



# Pointmaker

## SMALL IS BEST

### LESSONS FROM ADVANCED ECONOMIES

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#### SUMMARY

- This statistical paper analyses the performance of countries defined as 'advanced' by the International Monetary Fund (IMF). It investigates the claim made by advocates of supply-side theories that smaller government leads to higher economic growth.
- In addition, it examines whether smaller governments are associated with worse outcomes in health and education.
- Econometric analysis of advanced OECD countries for the period 1965-2010 finds that a higher tax to GDP ratio has a statistically significant, negative effect on growth. For example, an increase in the tax to GDP ratio of 10 percentage points is found to lower annual per capita GDP growth by 1.2 percentage points. A similarly statistically significant negative effect on growth is found with a higher *spending* to GDP ratio.
- For the last 10 years, advanced small government countries have, on average, seen significantly higher growth rates than advanced big government countries.
- Between 2003 and 2012, real GDP growth was 3.1% a year for small government countries (i.e. where both government outlays and receipts were on average below 40% of GDP for the years 1999 to 2009), compared to 2.0% for big government countries.
- There is little evidence that small government countries have worse social outcomes:
  - Health outcomes are mixed: in the past 10 years, life expectancy in small government countries has been higher than in big government countries. Infant mortality has been lower in big government countries.
  - Statistical evidence from the last 10 years suggests that small government countries achieve higher academic outcomes.
- Correlation does not mean causation for these social variables – but the evidence supports the view that economies with small governments tend to grow faster, and, at the very least, do not perform systematically worse than big government countries in terms of social outcomes.



## 1. THE SUPPLY-SIDE HYPOTHESIS

A strong free-market economy requires effective governance. Government is required to defend the nation, to enforce property rights, to provide public goods and to intervene in markets which exhibit large externality effects.

However, many rich countries now have governments which do far more than this. These larger states require increased tax revenue and, since taxation is distortionary, this creates inefficiencies. Economies with low tax burdens will be subject to less distortionary taxation and so will be more efficient.

Supply-side economists go on to argue that, by encouraging enterprise and risk-taking, the low tax rates in small government countries will lead to higher rates of economic growth. The implication is that, as long as the effect on economic growth is sufficiently large, small government countries may be able to invest as many resources into public services as big government countries. As a result there is no *a priori* reason to expect small governments to deliver worse objective social outcomes.

In the 1980s, this supply-side hypothesis strongly influenced the economic policies of Ronald Reagan and Margaret Thatcher. Since then, many countries have followed their example by cutting taxes and constraining the size of government.

Now, 30 years later, this paper examines evidence with respect to the two main claims made by supply-side economists. Namely:

1. that economic growth in countries with small governments tends to be higher than in countries with big governments;
2. that small governments deliver no worse social outcomes than big governments.

To test these claims, the performance of a set of “advanced” economies – as defined by the IMF – is examined here.<sup>1</sup> Restricting the sample to rich countries is justified for two reasons:

- The supply-side theory is based around the idea that tax rates (in particular marginal rates) cause detrimental growth effects. Tax compliance levels tend to be much higher in advanced economies, meaning that tax revenues are an effective proxy for tax rates in these countries.<sup>2</sup>
- For almost all of the economies examined in this paper, spending on R&D, human capital and schooling amounts to between 25% and 33% of total government expenditure. This means that the size of government is largely determined by the level of government transfers.

The rest of the paper is set out as follows:

- Section 2 explains why supply-side economists claim that lower tax rates can generate faster economic growth in the long run.
- Section 3 undertakes a pooled cross-section regression analysis for all advanced IMF countries in the OECD to examine how

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<sup>1</sup> The countries examined in this paper are: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom, United States.

