which the relationship flattens out completely.

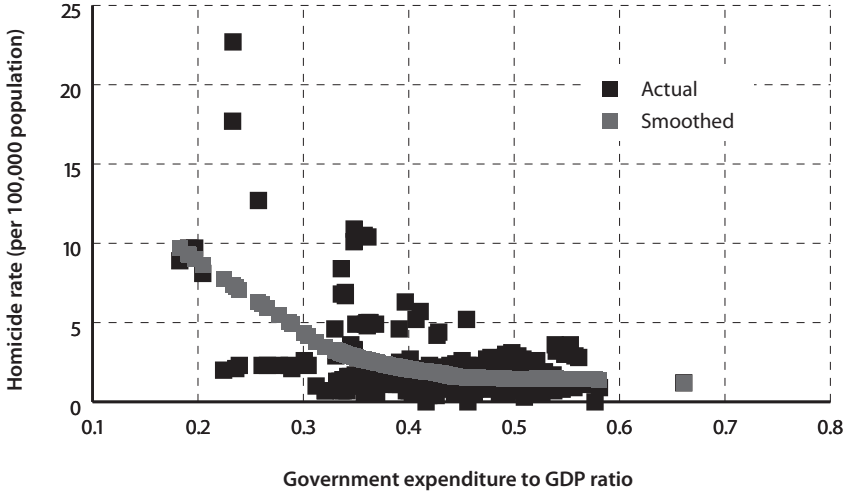
Figure 3.18 plots the relationship between burglaries[16] and the government expenditure to GDP ratio. The relationship between the burglary rate and the government expenditure to GDP ratio rises steadily, but it is unclear as to why that may be. The positive association between government spending and burglaries seems counterintuitive. There may be a relationship between a larger public sector and economic development that is associated with a larger middle class, more property ownership, and more opportunity for theft, as well as more resources for reporting those thefts.

Again, it should be stressed that these relationships are correlations and do not imply that either more government spending or a large public sector causes burglaries or that more public spending reduces the homicide rate. One would need to control for confounding factors such as expenditure composition or societal differences to better answer what the complete

15 Intentional homicide is defined as unlawful death purposefully inflicted on a person by another person (see United Nations, 2012).

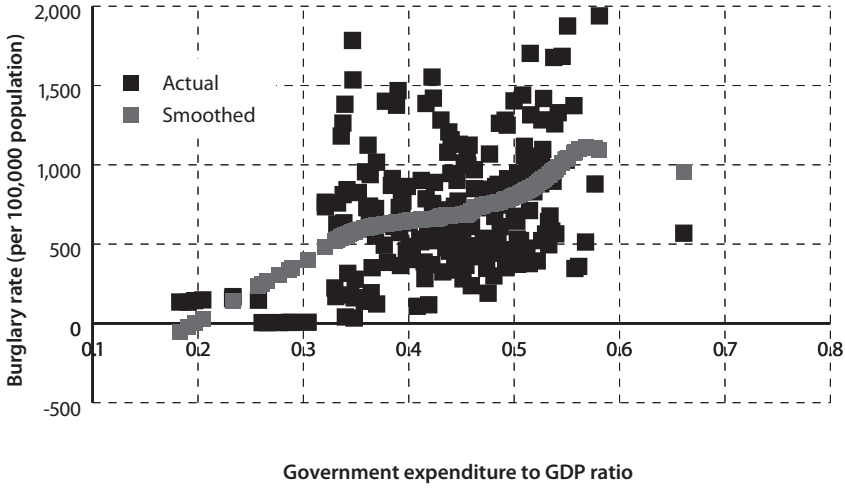
16 The burglary rate is defined as the number of police-recorded breaking and entering offences at the national level per 100,000 population. According to the definition provided by the data source, the United Nations Office on Drugs and Crime, "burglary" means gaining unauthorized access to a part of a building/dwelling or other premises; including by use of force; with the intent to steal goods (breaking and entering). "Burglary" should include, where possible, theft from a house; apartment or other dwelling place; factory; shop or office; from a military establishment; or by using false keys. It should exclude theft from a car; from a container; from a vending machine; from a parking meter and from fenced meadow/compound (see UNODC, 2013).

Figure 3.17: LOWESS smooth of homicide rates versus government expenditure to GDP ratio in OECD countries (bandwidth=0.8), 2000-2011



Sources: OECD, 2013a, and United Nations, 2012.

Figure 3.18: LOWESS smooth of burglary rates versus government expenditure to GDP ratio in OECD countries (bandwidth=0.8), 2000-2011



Sources: OECD, 2013a, and UNODC, 2013.

causative relationships might be. Moreover, there is the underlying consideration of how these crimes are reported across different jurisdictions and the resources available for crime reporting. Nevertheless, the main point stands: a larger public sector is not always associated with improved outcomes with respect to crime indicators.

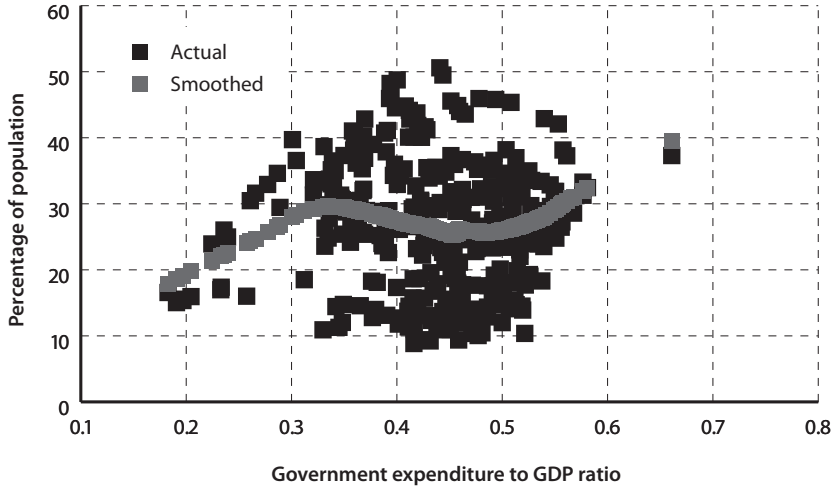
Figure 3.19 examines the relationship between the proportion of the population aged 25 to 64 with tertiary (post-secondary) education and the government expenditure to GDP ratio. Again, the correlation suggests that tertiary education rates increase as the government expenditure to GDP ratio rises, but up to a point, after which results are more varied. Indeed, tertiary education rates actually decline after the government expenditure to GDP ratio reaches 30 percent and then begin to rise again after it reaches 50 percent.

Finally, figure 3.20 plots the relationship between student test score results and the government expenditure to GDP ratio. The proportion of 15-year-old students reporting a score of level four or higher on the OECD's Programme for International Student Assessment (PISA)[17] in 2006 and 2009 is plotted against the government size variable for those years. The LOWESS smooth shows an upward sloping curve, but not a particularly steep relationship. At a government expenditure to GDP ratio of 20 percent, about 25 percent of students are at level four or higher, while at 50 percent of GDP, 30 percent of students are at level four or higher.

It should be stressed again that these figures illustrate average relationships between public sector size and economic growth, health, social, and education outcomes without controlling for other variables and, at best, represent broad correlations. Their contribution illustrates that a larger public sector is not necessarily always associated with more positive health, social and education outcomes. Indeed, there are often ranges where increased government activity in the form of larger expenditure shares does not result in much change on average in these outcome indicators. In the case of economic growth rates, the relationship is quite clearly a negative one, but confounding factors are not controlled for in the visual LOWESS curve. Further analysis requires regression analysis to attempt to control for these factors. This will be done in the next section for the case of economic performance.

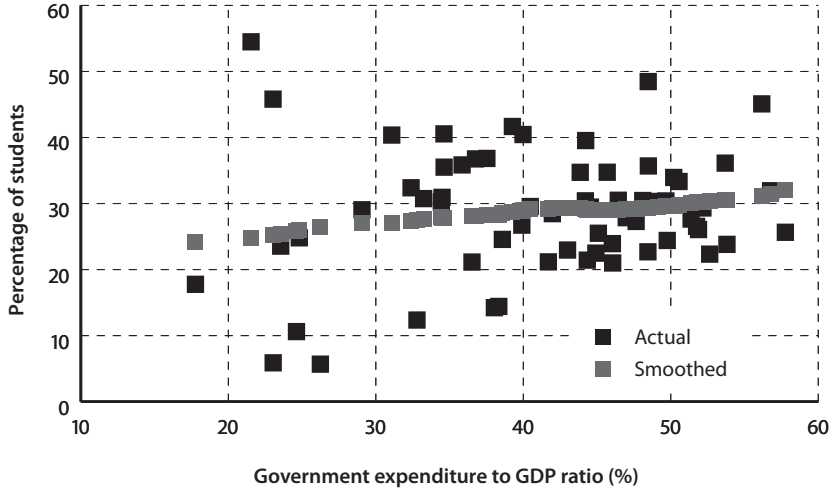
17 There are six reading levels.

Figure 3.19: LOWESS smooth of percentage of population aged 25 to 64 with tertiary education versus government expenditure to GDP ratio in OECD countries (bandwidth=0.8), 2000-2010



Source: OECD, 2013a.

Figure 3.20: LOWESS smooth of percentage of students with reading proficiency scores at level four or higher versus government expenditure to GDP ratio in OECD countries (bandwidth=0.8), 2006 and 2009



Sources: OECD, 2006, 2009, 2013a.

Chapter 4

Government Size and Economic Growth Performance

The relationship between public sector size and economic growth is crucial. Ultimately, an analysis of the effect of public sector size on economic growth needs to control for confounding factors through regression analysis. As Bergh and Henrekson (2011) argue, one of the reasons for the contradictory results in the studies that relate government size to economic growth is the variation in definitions and countries studied. And while limiting the focus to wealthy countries alone may provide more consistent results, it also means that a great deal of data is not analyzed. For this reason, the regression models in this study will be applied to the world data set, but will attempt to control for some of the variation across countries by including regional grouping variables.

In order to estimate the determinants of international economic performance in the early twenty-first century, a pooled time-series cross-section regression[1] model is specified taking the form:

$$(1)\ Y_{it} = f(d_{1it}, d_{2it}, \ldots . d_{nit}) + e_{it}$$

where Y_{it} is an economic performance variable of the i-th country at time t, and d_1 to d_n represent a vector of social, demographic, economic, and policy variables of the i-th country at time t, which are determinants of Y_{it} and e_{it} is an error term. The economic performance variable used as the dependent variable is the growth rate of per capita GDP (measured in US PPP$).

1 The pooled regression is preferable to single country estimates because pooling allows for a larger sample and more degrees of freedom.

The key independent variable designed to capture the effects of public sector size is government expenditure as a share of GDP. Population is included as an independent variable to capture any effects of population size on economic growth rates. As well, per capita GDP lagged one year is included to allow for some of the differences in economic development across countries as captured by the level of per capita income. The net debt to GDP ratio is also included, given the relationship between net debt and economic performance that has been highlighted recently by the Reinhart-Rogoff debate on the relationship between debt and economic growth.[2] In addition, a time trend variable is included to capture the effects of trends in growth over time, independent of the other variables.

The effects of institutional determinants on economic growth are controlled for with variables for governance and economic freedom.[3] The governance index variable was obtained from the 2012 World Governance indicators and is an annual average of the scores for the five governance indicators available for each country: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, and control of corruption.[4] The economic freedom index was obtained from the Fraser Institute Index of Economic Freedom and is for each of the years from 2000 to 2010.

The main data source for the economic, government expenditure, and population variables is the IMF World Economic Outlook Database 2012 (IMF, 2012), which covers 186 countries. However, there are some gaps in the IMF data for certain countries, as well as some gaps for the governance and economic freedom indicators. This results in differing sample sizes for regression analysis depending on the variables used in the specification.[5]

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2 Reinhart and Rogoff (2010) argue that the relationship between government debt and real GDP growth is weak for debt to GDP ratios below 90 percent, with a greater impact on growth above 90 percent. This result has been critiqued by Herndon et. al. (2013).