<sup>2</sup> The main argument for this comes from W Easterly, *Comment on Slemrod*, Brookings Papers on Economic Activity 2, 1995.



government size affects economic growth, controlling for a range of other factors.<sup>3</sup>

- Section 4 divides the 34 current IMF advanced economies into two groups – those defined as small (with average tax and government spending rates of below 40% of GDP over the past 10 years) against big government countries (the rest), comparing their growth performance and highest corporate and marginal income tax rates over the period.<sup>4</sup>
- Section 5 completes the analysis by examining how a range of objective social outcomes are correlated to government size.

## 2. GOVERNMENT SIZE AND ECONOMIC GROWTH – THE THEORY

Supply-side theory is grounded on classical economic assumptions about how incentives change behaviour. The conclusion that lower taxes are desirable should not be confused with the views of short-term fiscal expansionists, who think that higher growth will arise through the direct Keynesian effect of tax cuts on aggregate demand. In fact, the argument of supply-side economists is more nuanced. In order to understand it, it is

important to distinguish between the level of output and the long-run growth of output.

That cutting tax rates may well increase the level of output (and therefore also the growth rate) in the very short-run is fairly mainstream economics. A decrease in tax, for example on individuals, is likely to increase consumption. An increase in demand leads, *ceteris paribus*, to more output in the short-run and thus, short-term growth.

Furthermore, marginal income tax rates have a direct effect on the supply of labour – the higher they are, the less additional labour is rewarded. A decrease in the marginal rate therefore tends to make people work longer or harder, leading to a further increase in the level of output through increasing supply.

But neither of these channels has an effect on the growth rate in the long run: higher demand leads to higher output only in the short-run (in the long-run it merely leads to higher prices). Working longer hours has a long-run effect on the level of output, but not on the rate of growth. Only in the short-run (namely during the transition period from the former level of output to the new and higher level of output) will one observe a higher rate of economic growth.

Why do supply-side economists go one stage further and suggest that tax rates can affect the economic growth rate?

The answer lies in the effect on risk-taking and entrepreneurship of lower marginal tax rates. Taking risks is a prerequisite for any kind of capitalist endeavour. Arthur Pigou even called risk an ‘elementary factor of production

<sup>3</sup> Time series data on government outlays and tax as a proportion of GDP were only available for OECD countries within our sample of advanced countries. The regression analysis therefore excludes the following countries which were in the full IMF sample: Cyprus, Hong Kong, Malta, Singapore and Taiwan.

<sup>4</sup> IMF, *World Economic Outlook*, 2011. The division between big and small government follows the methodology used by Keith Marsden in *Big, not Better* (CPS, 2008). The differences in economic and social outcomes between big and small government countries reported in this article are statistically significant at the 0.1 level (or better) using a one-tailed test, except when stated otherwise.



standing on the same level as any of the better-known factors'.<sup>5</sup>

Lower marginal tax rates, increasing the after-tax rate of return from work and investment, increase the incentive for potential entrepreneurs to take risks, while higher marginal rates reduce them. Greater risk-taking accompanied by a more efficient economy enables faster growth of productivity. It is therefore reasonable to expect to see a positive relationship between entrepreneurial activity and growth; and therefore also between low taxation and growth.

In some cases, lowering tax rates can even actually increase tax revenues, where these behavioural effects are large. At worst, they mean a portion of the static cost to government of a tax rate cut is recouped by changed behaviour and more entrepreneurial activity.

Endogenous theories of economic growth offer an alternative perspective, emphasising positive effects of public spending. These theories emphasise that investment in R&D and human capital, for example, can enhance long-run growth prospects because they are components of a production function that is also enhanced by increases in output.<sup>6</sup>

There is no doubt that some of these effects exist. However, as noted above, for almost all of the economies examined in this paper, spending on R&D, human capital and schooling typically amounts to between 25% and 33% of total expenditure. This means that the size of any particular government is largely determined

by the level of government transfers, for which there is no reason to expect a positive growth effect. Indeed, additional government expenditures, which require a higher tax burden, will dampen the extent to which these investments are utilised through entrepreneurial endeavour.