3 The use of an economic freedom index in regressions for the determinants of economic growth rates has precedents in the literature. For examples, see Justesen (2008), Bjornskov and Foss (2008), Nystrom (2008), and Heckelman and Powell (2010).

4 See World Bank Group (2013a). Where there were countries with scores for fewer than the five indicators, the average was taken for the available indicators. This variable is an annual average available for the years 1996, 1998, 2000, and 2002, and then annually until 2011 for each country.

5 There are 42 countries out of 186 with some missing observations for one or more variables over the period of 2000 to 2011. These include Afghanistan, Angola, Antigua and Barbuda,

The variables are presented in table 4.1 and the results presented in table 4.2.[6] The results estimate the determinants of the rate of economic growth as a function of public sector size and public sector size squared—in essence, an estimate of a Scully Curve relationship. An effort is also made to control for the effects of the level of economic development on the determinants of the economic growth rate by including the one year lagged value of per capita GDP. Two specifications are estimated: a narrow one (Equation I) and one with a broader set of variables (Equation II). Along with population, net debt to GDP, governance, economic freedom, and time, Equation II controls for regional effects and whether or not a country is an OECD member—a further effort to control for differences between richer countries and less developed ones.

The results in table 4.2 suggest that the relationship between public sector size and per capita GDP growth is negative when a narrow specification is used. Each percentage point increase in the government expenditure to GDP ratio results in a seven-tenths of one percentage point decrease in the growth rate. This result, however, does not control for confounding factors.

When a broader variable specification is used, a Scully Curve emerges with statistically significant coefficients.[7] The Scully Curve estimated in

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Armenia, Bhutan, Brunei, Burundi, Central African Republic, Comorros, Croatia, Democratic Republic of the Congo, Dominica, Egypt, Eritrea, Macedonia, Grenada, Iraq, Kiribati, Kosovo, Laos, Liberia, Maldives, Mauritania, Montenegro, Myanmar, Nicaragua, Papua New Guinea, Samoa, San Marino, Sao Tome and Principe, Serbia, Seychelles, Sierra Leone, Solomon Islands, South Sudan, St. Kitts and Nevis, St. Vincent and the Grenadines, Sudan, Tonga, Tuvalu, Vanuatu, and Zimbabwe.

6 The estimation package is STATA 11 and testing was conducted on the data. Normality plots of the key variables found population, real per capita GDP, and per capita government spending less likely to be normally distributed, while the other variables were more normally distributed. As well, other tests were conducted on the data with respect to stationarity and functional form. The regressions are pooled time series cross sections using Generalized Least Squares (GLS) as the estimation technique. GLS is used rather than Ordinary Least Squares when there is heteroskedasticity or a degree of correlation between the observations. The GLS estimates assume heteroskedastic panels and panel specific first order autocorrelation and are also weighted regressions with total GDP (in US PPP$) as a weighting variable. This was done to provide a greater weight in the regression to countries with larger GDP, reflecting their economic size. All significances are reported at the five or 10 percent level unless otherwise stated.

7 Sufficient data existed for the variables in this narrow variable specification that allowed for the inclusion of 183 out of 186 countries. The three omitted countries are Kosovo, Mauretania, and San Marino. For the broader variable specification, the span of the data and variables was

Table 4.1: Regression variable definitions and means, 2000-2011

	Mean	Observations	Minimum	Maximum
GDP in US PPP$ (millions)	323.935	2,203	0.025	15,075.670
Dependent variables				
Growth rate of per capita GDP in US PPP$ (%)*	5.031	2,157	-58.408	54.891
Independent variables				
Government expenditure to GDP ratio (%)	31.411	2,160	5.426	134.821
Population (millions)	35.487	2,171	0.010	1347.350
Per capita GDP in US PPP$	11,976.840	2,170	213.200	98,959.810
Net debt to GDP ratio (%)**	44.860	1,159	-196.081	891.197
Governance indicator	-0.057	2,035	-2.195	1.989
Economic Freedom Index	6.728	1,342	2.882	9.048
Economic regions fixed effects:				
Europe	0.238	2,220	0	1
Asia	0.157	2,220	0	1
Pacific	0.059	2,220	0	1
Australia & New Zealand	0.011	2,220	0	1
North America	0.016	2,220	0	1
South America	0.059	2,220	0	1
Central America & Caribbean	0.103	2,220	0	1
Middle East	0.076	2,220	0	1
Africa	0.281	2,220	0	1
OECD member	0.184	2,220	0	1
Year	2005.500	2220	2000	2011

*The minimum and maximum growth rates are both for Zimbabwe for the years 2004 and 2005.

**Libya had the lowest net debt to GDP ratio at -196.081 in 2011. Liberia had the highest at 891.197 in 2003.

Sources: See Appendix 2.

Table 4.2: Regression results for determinants of per capita GDP growth

Dependent variable	Per capita GDP growth rate		
	I (Narrow)	**II (Broad)**	**III (Broad & Outlier adjusted)**
Independent variables			
Government expenditure to GDP ratio	**-0.0767**	**0.2341**	**0.1993**
Government expenditure to GDP ratio squared	-0.0001	**-0.0045**	**-0.0038**
Net debt to GDP ratio		**-0.0107**	**-0.0108**
Population		**0.0071**	**0.0069**
Per capita GDP lagged one year	**-0.0001**	**-0.0002**	**-0.0002**
Governance indicator		**1.2045**	**1.0585**
Economic Freedom Index		***0.5757***	**0.7025**
Europe		**1.8530**	**1.7237**
Asia		0.5828	0.7256
Pacific		**-2.5308**	**-2.3444**
Australia & New Zealand		-0.3223	-0.1991
North America		0.1356	0.1407
South America		0.2741	0.3411
Central America & Caribbean		0.4299	-0.3218
Middle East		**2.0857**	**2.2305**
OECD member		0.6579	0.3620
Year	-0.0335	**-0.1008**	**-0.0966**
Constant	**9.5426**	2.3289	1.5862
n	2126	683	630
Countries	182	70	70
Wald chi2(14)	179.42	158.85	164.72
Square of correlation coefficient: actual vs fitted	0.03	0.20	0.19

Estimation technique: Generalized Least Squares

Note: Bold type denotes results significant at the five percent level; bold Italics at the 10 percent level.

Sources: See Appendix 2.

table 4.2 (Equation II) is plotted in figure 4.1 and shows an inverse U-shaped curve that maximizes annual per capita GDP growth at three percent at the government expenditure to GDP ratio of 26 percent.[8] Beyond a government expenditure to GDP ratio of 26 percent, economic growth rates decline. This peak growth public sector size is higher than that estimated by Scully (1991), though it should be noted that the Scully estimate used a tax revenue to GDP variable as a measure of public sector size and was a simple cross section of 103 countries in 1980.[9] Equation III controls for outliers in the growth rates and restricts the per capita GDP growth rates to between plus and minus 10 percent. Its results parallel those in Equation II and it also yields a Scully Curve that maximizes economic growth at a government expenditure to GDP ratio of 26 percent.

With respect to other variables affecting economic growth, the governance and economic freedom variables both positively and significantly affect per capita growth rates. Good governance and economic freedom together are potent forces for economic growth. In addition, increases in the net debt to GDP ratio have a negative and significant effect on the growth of per capita GDP with a one percent increase in the net debt to GDP ratio associated with a reduction in per capita GDP growth of one-tenth of one percent.

Population has a positive impact on growth rates after controlling for all other variables, with each additional million persons of population associated with a one-tenth of one percent higher growth rate. In addition, the coefficient on lagged per capita GDP is negative and significant, suggesting

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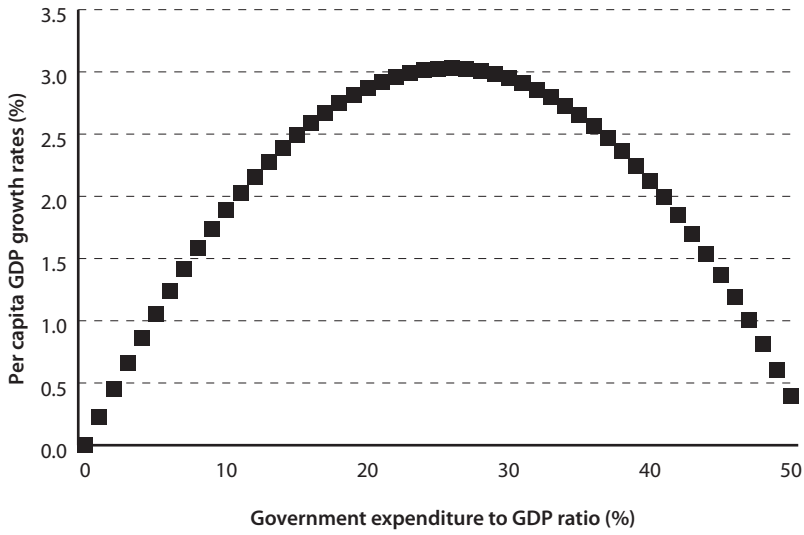
such that only 70 countries were included in the regression: Albania, Algeria, Australia, Austria, Bahrain, Belgium, Belize, Bolivia, Brazil, Bulgaria, Cameroon, Canada, Chile, Columbia, Costa Rica, Denmark, Dominican Republic, Egypt, Estonia, Fiji, Finland, France, Germany, Ghana, Greece, Guyana, Hungary, Iceland, Ireland, Iran, Israel, Italy, Japan, Jordan, Kenya, South Korea, Latvia, Lithuania, Malawi, Mali, Mauritius, Mexico, Morocco, Nepal, the Netherlands, New Zealand, Niger, Nigeria, Norway, Pakistan, Panama, Peru, Poland, Portugal, Democratic Republic of Congo, Sierra Leone, South Africa, Spain, Sweden, Switzerland, Syria, the Bahamas, Trinidad and Tobago, Turkey, Ukraine, United Arab Emirates, the United Kingdom, United States, Uruguay, and Zambia.

8 The regression was also run using the growth rate of per capita GDP adjusted for inflation (real per capita GDP growth) and restricted to growth rates between plus and minus 10 percent. The results were very similar to those reported in table 4.2 (Equations II and III) and yielded a Scully Curve with maximum growth occurring at a government expenditure to GDP ratio of 29 percent.

9 The growth rate for each country in Scully (1991) was an annual growth estimate over the period of 1960 to 1980.

Figure 4.1: Estimated Scully Curve from table 4.2, Equation II



that, all other things given, over the period of this study higher per capita GDP countries had lower growth rates. As well, the negative and significant coefficient on the year variable shows a decline in economic growth over time. This is to be expected given the impact of the 2008-2009 recession.[10]

Finally, the regional variables in Equation II should have their coefficients interpreted with respect to the omitted region, Africa. The estimates show that, relative to Africa, growth rates were significantly higher in Europe and the Middle East and not significantly different in other regions of the world, except the Pacific. Relative to Africa, the Pacific region saw significantly lower rates of per capita GDP growth. When membership in the OECD is controlled for, being a member of the OECD results in higher economic growth rates relative to non-OECD members, but the result is not statistically significant.

After controlling for the effect of confounding variables, public sector size remains a potent long-term determinant of economic growth. For

10 The models were also run for the 2000 to 2008 period to omit the effects of the 2009 recession and yielded similar results.

example, based on the coefficients in Equation II, a government expenditure to GDP ratio of 30 percent is associated with a per capita GDP growth rate of just under three percent, while a ratio of 40 percent is associated with a growth rate of 2.1 percent. All other things given, over the course of a decade, an economy with a public sector size of 30 percent could see its per capita GDP (in US PPP$) grow by over one-third, while an economy with a public sector size of 40 percent would see smaller per capita GDP gains of only one-fifth.

Chapter 5

Measuring Public Sector Efficiency

This section presents estimates of public sector performance and efficiency for 34 OECD countries using data from the OECD to compute and rank a set of outcome indicators and then combine them with government size data to create an index of efficiency. The methodology is based on approaches used in other studies,[1] all of which assess the efficiency of the public sector by first estimating indexes of outcome and then assessing efficiency by some measure of cost per outcome. The results developed in this study will be scored and ranked using the well-established MinMax method,[2] which is used to assign relative scores on a ranking from 0 to 10. All such approaches require assumptions regarding the categories to be used for comparison, as well as the weighting to be used for those categories. Furthermore, all such comparisons are ultimately dependent on the quantity and quality of the international data available and represent an estimate and should be interpreted in this manner.

The data

The indicators are constructed from data for government spending, economic performance, health, and broader societal outcomes covering the period of 2000 to 2012 for 34 OECD countries. For some of these indicators, an average was calculated for the period of 2000 to 2011, while for others the calculations

1 See, for example Tanzi et al. (2007), Clemens et al. (2010), and Afonso and Jalles (2011).

2 The MinMax method is often used in Fraser Institute publications to generate standardized scores for comparison purposes (see, for example, Barua, 2013). The methodology has also been employed by the United Nations in its Human Development Index Reports. See, for example, United Nations Development Programme (2011).

are based on one or two years of data during the 2000 to 2012 period.[3] The indicators were selected to provide a variety of aspects that a national society could be judged on, including economic activity, health outcomes, and societal outcomes such as the degree of income inequality, educational attainment, crime rates, and overall environmental performance and human development. Many of these variables also have been used as inputs into other indexes such as the United Nations' Human Development Index. As well, some of the indicators of the recently released OECD Better Life Index[4] are used to provide a general set of quality and quantity of life indicators at the individual and family level that are also measures of national performance.

In an effort to measure government performance in the early twenty-first century, data for the period of 2000 to 2011 is used because it incorporates information on economic activity, government spending, and societal performance for a broad period of time. Basing some of the indicators on one or two years of data where longer runs of data are not available is also acceptable given that it is a relatively short time span. The main data source for these variables is the OECD.[5] Many of these variables have already been used and described in some of the preceding analysis. There are four economic performance indicators, two health outcome performance indicators, five social outcome performance indicators, and nine better life indicators for a total of 20 categories.[6] The raw indicators for each country are defined as follows:

Economic indicators

- Inflation: Average of annual inflation rates from 2000 to 2011, based on the Consumer Price Index.

3 For some other countries, data was available for a shorter span than 2000 to 2011, and the average was computed for the shorter range accordingly. As well, some of the indicators were only available for several years, as was the case with the Gini coefficient for income inequality. The OECD Better Life Index is based on single-year observations during this period.

4 The OECD Better Life Index compares well-being on 11 topics that the OECD has identified as essential in the areas of material living conditions and quality of life.

5 A full listing and description of sources can be found in Appendix 2.

6 By way of comparison, Afonso, Schuknecht, and Tanzi (2005) compute public sector performance and efficiency using one composite and seven sub-indicators. Clemens et al. (2010) use five broad indicators.

- Unemployment rate: Average of annual unemployment rates from 2000 to 2011.
- Level of per capita GDP: Average of annual per capita GDP in US PPP$ for the period of 2000 to 2011.
- Real per capita GDP growth rate: Average of annual growth rates for the period of 2000 to 2011.

Health outcomes

- Life expectancy: Average of annual life expectancy at birth in years available for the period of 2000 to 2011.
- Infant mortality: Average of annual mortality rate in deaths per 1,000 live births available for the period of 2000 to 2011.

Social outcomes

- Tertiary education: Average of annual tertiary level (post-secondary) educational attainment for the 25–64 age group as a percentage of the population in this age group available for the period of 2000 to 2011.
- PISA reading score proportion: The proportion of 15-year-old students reporting a score of level four or higher on the reading portion of the Programme for International Student Assessment (PISA)[7] in OECD countries in 2006 and 2009.
- Gini coefficient: Average of annual values of the Gini coefficient of income inequality for the total population for income after taxes and transfers available for the period of 2000 to 2011.[8]
- Homicide rate: Average of annual values of the homicide rate defined as homicides per 100,000 population available for the period of 2000 to 2011.
- Burglary rate: Average of annual number of the burglary/breaking and entering offenses at the national level per 100,000 population available for the period of 2000 to 2011.

7 There are six reading levels.

8 Estimates for the Gini coefficient were only available for the years 2003 and 2007.

OECD Better Life indicators[9]

- Rooms per person: The number of rooms (excluding kitchenette, scullery/utility room, bathroom, toilet, garage, consulting rooms, office, shop) in a dwelling divided by the number of persons living in the dwelling. The reference year is 2011 for all countries, with the exception of 2010 for Ireland, Israel, South Korea, Mexico, and Turkey; 2006 for Canada; and 2001 for Chile.
- Household net adjusted disposable income: Includes earnings, self-employment and capital income, as well as current monetary transfers received from other sectors and the social transfers in-kind that households receive from governments (such as education and health care services), subtracting the taxes on income and wealth, social security contributions paid by households, and the depreciation of capital goods consumed by households. It is valued in US PPP$ and the reference year is 2010.
- Household net financial wealth: Includes monetary gold; currency and deposits; securities other than shares; loans, shares, and other equity (including shares issued by investment funds); insurance technical reserves; and other accounts receivable or payable; net of household financial liabilities, as defined by the System of National Accounts (SNA). Data refer to the sum of households and non-profit institutions serving households. It is valued in US PPP$ and the reference year is 2010.
- Life satisfaction: Considers people's evaluation of their life as a whole. It is a weighted sum of different response categories based on people's rating of their current life relative to the best and worst possible lives for them on a scale from 0 to 10, with 10 as the top score. The reference year is 2012 for all countries except for Chile, for which is the reference year is 2011.
- Self-reported health status: Refers to the percentage of the population aged 15 years old and over who report "good" or "better" health. The reference year is 2011 for all countries, with the exception of

9 For more detail on these variables, see OECD (2013b).

2012 for New Zealand; 2010 for Ireland and Japan; 2009 for Chile; and 2006 for Mexico.

- Voter turnout: The ratio of the number of individuals who cast a ballot during an election (whether this vote is valid or not) to the population registered to vote. The reference year is 2012 for Finland, France, Greece, South Korea, Mexico, Russia, and Slovak Republic; 2011 for Canada, Denmark, Estonia, Ireland, New Zealand, Portugal, Slovenia, Spain, Switzerland, and Turkey; 2010 for Australia, Belgium, Brazil, Czech Republic, Hungary, the Netherlands, Poland, Sweden, and the United Kingdom; 2009 for Chile, Germany, Iceland, Israel, Japan, Luxembourg, and Norway; 2008 for Austria, Italy, and the United States.
- Air pollution: An urban-population weighted average of annual concentrations of particulate matters less than 10 microns in diameter (PM10) in the air in residential areas of cities with more than 100,000 residents. The reference year is 2009 for all countries.
- Water quality: Based on the question "In the city or area where you live, are you satisfied or dissatisfied with the quality of water?" it records the percentage of people who reported satisfaction. The reference year is 2012 for all countries, except Brazil, Chile, Japan, South Korea, and the United Kingdom, which have 2011 as their reference year.

These indicators will be used to generate a total performance score, which will then be combined with a government size variable to generate a cost-effectiveness index. The government expenditure variable used to construct the cost-effectiveness measures will be the government expenditure to GDP ratio, defined as the average of the annual values of the ratio of general government expenditure to GDP for the period of 2000 to 2011.

Why this particular measure of public sector size? Using per capita government spending to measure efficiency does not adjust for differences in ability to spend due to a stronger and more developed economy, given that per capita government spending tracks very closely with per capita GDP. All things given, countries with higher per capita GDP can spend more on government services if they wish due to potentially greater resources. Even among OECD countries there is a substantial range in per capita GDP and per capita government spending.

What is more important is government spending relative to GDP—the size of the public sector. This allows us to examine spending relative to the size of the economy. A country with a very high GDP can spend a smaller share of its economy on government services and still spend more per capita than a poorer country with a smaller GDP that spends a larger share of its resources on government.

Using the expenditure to GDP ratio is also preferable to the revenue to GDP ratio as it measures the total projection of government into the economy, including spending due to deficit financing. Given the large amount of deficit spending in the wake of the recent world financial crisis, the revenue to GDP ratio would underestimate the size of government activity in the economy relative to GDP.

Methodology for calculating performance rankings

The MinMax methodology will be applied to the raw data for each of the indicators to generate a score between 0 and 10, and these scores will then be used to construct a ranking of the outcomes. Based on the specific variable, favourable outcomes can be denoted by either higher values (for example, per capita GDP or life expectancy at birth) or lower values (for example, unemployment rates or infant mortality rates). Where a higher score is the more favourable outcome, the formula takes the form:

(1) (National value-Min(Range of National Values))/(Max(Range of National Values)-Min(Range of National Values))*10

Where a lower score is the more favorable outcome, the formula is as follows:

(2) (Max(Range of National Values)-National Values)/(Max(Range of National Values)-Min(Range of National Values))*10

Each of the 20 indicators will be assigned a score for each country ranging from 0 to 10. Then the indicators will have their individual component scores averaged to produce a total performance score.

Performance results

The results for the total performance ranking are presented in table 5.1, which ranks the countries for their total performance from highest to lowest for two total performance scores. The first (WA) is a weighted average across the 20 categories used that places a heavier weight on the economic indicators based on the rationale that a strong economy is the basis for success in other areas.[10] This weighted approach places a weight of 50 percent on the economic indicators, 30 percent on the health and social outcomes, and 20 percent on the Better Life indicators.[11] The second score (SA) is a simple average based on an equal weighting of the indicators and is included for comparison purposes.

Tables 5.2, 5.3, 5.4, and 5.5 provide the scores for the economic, health and social outcomes, and Better Life indicators, but retain the country order from the total performance index ranking using the weighted average (WA). In all of these tables, higher values are considered the more favourable outcome.

For comparison purposes, table 5.1 presents results for both the weighted and unweighted average of the categories to generate a total performance score. The two approaches yield relatively similar results. The bottom three in terms of total performance—Chile, Mexico, and Turkey—are the same using both approaches, as are the top two—Norway and Luxembourg. Canada is seventh using the weighted average and third when the simple average is used. The United States is 14th using a weighted averaged and 11th when the simple average is used. Greece, on the other hand, has the same rank with both approaches. Given the importance of economic performance in setting the foundation for a society's total performance, the remainder of the discussion will use the weighted average score for total performance.

As table 5.1 reveals, Norway, Luxembourg, and Switzerland are the top three OECD performers, based on the aforementioned indicators, while Chile, Mexico, and Turkey rank at the bottom. In terms of economic

10 Other studies have used either equal weight approaches or weighted approaches; reasonable cases can be made for either. See Tanzi et al. (2007), Clemens et al. (2010), and Afonso and Jalles (2011).

11 The weights are as follows: 20 percent for economic growth, 15 percent for per capita GDP, 10 percent for the unemployment rate, and five percent for inflation. For the seven health and social outcome indicators, each has a weight of 4.3 percent (equal weight within their category). For the Better Life indicators, each of the nine items has a weight of 2.2 percent (again, equal weight within their category).