Of course, there could be other reasons to think that a larger government could harm economic growth prospects in the long run. For example, Gwartney et al (1998) highlight:<sup>7</sup>

- diminishing returns as governments undertake activities for which they are ill-suited;
- an interference with the wealth creation process, as governments are not as good as markets in adjusting and finding innovative new ways of increasing the value of resources.

### 3. THE DETAILED STATISTICAL ANALYSIS

Using tax to GDP and spending to GDP ratios as a proxy for size of government, regression analysis can be used to estimate the effect of government size on GDP growth in a set of countries defined as advanced by the IMF between 1965 and 2010.<sup>8</sup>

<sup>5</sup> A Pigou, *The Economics of Welfare*, 1920.

<sup>6</sup> P Minford and J Wang, "Public Spending, Taxation, and Economic Growth – the evidence" in *Sharper Axes, Lower Taxes*. Institute of Economic Affairs. 2011.

<sup>7</sup> J Gwartney, R Lawson and R Holcombe, *The size and functions of Government and Economic Growth*, Joint Economic Committee, Washington, April 1998.

<sup>8</sup> All countries defined as advanced by the IMF for which there existed tax and spending data from the OECD were included. The countries for which the relevant data was not available were: Cyprus, Hong Kong, Korea, Malta, Singapore and Taiwan. Some studies have simply used government consumption, rather than total government outlays, to proxy for government size. This was rejected for the purposes of this study, as the key driver is thought to be the incentive effects associated with lower marginal tax rates. In this



The factors which underpin economic growth in the long-run are subject to wide-scale debate in the academic literature. This led the Nobel laureate economist Robert Lucas to once say "Once you start thinking about economic growth, it is hard to think about anything else." Results analysing how the size of government affects economic growth tend to differ according to which other control variables are included in the relevant regression analyses.<sup>9</sup> Similarly, differing results have been found dependent on whether the regressions have been undertaken on a pure cross-sectional or panel data basis.

Annual data is unsuitable for this purpose as any countercyclical, fiscal policy response to the business cycle will naturally result in greater government expenditure during periods of low economic growth. In order to avoid this biasing our results, we collapse our data into 10 five-year intervals: 1960-64, 1965-1969, 1970-74, 1975-79, 1980-84, 1985-89, 1990-94, 1995-99, 2000-04 and 2005-09; and undertake the regression on pooled cross-section basis.<sup>10</sup>

In deciding which other variables to include, we draw on mainstream economic growth

theory.<sup>11</sup> According to this, the growth rate of output per capita is determined by technological progress and the growth rate of the factors of production: the growth rate of physical capital per capita, the growth rate of human capital per capita and the growth rate of the labour force. Therefore, each regression specification includes: an initial GDP measure (to account for conditional convergence), investment as a proportion of GDP, the growth rate of the labour force, and the growth rate of human capital (proxied by the growth rate of average years of school).

To overcome the issue of unobserved heterogeneity between countries, we also include country-level fixed effects. These account for any country-specific factors that are constant over time.<sup>12</sup>

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context, the effect of government spending on transfer payments is indistinguishable from government consumption.

<sup>9</sup> R Levine and D Renelt, "A sensitivity analysis of cross-country growth regressions", *American Economic Review* 82, 942-963, 1992.

<sup>10</sup> This approach is similar to that used in S Fölster and M Henreckson, *Growth Effects of Government Expenditure and Taxation in Rich Countries*, Working Paper Series in Economics and Finance 391, Stockholm School of Economics, 2001.

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<sup>11</sup> Building on the augmented Solow growth model outlined in G Mankiw, D Romer and D Weil, "A contribution to the Empirics of Economic Growth", *Journal of Economics*, Volume 107 Issue 2 407-437, 1992.

<sup>12</sup> A fixed effects estimator allows us to time demean the data and thus enables the elimination of any time-invariant individual unobservable country effects. The problem with this method, however, is that it also eliminates the information provided by variables that vary little for a country over time. That said, this estimation method is taken as the preferred method since it allows for variable country production functions (using the panel data time-series element) and goes furthest to eliminating biases associated with endogeneity.