Table 5.1: Total performance scores and rankings

Total performance score: Weighted average (WA)		Total performance score: Simple average (SA)	
Luxembourg	7.5	**Norway**	7.6
Norway	7.4	**Luxembourg**	7.5
Switzerland	6.2	**Canada**	7.1
Australia	6.1	**Sweden**	7.1
United Kingdom	6.1	**Switzerland**	7.1
Sweden	6.1	**Australia**	7.1
Canada	6.1	**Finland**	6.8
Iceland	6.0	**Netherlands**	6.8
Netherlands	6.0	**Belgium**	6.8
Korea, South	5.8	**Iceland**	6.7
Finland	5.8	**United States**	6.7
Denmark	5.6	**Denmark**	6.7
Ireland	5.6	**United Kingdom**	6.7
United States	5.5	**New Zealand**	6.6
Belgium	5.5	**Ireland**	6.5
Austria	5.5	**Germany**	6.4
New Zealand	5.5	**France**	6.4
Japan	5.5	**Austria**	6.4
Germany	5.3	**Japan**	6.3
France	5.2	**Korea, South**	5.9
Slovenia	4.9	**Spain**	5.6
Israel	4.8	**Italy**	5.5
Estonia	4.8	**Israel**	5.5
Czech Republic	4.7	**Slovenia**	5.3
Italy	4.6	**Czech Republic**	5.2
Spain	4.5	**Portugal**	4.8
Greece	4.1	**Greece**	4.7
Portugal	4.1	**Estonia**	4.6
Hungary	4.0	**Slovak Republic**	4.5
Poland	3.9	**Poland**	4.2
Slovak Republic	3.8	**Hungary**	4.2
Chile	3.7	**Chile**	4.0
Mexico	3.5	**Mexico**	3.4
Turkey	2.5	**Turkey**	2.6

performance, Japan had the lowest inflation while Turkey had the highest (table 5.2). Unemployment rates were lowest in Norway and South Korea and were highest in the Slovak Republic and Poland. Per capita GDP was highest in Luxembourg and Norway and lowest in Turkey and Mexico. However, in terms of the growth rate of real per capita GDP, Japan ranked the lowest whereas Estonia ranked the highest.

In terms of health outcomes, table 5.3 shows that life expectancy at birth was highest in Japan and Switzerland and lowest in Estonia and Turkey. The infant mortality was lowest in Iceland, followed by Japan, and highest in Mexico and Turkey.

Table 5.4 provides outcomes for a variety of societal indicators. The proportion of the population aged 25 to 64 with tertiary (post-secondary) education was highest in Canada and Israel and lowest in Turkey and Portugal. Income inequality, as indicated by the ranking of Gini coefficients, was lowest in Denmark and highest in Mexico. The homicide rate was lowest in Japan and highest in Mexico, while burglary rates were highest in Denmark and lowest in South Korea. With respect to the PISA results for reading scores, South Korea had the highest proportion of students scoring a level four or higher, while Mexico had the lowest.

Table 5.5 presents the OECD Better Life indicators scores. Canada ranked the highest in terms of rooms per person, followed by the United States and Australia, while Turkey, Mexico, Hungary, and Poland ranked the lowest. Household net financial wealth and net income were both highest in the United States, while net financial wealth was lowest in Norway and net income lowest in Chile. Life satisfaction was highest in Switzerland and lowest in Hungary. Self-reported health status was highest in the United States and lowest in Japan. Not surprisingly, voter turnout was the highest in Australia (which has laws making it compulsory) and lowest in Hungary. Air quality was best in Estonia and poorest in Chile, while water quality was best in the United Kingdom and Iceland and poorest in Turkey. Finally, Denmark ranked the highest for leisure and other personal care time while Turkey ranked the lowest.

Naturally, countries that did poorly consistently across individual categories were more likely to be at the bottom of the total performance ranking. Mexico and Turkey, for example, were at the bottom of many of the individual ranking categories. While they performed relatively well in some

Table 5.2: Economic indicators scores by total performance ranking (WA)

	Inflation	Unemployment rate	Per capita GDP (US PPP$)	Real per capita GDP growth rate
Luxembourg	8.7	9.6	10.0	5.0
Norway	8.9	10.0	6.4	7.1
Switzerland	9.4	9.9	4.6	2.7
Australia	8.3	8.4	4.2	4.2
United Kingdom	9.8	8.1	3.7	6.2
Sweden	9.1	7.4	3.7	3.9
Canada	8.8	6.9	4.0	3.1
Iceland	6.9	9.7	4.4	2.2
Netherlands	8.8	9.7	4.1	2.6
Korea, South	8.3	10.0	2.0	5.8
Finland	9.0	6.0	3.3	3.2
Denmark	8.8	8.7	3.7	1.8
Ireland	8.5	7.2	4.1	1.7
United States	8.6	7.8	5.2	1.5
Belgium	8.8	6.5	3.5	1.9
Austria	8.8	9.4	3.9	2.3
New Zealand	8.5	8.7	2.3	2.6
Japan	10.0	9.0	3.1	0.0
Germany	9.1	5.8	3.5	1.6
France	9.0	5.5	3.2	1.9
Slovenia	7.7	7.7	2.0	4.4
Israel	8.8	5.9	2.2	2.6
Estonia	7.8	4.3	0.9	10.0
Czech Republic	8.6	6.9	1.7	4.1
Italy	8.8	6.1	2.8	0.8
Spain	8.4	2.0	2.6	2.3
Greece	8.2	4.0	2.1	1.9
Portugal	8.6	6.6	1.7	0.9
Hungary	7.0	6.5	0.9	4.1
Poland	8.2	1.0	0.5	6.4
Slovak Republic	7.4	0.0	0.9	5.2
Chile	8.3	5.9	0.3	4.0
Mexico	7.4	9.9	0.1	4.9
Turkey	0.0	4.2	0.0	4.6

Table 5.3: Health indicators scores by total performance ranking (WA)

	Life expectancy	Infant mortality
Luxembourg	6.9	9.2
Norway	7.8	9.4
Switzerland	9.1	8.8
Australia	8.5	8.6
United Kingdom	6.9	8.4
Sweden	8.5	9.6
Canada	7.6	8.3
Iceland	8.8	10.0
Netherlands	7.1	8.7
Korea, South	6.1	9.0
Finland	6.8	9.6
Denmark	5.7	8.9
Ireland	6.7	8.7
United States	5.2	7.4
Belgium	6.8	9.0
Austria	7.2	8.9
New Zealand	7.5	8.1
Japan	10.0	9.7
Germany	7.1	9.0
France	8.1	9.0
Slovenia	5.2	9.3
Israel	8.0	8.7
Estonia	0.0	8.0
Czech Republic	3.9	9.3
Italy	8.6	9.1
Spain	8.4	9.1
Greece	7.0	8.9
Portugal	6.0	9.0
Hungary	0.5	7.5
Poland	2.6	7.5
Slovak Republic	1.7	7.4
Chile	5.4	6.7
Mexico	2.3	1.8
Turkey	0.2	0.0

Table 5.4: Social outcome indicators scores by total performance ranking (WA)

	Tertiary education	PISA scores	Gini coefficient	Homicide rate	Burglary rate
Luxembourg	3.9	4.1	8.7	8.8	6.3
Norway	6.4	5.1	9.0	9.8	6.9
Switzerland	5.4	5.6	8.1	9.6	5.0
Australia	6.3	6.8	6.6	9.3	2.1
United Kingdom	5.9	5.2	6.0	9.0	2.9
Sweden	5.2	5.8	9.6	9.6	3.0
Canada	10.0	7.8	6.8	8.8	5.6
Iceland	5.2	4.9	8.3	9.9	4.6
Netherlands	5.2	6.4	7.9	9.3	3.8
Korea, South	6.0	10.0	7.2	8.4	10.0
Finland	6.9	9.2	9.3	8.0	7.7
Denmark	5.9	4.6	10.0	9.6	0.0
Ireland	5.3	6.1	7.4	9.4	6.5
United States	8.2	2.1	4.8	6.2	5.6
Belgium	5.7	6.8	8.6	8.5	4.7
Austria	1.8	4.6	8.9	9.8	1.9
New Zealand	7.2	7.8	6.2	9.4	1.4
Japan	8.2	6.7	6.4	10.0	9.1
Germany	4.0	5.8	8.2	9.5	7.1
France	4.3	5.6	7.9	9.1	6.6
Slovenia	2.9	1.4	9.8	9.5	4.8
Israel	9.6	4.1	5.1	8.1	5.2
Estonia	6.4	1.8	6.3	3.4	9.9
Czech Republic	0.8	4.4	9.0	8.6	6.6
Italy	0.5	4.2	5.9	9.5	8.6
Spain	4.7	2.7	6.6	9.4	6.6
Greece	3.0	3.4	7.0	9.4	7.5
Portugal	0.5	3.9	5.1	9.3	7.4
Hungary	1.8	4.5	8.1	8.8	7.5
Poland	1.7	5.9	6.7	8.8	7.1
Slovak Republic	0.8	3.5	9.0	8.6	7.9
Chile	4.0	1.1	0.0	7.3	5.6
Mexico	1.5	0.0	0.5	0.0	9.3
Turkey	0.0	1.7	3.0	6.8	9.2

of the economic indicator categories, they tended to perform quite poorly in terms of health and social outcomes. Norway, Luxembourg, and Japan ranked highly in most of the categories, though Japan performed poorly in terms of real per capita GDP growth.

The relationship between total performance and public sector size is one worth exploring. Table 5.6 presents the total performance scores and the average government expenditure to GDP ratios for the period of 2000 to 2011. Figure 5.1 plots the total performance scores against the expenditure to GDP ratios for the OECD countries and then adds a LOWESS smooth to provide an estimate of the average relationship. The data show that while the relationship is a broadly positive one, it has two phases. There is a steep positive association between performance and a larger public sector from the 20 to 35 percent public sector size range, over which performance scores rise from about 4 to 5. However, most countries are on the second phase of the curve, in which performance scores stay just over 5 as the public sector size increases from 30 to 50 percent. When the public sector rises above 50 percent, total performance scores, according to the LOWESS curve, rise to just under 6. This suggests that there are not large gains in total performance once public sectors expand beyond 35 percent of GDP.

However, when it comes to public sector size and spending, it is important to consider how the funds are spent, and not just how much is spent. In 2008, the largest program expenditure categories for 31 OECD countries were social protection, which accounted for an average of 33.5 percent of government expenditure, health (14.7 percent), education (13.1 percent), and general public services (13.1 percent) (OECD, 2011). These four categories accounted for almost 75 percent of government program spending. Figures 5.2 to 5.5 combine the total performance index scores for 31 of the 34 OECD countries[12] with information on the composition of OECD spending in 2008 to plot LOWESS smooths to illustrate the broad associations between program expenditure ratios and total performance.

As these figures show, OECD countries that spent a larger share of their budget on defense, public order, and safety tended to have lower total performance scores (figure 5.2). Spending a larger share on general public

12 Turkey, Mexico, and Chile were omitted as there was no expenditure composition data available in OECD (2011).

Table 5.5: OECD Better Life indicators scores by total performance ranking (WA)

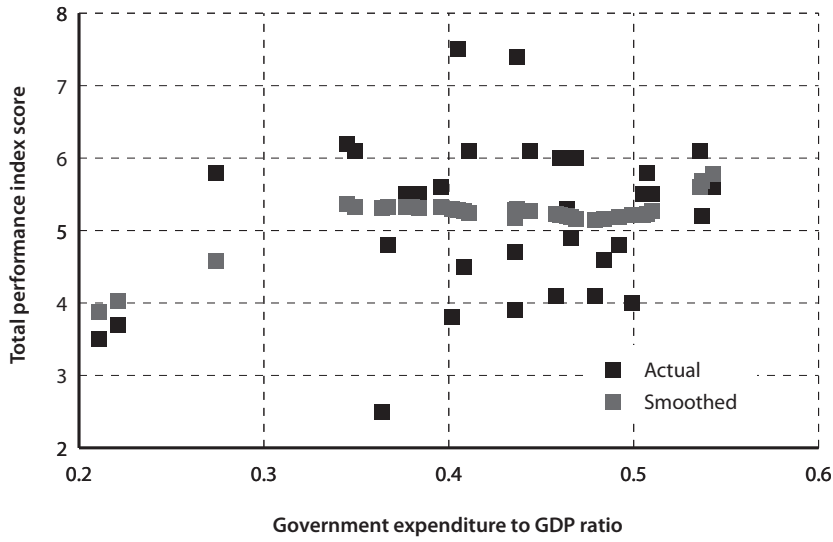
	Rooms per person	Household net financial wealth	Household net income	Life satisfaction
Luxembourg	5.9	5.5	9.1	7.4
Norway	6.5	0.0	7.6	9.7
Switzerland	5.3	8.5	7.1	10.0
Australia	8.2	2.3	6.6	8.1
United Kingdom	5.3	5.1	5.9	6.8
Sweden	4.7	3.5	5.6	9.4
Canada	10.0	5.2	6.4	8.7
Iceland	4.1	2.2	3.8	9.4
Netherlands	6.5	5.5	5.4	9.0
Korea, South	2.9	1.8	2.3	4.2
Finland	5.9	1.4	5.5	8.7
Denmark	5.9	2.7	5.1	9.0
Ireland	7.1	1.9	4.8	7.4
United States	8.2	10.0	10.0	7.4
Belgium	7.6	6.2	5.9	7.1
Austria	4.7	3.7	6.6	8.7
New Zealand	8.2	2.4	4.0	8.1
Japan	5.3	6.2	4.9	4.2
Germany	5.3	3.5	6.6	6.5
France	5.3	3.6	6.4	6.1
Slovenia	2.9	1.0	3.0	4.5
Israel	1.2	3.9	3.0	7.7
Estonia	4.1	0.2	0.7	2.3
Czech Republic	2.9	0.7	2.2	5.2
Italy	2.9	4.4	4.9	3.5
Spain	5.3	1.4	4.4	5.2
Greece	1.8	0.6	3.5	1.3
Portugal	4.1	2.0	3.1	1.0
Hungary	0.6	0.5	1.0	0.0
Poland	0.6	0.2	1.6	3.9
Slovak Republic	1.8	0.1	2.1	3.9
Chile	2.4	0.9	0.0	5.8
Mexico	0.6	0.3	0.6	8.4
Turkey	0.0	0.3	0.7	1.9

	Self-reported health	Voter turnout	Air pollution	Water quality	Leisure time
Luxembourg	7.0	9.6	9.1	7.2	7.7
Norway	7.2	6.3	8.6	9.7	8.8
Switzerland	8.5	0.4	7.0	9.4	7.0
Australia	9.2	10.0	8.9	8.3	6.2
United Kingdom	7.8	4.1	9.1	10.0	7.2
Sweden	8.3	8.3	9.8	9.4	7.8
Canada	9.7	3.0	8.4	7.8	5.8
Iceland	7.8	8.3	8.4	10.0	5.4
Netherlands	7.7	6.1	5.2	8.1	9.1
Korea, South	1.2	6.3	4.5	4.7	6.7
Finland	6.5	4.8	8.6	8.6	7.3
Denmark	6.7	8.9	8.4	9.2	10.0
Ireland	8.8	5.0	9.3	6.4	8.0
United States	10.0	5.0	8.0	7.2	5.9
Belgium	7.2	9.1	7.3	5.3	9.2
Austria	6.5	7.6	5.9	9.7	6.3
New Zealand	9.8	5.9	9.3	7.5	7.3
Japan	0.0	4.8	6.4	6.9	5.2
Germany	5.7	5.2	8.4	8.9	8.3
France	6.2	7.2	9.3	5.6	8.3
Slovenia	5.0	4.1	6.1	7.2	6.7
Israel	8.7	3.9	6.8	1.4	4.8
Estonia	3.5	3.7	10.0	3.9	5.7
Czech Republic	4.8	3.5	8.2	6.4	6.0
Italy	5.7	7.4	7.3	2.8	7.3
Spain	7.5	4.8	6.4	5.0	9.5
Greece	7.7	3.3	5.0	2.2	6.7
Portugal	3.2	2.4	7.5	6.9	6.9
Hungary	4.2	0.0	8.6	4.2	7.3
Poland	4.5	1.7	4.3	5.0	5.7
Slovak Republic	5.3	2.6	9.3	5.6	7.0
Chile	4.8	8.9	0.0	4.4	4.5
Mexico	6.0	3.5	4.5	4.7	2.1
Turkey	6.2	8.9	3.6	0.0	0.0

Table 5.6: Total performance index scores and government expenditure to GDP ratios

	Total performance index score (WA)	Government expenditure to GDP ratio
Australia	6.1	0.349
Austria	5.5	0.510
Belgium	5.5	0.505
Canada	6.1	0.411
Chile	3.7	0.221
Czech Republic	4.7	0.436
Denmark	5.6	0.543
Estonia	4.8	0.367
Finland	5.8	0.507
France	5.2	0.537
Germany	5.3	0.464
Greece	4.1	0.479
Hungary	4.0	0.499
Iceland	6.0	0.460
Ireland	5.6	0.396
Israel	4.8	0.492
Italy	4.6	0.484
Japan	5.5	0.380
Korea, South	5.8	0.274
Luxembourg	7.5	0.405
Mexico	3.5	0.211
Netherlands	6.0	0.469
New Zealand	5.5	0.384
Norway	7.4	0.437
Poland	3.9	0.436
Portugal	4.1	0.458
Slovak Republic	3.8	0.402
Slovenia	4.9	0.466
Spain	4.5	0.408
Sweden	6.1	0.536
Switzerland	6.2	0.345
Turkey	2.5	0.364
United Kingdom	6.1	0.444
United States	5.5	0.377

Figure 5.1: LOWESS smooth of total performance index scores versus government expenditure to GDP ratios



services was associated with a rising total performance score until general public services accounted for about 10 percent of spending; increases in its share beyond that were associated with declines in total performance (figure 5.3). As for health and education, growth in its public expenditure share from 20 to 25 percent was associated with a rapid increase in total performance scores, but increased spending beyond that point resulted in little improvement in performance (figure 5.4).

Plotting social protection spending as a share of total government spending against total performance index scores results in a LOWESS curve that is U-shaped (figure 5.5). This result suggests that the effect of social protection spending on total performance is complex. Governments can achieve high levels of total performance with either a large share of spending on social protection or a much smaller one, suggesting that there are other factors operating in conjunction with social spending to affect a nation's broad total performance, as measured by the total performance index calculated in this study.

Figure 5.2: LOWESS smooth of share of government spending on defense, public order, and safety versus total performance index score

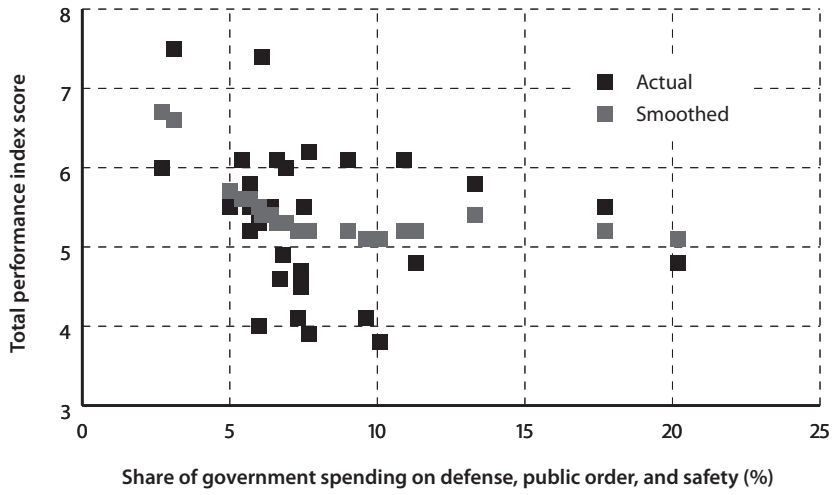


Figure 5.3: LOWESS smooth of share of government spending on general public services versus total performance index score

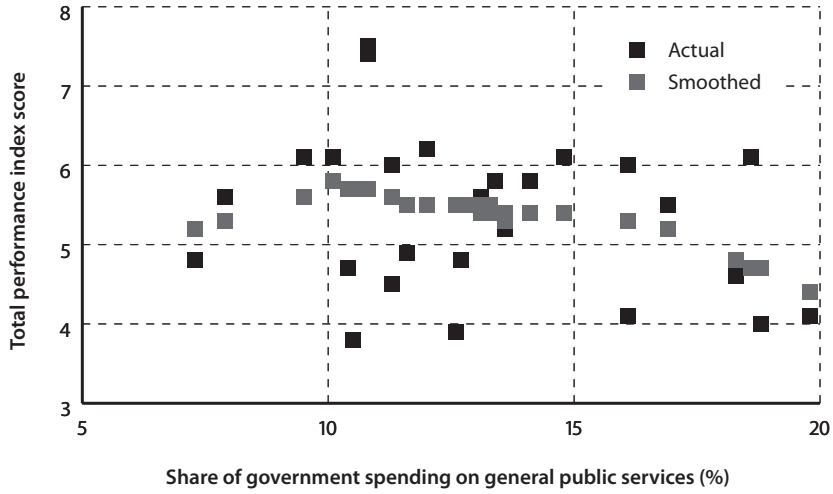


Figure 5.4: LOWESS smooth of share of government spending on health and education versus total performance index score

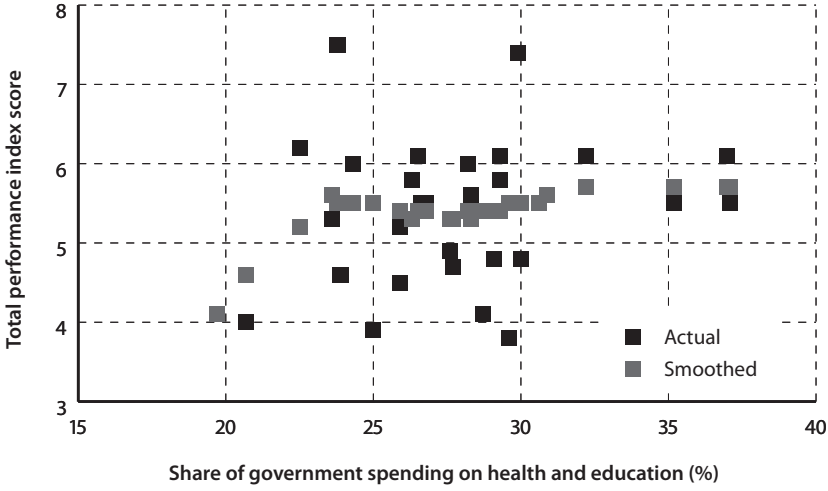
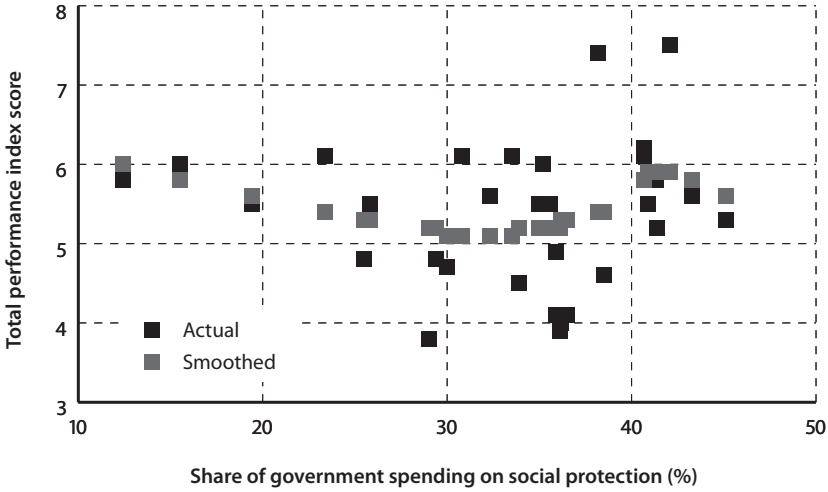


Figure 5.5: LOWESS smooth of share of government spending on social protection versus total performance index score



Measuring cost-effectiveness

Measuring the performance of public spending is not only about total performance, but also about the cost-effectiveness of that performance. Once we have standardized outcomes according to a ranking system, how can we calculate the resource cost per unit of standardized outcome? This requires an estimate and ranking of cost-effectiveness. A cost-effectiveness ratio is calculated by taking the ratio of a resource cost measure to the outcome. Changes in outcomes are captured in the denominator while changes in resource use are in the numerator. A lower resource cost per given outcome is evidence of greater efficiency or cost-effectiveness.

In order to calculate a national estimate of cost-effectiveness, the total performance index score will be the denominator term while a public sector size variable will be the resource cost variable in the numerator. A cost-effectiveness ratio (CER) will be calculated for each country by taking the average ratio of government expenditure to GDP for the years 2000 to 2011, and then dividing it by the total performance index score: The formula is as follows:

$$(3) \qquad CER_i=(G/GDP)_i/TPI_i$$

Using the government expenditure to GDP ratio is preferable to using per capita government expenditure because it adjusts for the size of government expenditure relative to the resource base. The MinMax procedure will then be used to rank countries on a scale of 0 to 10 with 10 as the most cost-effective and 0 as the least cost-effective. Essentially, if two countries have the same total performance index score, the one with the smaller government expenditure to GDP ratio will be the more efficient one.

While there is a broad positive correlation between the size of the public sector and the total performance index score, one needs to look at a measure that combines public sector size relative to performance in order to appropriately gauge efficiency. For example, as table 5.6 shows, Austria and Belgium both have total performance index scores of 5.5 and achieve this with almost equivalent government expenditure to GDP ratios. One could argue that they are approximately equivalent in their efficiency, given that they achieve similar performance outcomes with similarly sized public sectors.

Sweden and Switzerland provide another example. Their total performance index scores are quite similar, with Sweden at 6.1 and Switzerland at 6.2. However, Switzerland accomplishes this performance with an average

government expenditure to GDP ratio of 0.345 (approximately 35 percent) while Sweden's is 0.536 (approximately 54 percent). Put another way, for an incremental 12 percent improvement in total performance, Sweden has a public sector to GDP ratio that is 55 percent larger than Switzerland's. As such, Sweden can be considered much less efficient than Switzerland.

Table 5.7 presents a ranking of cost-effectiveness ratios and shows that, based on the criteria used to estimate public sector efficiency in this report—total performance index score and government expenditure to GDP ratio—the most efficient public sector is currently that of South Korea, followed by Luxembourg, Switzerland, Australia, and Norway. These are countries that achieve a high level of total performance and do so more efficiently than many other countries. For a given performance level, they devote a smaller share of their GDP to public services. They illustrate that the goal is not a smaller public sector per se, but a smaller public sector given a performance level.

Luxembourg and South Korea, the two most cost-effective countries, illustrate this important point. Luxembourg achieves the highest total performance score of 7.5, but it does so with a government expenditure to GDP ratio of 40.5 percent. South Korea achieves a total performance index score of 5.8 and has a government expenditure to GDP ratio of 27.4 percent. Despite their differences in scores and spending, these two countries rank highest in terms of cost-effectiveness. This is due to the fact that while Luxembourg has a substantially larger public sector, it also has a better total performance index score. Nevertheless, it ranks below South Korea in cost-effectiveness because its public sector is 48 percent larger than South Korea's while its total performance score is only 29 percent better.

At the other end of the spectrum, Turkey has the lowest total performance index score of the 34 OECD countries while having a government expenditure to GDP ratio of 36 percent. Given Turkey's low total performance index score, to be as efficient as South Korea in terms of its cost-effectiveness ranking, its government expenditure to GDP ratio would have to be 12 percent. As a result, Turkey is the least cost-effective country. Mexico, on the other hand, has the second lowest total performance index score, but its government expenditure to GDP ratio is only 21 percent and, as a result, it ranks seventh in terms of cost-effectiveness. These results show that there is a range of performance outcomes and some of them can be achieved more efficiently than others.

Table 5.7: Ranked cost-effectiveness scores and government expenditure to GDP ratios

	Cost-effectiveness score	Government expenditure to GDP ratio
Korea, South	10.0	0.274
Luxembourg	9.3	0.405
Switzerland	9.2	0.345
Australia	9.0	0.349
Norway	8.8	0.437
Chile	8.7	0.221
Mexico	8.6	0.211
Canada	7.9	0.411
United States	7.9	0.377
Japan	7.8	0.380
New Zealand	7.7	0.384
Ireland	7.6	0.396
United Kingdom	7.4	0.444
Estonia	7.0	0.367
Iceland	7.0	0.460
Netherlands	6.8	0.469
Finland	6.0	0.507
Germany	5.9	0.464
Sweden	5.9	0.536
Spain	5.7	0.408
Belgium	5.6	0.505
Austria	5.5	0.510
Czech Republic	5.5	0.436
Slovenia	5.2	0.466
Denmark	5.0	0.543
France	4.5	0.537
Israel	4.5	0.492
Italy	4.2	0.484
Slovak Republic	4.1	0.402
Poland	3.5	0.436
Portugal	3.5	0.458
Greece	3.2	0.479
Hungary	2.3	0.499
Turkey	0.0	0.364

If Canada were as cost-effective as South Korea in achieving its total performance index score, its government expenditure to GDP ratio would be 29 percent as opposed to the current estimate of 41 percent. However, it should be acknowledged that such comparisons of government size and performance must take into account demographic variables such as age structure and population density. For example, given Canada's relatively low population density and the greater difficulty in reaching economies of scale, one might expect its government expenditure to GDP ratio to be more than 29 percent.[13]

As table 5.8 illustrates, most countries would have substantially smaller public sectors if they achieved their total performance index scores as cost-effectively as South Korea. However, these estimates should be treated as a lower bound rather than a policy objective, given cost differences due to local and regional variation, societal preferences, and choices for the delivery of certain public goods, as well as differences in political organization such as federal as opposed to non-federal countries.

For example, while South Korea has a universal public health care system, its proportion of health care that is publicly financed is one of the lowest among the OECD countries at 58 percent. If its public finance share of health were at the OECD average of 72 percent, its government expenditure to GDP ratio could be several percentage points higher.[14] The point is not that South Korea should serve as an absolute benchmark, but rather that there is a scope for efficiency in terms of public sector spending in all countries, even South Korea. The efficiency frontier can always be shifted.

Is a larger public sector associated with greater cost-effectiveness? Figure 5.6 plots the cost-effectiveness ratios from table 5.7 against the government expenditure to GDP ratios, along with a LOWESS curve. Again, the results show an inverse relationship between a higher ranking in cost-effectiveness and public sector size. All things given, a smaller public sector is generally associated with a higher ranking in terms of cost-effectiveness, though there is variation around the LOWESS fitted curve.

13 For examples of literature relating public sector size and spending to demographic variables, see Ladd (1992) and Kelley (1976).

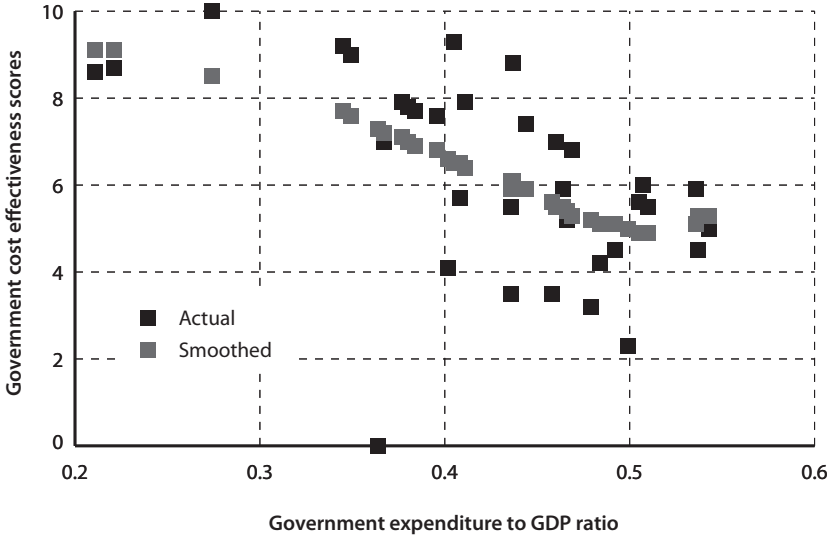
14 As well, the private sector plays a substantial role in South Korean education as half of all secondary schools are private.

Table 5.8: Government expenditure to GDP (GE/GDP) ratios if total performance as cost effective as South Korea

	Total performance index (WA)	Actual GE/GDP ratio	Most cost effective GE/GDP ratio*	Percentage gap
Australia	6.1	0.35	0.29	-16.7
Austria	5.5	0.51	0.26	-48.7
Belgium	5.5	0.51	0.26	-48.2
Canada	6.1	0.41	0.29	-30.4
Chile	3.7	0.22	0.17	-21.8
Czech Republic	4.7	0.44	0.22	-48.7
Denmark	5.6	0.54	0.26	-51.5
Estonia	4.8	0.37	0.23	-38.6
Finland	5.8	0.51	0.27	-46.0
France	5.2	0.54	0.25	-53.9
Germany	5.3	0.46	0.25	-46.2
Greece	4.1	0.48	0.20	-59.1
Hungary	4.0	0.50	0.19	-62.0
Iceland	6.0	0.46	0.28	-38.6
Ireland	5.6	0.40	0.26	-33.7
Israel	4.8	0.49	0.23	-53.9
Italy	4.6	0.48	0.22	-54.9
Japan	5.5	0.38	0.26	-31.9
Korea, South	5.8	0.27	0.27	0.0
Luxembourg	7.5	0.41	0.35	-12.5
Mexico	3.5	0.21	0.16	-22.8
Netherlands	6.0	0.47	0.28	-40.0
New Zealand	5.5	0.38	0.26	-32.6
Norway	7.4	0.44	0.35	-20.4
Poland	3.9	0.44	0.18	-57.9
Portugal	4.1	0.46	0.19	-57.9
Slovak Republic	3.8	0.40	0.18	-55.6
Slovenia	4.9	0.47	0.23	-50.5
Spain	4.5	0.41	0.21	-47.6
Sweden	6.1	0.54	0.29	-46.5
Switzerland	6.2	0.34	0.29	-14.8
Turkey	2.5	0.36	0.12	-67.9
United Kingdom	6.1	0.44	0.29	-35.2
United States	5.5	0.38	0.26	-30.6

*Based on South Korean cost effectiveness

Figure 5.6: LOWESS smooth of government cost effectiveness scores versus government expenditure to GDP ratios



Chapter 6

Conclusion

The growth of the public sector has been one of the key features of modern economic history. While government expenditure to GDP ratios were well below 10 percent in the nineteenth century, government spending in some countries came to account for well over 40 percent of GDP by the late twentieth century. After growing for much of the twentieth century, public sectors began to decline in size after 1980. By 1999, the revenue to GDP ratio for the world had declined to 28 percent and the expenditure to GDP ratio to 31 percent. However, the first decade of the twenty-first century saw a resumption of growth in public sector size and by 2011, the average government expenditure to GDP ratio for the world had climbed back to 33 percent and the revenue to GDP ratio to 31 percent. It appears that there has been a reversal of the international trend towards smaller government that marked the 1980s and 1990s.

Much resource allocation is done or affected by government, and thus it imperative that we understand the effect of the actions and activities of government on economic growth and efficiency. The public sector, through its taxing and expenditure functions, affects resource allocation and economic growth in the economy. And if government is providing goods and services, then taxpayers should be getting value for money and steps should be taken to improve the efficiency of the public sector. A survey of the literature shows that numerous studies document a negative empirical relationship between government size and economic growth rates. As well, there seems to be an association between smaller public sectors and greater efficiency in public service provision, as well as better performance outcomes.

This study provides a twenty-first century update in measuring the size and efficiency of government. Average government spending per capita in 2011 across 186 countries (in US PPP$) was $5,333 and ranged from a low of $101 to a high of $33,878. For the highest-spending 50 countries, spending

ranged from a low of $6,744 per capita for South Korea to a high of $33,878 for Luxembourg. For the lowest-spending 50 countries, spending per capita ranged from a low of $101 for the Democratic Republic of the Congo to a high of $929 for Djibouti.

In 1980, per capita government spending in the OECD countries was $4,006 (in US PPP$); by 2011, it was $14,977. For the world as a whole, the comparable figures for 1980 and 2011 are $2,153 and $5,333.

For the 50 largest and 50 smallest public sectors in terms of expenditure to GDP ratios in 2011, the top 50 ranged from a low of approximately 40 percent to a high of 95 percent, while the bottom 50 ranged from approximately 12 percent to just below 35 percent.

Looking at societal outcomes, a comparison of public sector spending variables and outcome indicators such as life expectancy, infant mortality, crime rates, and educational attainments shows that the relationships are complex. While there is indeed a positive association between government spending and favourable societal outcomes, much of this association is for lower amounts of spending with improvements leveling off as spending or public sector size rises above a certain level. For example, in the case of life expectancy at birth, an increase in the government expenditure to GDP ratio from 20 to 30 percent is associated with a gain of three years. However, growth from 30 to 50 percent yields only another year, which suggests diminishing returns in the health benefits associated with increased public sector size and spending. This implies that larger public sectors are not invariably associated with more positive outcomes. While public spending and programs are important, more is not always preferable to less.

Regression analysis leads to the conclusion that over the first decade of the twenty-first century, after controlling for confounding factors such as population, lagged per capita GDP, net debt to GDP, the institutional factors of governance and economic freedom, and regional variations, there is a hump-shaped Scully curve relationship between the government expenditure to GDP ratio and the growth rate of per capita GDP. All other things given, annual per capita GDP growth is maximized at 3.1 percent at a government expenditure to GDP ratio of 26 percent; beyond this ratio, economic growth rates decline. This demonstrates that there is an optimal size for the public sector when it comes solely to the effect on economic growth. Naturally, what size the public sector should be is also about broader societal outcomes but,

even then, the evidence suggests that there are few additional benefits once the public sector reaches 30 to 35 percent of GDP.

A total performance index for the period of 2000 to 2011 was calculated for 34 OECD countries based on four economic performance indicators, two health outcome performance indicators, five social outcome performance indicators, and nine better life indicators for a total of 20 categories. Based on a weighted average that assigned 50 percent of the weight to the four economic indicators, Luxembourg, Norway, and Switzerland were the top three performers in terms of total national performance, while Chile, Mexico, and Turkey ranked at the bottom.

A ranking of cost-effectiveness ratios based on the ratio of the government expenditure to GDP ratio to total performance index score shows that the most efficient public sector among 34 OECD countries is that of South Korea, followed by Luxembourg, Switzerland, Australia, and Norway. These countries provide a high level of performance and do so more efficiently than many other OECD countries. At the bottom in terms of cost-effectiveness are Poland, Portugal, Greece, Hungary, and Turkey. Given their low total performance scores, their public sectors are much larger than they need to be. Turkey achieves a total performance score of 2.5 with a government expenditure to GDP ratio of 36 percent. Switzerland, on the other hand, achieves a score of 6.2 with a government expenditure to GDP ratio of 35 percent, while Chile achieves a score of 3.7 with a government expenditure to GDP of 22 percent.

Government is very important and its programs are vital to our quality of life. At the same time, the results of this study demonstrate that more and larger government is not always associated with improved outcomes. Moreover, across countries some public sectors are more efficient in achieving a given outcome than others. There are certainly potential lessons to be learned in providing efficient government services from this vast array of international evidence. Governments would do well to seek examples of how to provide more and better services while reducing the cost to the tax-paying public.

Appendix 1

An Overview of the Role of Government

When studying the effects of government, we should not compare current institutional arrangements with some idealized arrangement. Rather, we should engage in a comparative institutions approach in which we compare alternative real institutional arrangements.[1] In reality, the economic operation of societies and their governments can be seen along an institutional continuum with varying ranges of reliance on economic freedom, private institutions, and free markets. There are two traditional economic approaches concerning the role of the public sector—classical and Marxist—which are supplemented by an array of modern views.

The classical view sees the market system as a natural order with government intervention called for only in very exceptional circumstances.[2] Closely linked with the classical view are modern libertarianism and classical liberalism.[3] Also termed the *laissez-faire* approach, the classical view is most succinctly expressed in the idea that the government that governs best is the one that governs least.[4] Society's economic welfare is maximized by the free interaction of individuals; government can only interfere with the economic allocation of resources produced by markets.[5] The original

1 For a pioneer in this approach of comparative institutional economics, see Demsetz (1969),

2 The classical view of the public sector is rooted in the works of the classical economists such as Adam Smith (1776/1952) and John Stuart Mill (1848/1969)

3 See Friedman (2002) and Hayek (2011).

4 This quote is attributed to Henry David Thoreau and was expressed fully in his essay *Civil Disobedience* (1849) as: "I HEARTILY ACCEPT the motto, — 'That government is best which governs least'; and I should like to see it acted up to more rapidly and systematically. Carried out, it finally amounts to this, which also I believe, — 'That government is best which governs not at all.'"

5 Contemporary David Hume's view of mercantilism and government was even more sophisticated than Adam Smith's in that he related mercantilism to the supply of money. The mercantilist

classical position was a reaction to the Mercantilist period, an era of heavy government involvement in the economy. During this period, governments granted monopolies to private companies, which restricted output, raised prices, and generally operated to the detriment of public welfare.[6]

Under the classical position, the role of government is that of a "night-watchman", concerning itself mainly with the maintenance of an institutional structure. Government provides defense services, a system of property rights enforcement, and a system of law but does not engage in the provision of goods and services or income redistribution. Adam Smith saw only three general functions for government, none of which were explicitly redistributive: protection, justice, and certain public works.[7] The third category is Smith's admission that there actually was a role for government provision of goods under certain conditions. The goods that fell under this category included infrastructure, such as harbours, and public education. These were goods that Smith termed to be of benefit to society but which would face difficulties in generating a profit.

John Stuart Mill argued that "government cannot manage the affairs of individuals as well as the individuals themselves" (1848/1969: 960), but like Smith made certain exceptions, one of which was education. Indeed, Mill suggested a more active program of state intervention in public life than earlier classical economists, particularly in the area of human capital investment such as education.[8] According to Mill, "Freedom of contract, in the case of children, is but another word for freedom of coercion" (958), and steps had to be taken to ensure the best long-term interests of children, rather than the short-term

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attempt to acquire money would fuel inflation and thereby raise the price of exports, which would defeat the mercantilist strategy. Adam Smith's position can be summarized as follows: government entails economic restrictions, which frustrate the division of labour and the operation of the invisible hand of the market (see Barber, 1984: 48–49).

6 Mercantilism was based on the premise that there was a fixed amount of wealth and nations could only become richer at the expense of others. Therefore, a strong centralized government and state regulation were seen as necessary to encourage domestic production (see Chambers et al., 1979: 488–89)

7 See Book Five of Adam Smith's *Wealth of Nations*.

8 Mill saw the state as a civilizer through the sponsorship of educational facilities and cultural amenities. He also saw some role for the state as a potential economic stabilizer to forestall the stationary state of declining growth through public works, as well as income distribution policies (see Barber, 1984: 104).

economic interests of parents. Again, historical context is important when understanding past writings on the role of government. Mill was writing in an era when child labour was commonplace and a valuable supplement to family income. He saw a risk of parents' short-term interests being at odds with the longer-term interests of their children.

If the classical position can be termed "minimum government", then the Marxist position, in terms of its application after the 1917 Russian Revolution, can be described as "maximum government." Now largely relegated to a historical relic since the fall of the Berlin Wall and the end of the cold war in 1990, Marxism and communist government justifies a great deal of government intervention in the economy, even though Marxist theory actually predicts the eventual withering away of the state.[9] Indeed, the work of Karl Marx is primarily an analysis of the business cycle and economic fluctuations and crisis rather than the role of the public sector.[10] This inconsistency is usually explained away by stating that there must be a transition period before the achievement of full communism. During this transition period, whose length was never specified, government owns all of the productive resources in the economy and makes decisions regarding production and distribution of goods and services.

In the Soviet variant that existed during the pre-Gorbachev era, official five-year plans were devised, which set output goals for sectors and industries in the economy. This centrally planned approach to economic management, with its low productivity outcomes, ultimately doomed the Soviet-style economies and fostered economic change and reform.

A newer approach to the public sector is the modernist position (sometimes referred to as "neoclassical"), which dominates modern public finance

9 In Marxist theory, the state is a tool of capitalist oppression; therefore, once there is no longer a class struggle, there will also be no need for the state (see Lenin, 1968: 221). According to Marxist and neo-Marxist analysis of capitalist economies and the state, "the state's actions [i.e., public policy] reflect the result of conflict between the interests of antagonistic economic classes" (McBride, 1992: 16). Essentially, there are three groups in society: labour, capitalists, and the state. Capitalists are concerned with the accumulation of capital, labour is interested in raising its subsistence wage, and the state is interested in the social and economic control of labour in order to accommodate the needs of capitalists. For examples of this approach to the role of the state, see McBride (1992), O'Connor (1973), Hueglin (1987), and Barrow (1993).

10 For other accounts of the Marxian model, see Barber (1984: 124–62) and the eminently readable Heilbroner (1995).

theory. It is essentially a pragmatic view, associated with public finance economist Richard A. Musgrave, which accepts that government exists and therefore there must be a role for it, and then proceeds to categorize and analyze the functions as an empirical exercise, using the economist's theoretical tool kit to study government economic activity. Musgrave's three tasks of government are allocation, distribution, and stabilization (Musgrave, Musgrave, and Bird, 1987: 2–21).

The allocative function concerns the resource allocation activities of government in the economy, with market failure—the failure of a functioning price mechanism—as the main reason for government intervention. One reason for market failure is that some goods—known as pure public goods—may have benefits that are collective or indivisible in nature and the marginal cost of adding an additional user is zero. Clean air and national defense are often used as examples of a public good, as once they are provided to serve one person all other people can use them at zero marginal cost. Government provides public goods because the inability to match private benefits with a user charge can result in the good not being provided at all, despite the good having a positive social value.

Another reason for market failure is that markets do not always take all costs and benefits into account in the transaction process, and there are spillovers of economic activity known as externalities. Pollution is an example of an externality. In the presence of externalities, the market may not reflect the true social costs and/or benefits of an economic activity, and therefore government market intervention may be required to restore a social optimum where society's welfare is maximized.[11] In cases where there are low transactions costs and a clearly identifiable source of the externality, private options may also be employed to correct externalities (see Coase, 1960).

Other reasons for government intervention in resource allocation include monopoly and merit goods. The existence of monopoly means that there are barriers to entry into a market resulting in a single provider and, consequently, price is often not equal to marginal cost as in a competitive environment. Government intervenes in an attempt to produce more output

11 It has been wryly observed that, with respect to the principle of market failure, "This principle may have contributed to the large growth in public spending because new, presumed, market failures were being found all the time" (Tanzi, 2011: x).

at lower cost. Merit goods are goods that are provided by the state on the grounds that individuals ought to consume them but would not act in their own self-interest to do so without subsidization. Government spending on arts and culture is sometimes explained in terms of a merit good rationale.[12] Despite the market failure argument, many of the activities and expenditures of government are social choices rooted in merit good arguments rather than the consequences of a market failure.[13]

The distributive function involves government transferring economic resources between individuals, as well as levels of government. In the absence of government redistributive activity, the distribution of wealth and income would depend on the ownership of factors of production and the demand for those factors, as well as voluntary redistribution through private charitable giving.[14] The prices those factors command in the factor market generate a distribution of wealth and income. The income and wealth distribution arising from market forces may not conform to a society's notion of fairness, and government may decide to affect the distribution of income through a program of taxes and transfers if private mechanisms are unable to achieve this end. As a result, a tax system with increasing tax rates or exemptions, welfare programs, and subsidized housing programs can all be seen as income redistribution programs.

The government's role in income and wealth distribution brings to the fore the relationship between equity and efficiency**.** Equity concerns perceptions of fair treatment while efficiency is a matter of obtaining maximum output at minimum cost. These two concepts can have resource implications that may conflict. Policies that promote more fairness can have resource implications that may interfere with efficiency and economic growth.[15]

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12 Indeed, this merit good argument can be traced back to the classical economists, particularly John Stuart Mill (see Barber, 1984: 104). It should be noted that even in the case of arts and culture, there is a case to be made that private mechanisms are also of importance (see Cowen, 1998).

13 For example, consider the public monopoly on the provision of alcohol through the Liquor Control Board of Ontario. It cannot be effectively argued that there is a market failure in the production and sale of alcoholic beverages that requires government intervention.

14 There is a literature on the voluntary/private provision of public goods. See Bergstrom et al. (1986) and Smith et al. (1995).

15 For a fuller discussion of equity, efficiency, and the roles of government, see also Rosen et al. (2008: 36–48).

Finally, the stabilization function of government concerns actions taken to affect employment and prices. Government, through tax and spending policies, can influence the level of aggregate demand.[16] Keynesian and New Keynesian economists who advocate more government intervention to stabilize the economy argue that information problems and rigidities can arise in the economy, which cause economic decision coordination problems and these can result in unemployment.[17] In contrast, classical and neoclassical macroeconomic theorists argue that economic agents are rational, informed, and forward-looking beings, and therefore government cannot systematically influence price, output, and employment in the economy.

Other views of the economic role of government have challenged the benign role often assigned to government in the Musgravian approach.[18] For example, Albert Breton (1998) has argued that models of governments fall into two main categories: common good approaches where government is the embodiment of a common will that is then used to pursue common goals, and self-interest models where government merely reflects the interests of those in power. The self-interest models are rooted in the public choice school of public finance.

The foundations of the school of public choice are set out by James Buchanan and Gordon Tullock (1962). In their view, the state is not representative of an organic community will but is simply the representation of the self-interest of separate individuals whose social interests can be promoted by market-type arrangements and decentralized political arrangements. According to Tanzi (2011: 182–89), the strands of the public choice approach include how public policy creates benefits for particular groups rather than the public interest, the creation of voluntary arrangements to produce social

16 This role is very much the product of the Great Depression and Keynesian economics. John Maynard Keynes argued in his *General Theory of Employment, Interest, and Money* (Keynes, 1936) that market economies were inherently unstable because investment spending was a volatile component of national expenditure. Therefore, government expenditures were needed to stabilize the economy.

17 For an elementary overview of schools of thought in macroeconomics, see Ragan and Lipsey (2008: 760–66) and Krugman et al. (2007: 453–74).

18 As Tanzi (2011: 183) notes in a famous debate between Musgrave and Buchanan, a key difference, according to Buchanan, is that public choice economics distrusts rather than trusts politicians.

output or public goods,[19] and the development of rules or fiscal constitutions that ensure individual freedom and constrain the size of the state. Indeed, "public choice has been important in calling attention to the fact that there is market failure as well as government failure and that the latter could be greater than the former" (Tanzi, 2011: 188).

Brennan and Buchanan (1977, 1978, and 1980) developed one of these self-interest models as the Leviathan hypothesis. Under the Leviathan view, government is a coercive entity with the power to tax and is a monolithic revenue maximizer operating subject to constitutional fiscal restraints. As Brennan and Buchanan write, "For the ordinary citizen, the power to tax is the most familiar manifestation of the government's power to coerce. This power to tax involves the power to impose, on individuals and private institutions more generally, charges that can be met only by a transfer to government of economic resources, or financial claims to such resources" (Brennan and Buchanan, 1980: 8).

Under the Leviathan hypothesis, there may be a relationship between the size of the public sector and fiscal centralization. According to Brennan and Buchanan (1980: 185), "Total government intrusion into the economy should be smaller, *ceteris paribus*, the greater the extent to which taxes and expenditures are decentralized." Knowing the determinants of fiscal centralization is useful from an economic policy perspective in that decentralization of public sector activities to a grass roots level is often seen as welfare enhancing (Wolman, 1990: 29–42). Decentralization of government activities—accompanied as they may be by a smaller public sector—may improve accessibility and local responsibility and generally make government more effective by bringing it closer to the people (Bird, 1993: 209). However, the empirical evidence concerning the effectiveness of decentralization on restraining public sector size has been mixed at best.[20] Indeed, lower tiers of government have often been marked by substantial expenditure growth.[21]

The modernist school and the competitive views of government are similar in that they stress the distinction between a private sector and a public

19 Private arrangements reduce transactions costs in a manner pointed out by Coase (1937).

20 For an empirical attempt at evaluating the Leviathan hypothesis, see Oates (1985). For a Canadian effort, see Di Matteo (1995).

21 In Canada, the Canadian Federation of Independent Business has documented the rapid growth of municipal spending in major Canadian cities (see Gormanns, 2013).

sector. Another somewhat different view of government and the public sector that focuses on institutions is known as the Italian school. Associated with the work of Antonio De Viti De Marco, it does not see the public and private sectors as watertight compartments. De Viti De Marco (1936) viewed public and private activity as intertwined. The activities and institutions of government and the state were very much a part of the production process of private firms, as they provided the firms with institutions such as property rights, as well as infrastructure and goods and services.[22] Such an approach to the role of government emphasizes that governments do not operate in isolation but can impact private sector resource allocation and decision making with their activities.

Any study that measures the size and impact of government on the economy invariably needs to compare measures of public sector size. However, how intrusive government is in an economy is also a function of the extent to which various approaches to the role of government have been internalized in the public decision-making psyche of the citizens and their leaders. Unfortunately, much public discussion of the role of government—whether it concerns health care, education, economic growth, or some other issue—seems to reflect the view that the public and private sectors are operating in watertight compartments. In fact, the insight of the Italian school—that the two are intertwined—is key to understanding that government has an important effect on economic performance.

22 As De Viti De Marco writes (1936: 51), "The deviations from the principle of maximum economic advantage which are due to political factors increase the price that tax-payers are called upon to pay for the production of public services: but they do not alter the fact that the State tends to specialize in the production of a given category of goods, just as private enterprise does. It is precisely this fact that shows the error of treating the phenomena of Public Finance as if they were dissociated from Private Economics. In fact they form an integral part of the general organism of production, exchange and consumption of goods."

Appendix 2

Data Sources

World data

Variable	Source	Website
Gross domestic product in purchasing power parity (PPP) valuation of country GDP	International Monetary Fund, *World Economic Outlook Database: October 2012 Edition*	<http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx>
Implied PPP conversion rate		
Gross domestic product, national currency units, current prices		
General government revenue, national currency units		
General government total expenditure, national currency units		
General government net debt, national currency units		
Total investment as a percentage of GDP		
Population		
Employment		
Unemployment rate		

OECD data

Variable	Source	Website
Gross domestic product in current prices	OECD Statistics	<http://www.oecd.org/statistics/>
Gross domestic product in PPP dollars		
Purchasing power parities for GDP		
Real gross private non-residential fixed capital formation, volume		
Consumer Price Index		
Inflation rate (based on CPI)		
Total employment		
Unemployment rate		
Public sector employment	OECD Statistics International Labour Organization (ILO), LABORSTA database	<http://www.oecd.org/statistics/> <http://laborsta.ilo.org>
Population	OECD Statistics	<http://www.oecd.org/statistics/>
Population aged 0-14, 15-64 and 65+		
General government revenues		
General government expenditure		
General government net financial liabilities, as a percentage of GDP		
Government spending by category		
a. General public services		
b. Defense		
c. Public order and safety		
d. Economic affairs		
e. Environmental protection		
f. Housing and community amenities		
g. Health		
h. Recreation, culture, and religion		
i. Education		
j. Social protection		
Life expectancy at birth		
Infant mortality rates		

Variable	Source	Website
Overall mortality rate	World DataBank	<http://data.worldbank.org/indicator/SH.DYN.MORT?display=default>
Cancer death rate	OECD Statistics	<http://www.oecd.org/statistics/>
Obesity rate		
Hospital beds per 1,000 population		
Physicians per 1,000 population		
Secondary school completion rate	OECD Statistics, *Education at a Glance 2012*, Table A2.3. Trends in graduation rates (first-time) at upper secondary level (1995–2010)	<http://www.oecd.org/edu/eag2012.htm>
Secondary school enrollment	World DataBank	<http://data.worldbank.org/indicator/SE.SEC.NENR?display=default>
Proportion of population with post-secondary education	OECD Statistics, *Education at a Glance 2012*, Table A1.4. Trends in educational attainment: 25–64 year-olds (1997–2010)	<http://www.oecd.org/edu/eag2012.htm>
Post-secondary enrollment	World DataBank	<http://data.worldbank.org/indicator/SE.TER.ENRR?display=default>
Student reading proficiency scores	OECD Statistics, PISA	<http://www.oecd.org/pisa/pisaproducts>
Literacy rate	World DataBank	<http://data.worldbank.org/indicator/SE.ADT.LITR.ZS>
Gini income inequality index, before and after taxes and transfers	OECD Statistics	<http://www.oecd.org/statistics/>
Gini income inequality index	World DataBank	<http://data.worldbank.org/indicator/SI.POV.GINI>

Variable	Source	Website
Gini wealth inequality index	Davies, James, Susanna Sandstrom, Anthony Shorrocks, and Edward N. Wolff (2009). *The Level and Distribution of Global Household Wealth*. NBER Working Paper No. 15508. National Bureau of Economic Research.	<http://www.nber.org/papers/w15508>
Income share of the bottom 20% of households	World DataBank	<http://data.worldbank.org/indicator/SI.DST.FRST.20/countries?page=6&display=default>
Crime rate variables		
Homicide rate	United Nations	<http://data.un.org/Data.aspx?q=homicide&d=UNODC&f=tableCode%3a1>
Property crime rate—burglary	UNODC	<http://www.unodc.org/unodc/en/data-and-analysis/statistics/crime.html>
Total number of prisoners		
Social variables		
Divorce rate	United Nations	<http://data.un.org/Data.aspx?q=divorce&d=POP&f=tableCode%3a16#POP>
Marriage rate		
Teen pregnancies	World DataBank	<http://data.worldbank.org/indicator/SP.MTR.1519.ZS?display=default>
Human Development Index	UNDP, UN Data	<http://hdrstats.undp.org/en/indicators/103106.html>
OECD Better Life Index	OECD Statistics	<http://www.oecdbetterlifeindex.org/>

Governance indicators

Variable	Source	Website
Annual average of five indicators	Worldwide Governance Indicators, 2012 Update	<http://www.govindicators.org>
Voice and accountability		
Political stability and absence of violence		
Regulatory quality		
Rule of law		
Control of corruption		

Economic freedom

Variable	Source	Website
Summary index of five broad areas, annual data, 2000–2011	Economic Freedom of the World, Fraser Institute	<http://www.freetheworld.com/release.html>
Government size (expenditures, taxes, enterprises)		
Legal structure and security of property rights		
Access to sound money		
Freedom to trade internationally		
Regulation of credit, labour, and business		

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