## THE ECONOMETRIC MODEL

The following specifications were estimated:<sup>13</sup>

- 1) Government size proxied by the tax revenue to GDP ratio:

$$Gr_{i,t} = \alpha + \beta_1 \left( \frac{TAX}{GDP} \right)_{i,t} + \beta_2 \left( \frac{I}{GDP} \right)_{i,t} + \beta_3 (y_{i,t}) + \beta_4 (LFG_{i,t}) + \beta_5 (HCG_{i,t}) + \mu_i + \varepsilon_{i,t}$$

- 2) Government size proxied by the Government Spending to GDP ratio:

$$Gr_{i,t} = \alpha + \beta_1 \left( \frac{OUTLAYS}{GDP} \right)_{i,t} + \beta_2 \left( \frac{I}{GDP} \right)_{i,t} + \beta_3 (y_{i,t}) + \beta_4 (LFG_{i,t}) + \beta_5 (HCG_{i,t}) + \mu_i + \varepsilon_{i,t}$$

Where:

- $i$  represents the country and  $t$  each five year time period.
- $Gr_{i,t}$  is the growth rate of real GDP per capita per year.<sup>14</sup>
- $\left( \frac{TAX}{GDP} \right)_{i,t}$  is the average tax-to-GDP ratio in each five year period.
- $\left( \frac{OUTLAYS}{GDP} \right)_{i,t}$  is the average government outlays to GDP ratio in each five year period.
- $\left( \frac{I}{GDP} \right)_{i,t}$  is the average investment to GDP ratio in each five year period.
- $y_{i,t}$  is the initial real GDP per capita at the start of each five year period.
- $LFG_{i,t}$  is the average annual growth rate of the labour force in each five year period.
- $HCG_{i,t}$  is the annual growth rate of the average years of schooling in the total population in each five year period.
- $\mu_i$  represents country fixed-effects dummy variables.

The supply-side hypothesis would thus suggest that coefficient  $\beta_1$  should be negative and statistically significant for both equations 1) and 2).

<sup>13</sup> A list of the sources for the variables used can be found in Appendix 1.

<sup>14</sup> Calculated by  $\left( \frac{Gr_E}{Gr_B} \right)^{\frac{1}{E-B}} - 1$ ; where B = beginning of period, E = end of period.



Table 1 in the Appendix presents the results. As supply-side economists would expect, the coefficients on the tax revenue to GDP and government spending to GDP ratios are negative and statistically significant. This suggests that, *ceteris paribus*, a larger tax burden results in a slower annual growth of real GDP per capita. Though it is unlikely that this effect would be linear (we might expect the effect to be larger for countries with huge tax burdens), the regressions suggest that an increase in the tax revenue to GDP ratio by 10 percentage points will, if the other variables do not change, lead to a decrease in the rate of economic growth per capita by 1.2 percentage points.<sup>15</sup> The result is very similar for government outlays to GDP, where an increase by 10 percentage points is associated with a fall in the economic growth rate of 1.1 percentage points.<sup>16</sup> This is in line with other findings in the academic literature.<sup>17</sup>

The robustness of this result was tested in several ways. First, time dummies were used to check whether the result was being driven by shocks affecting all countries (see columns 3

and 4 of Table 1 in the Appendix). This barely changed the finding for the tax to GDP ratio, and actually strengthened the result for the government outlays to GDP ratio.

The result was also robust to the inclusion of the following control variables: the percentage of the population aged either younger than age 15 or older than age 64, and the openness of the economy (measured as the sum of exports and imports as a percentage of GDP). As Table 2 shows, the coefficient on the tax revenue to GDP ratio is still negative and significant at the 0.01 level. In fact, the effect measured is now even slightly stronger to the baseline case.

Our empirical results are therefore supportive of the first assertion made by supply-side economists: bigger government appears to lead to slower economic growth.

#### 4. THE LAST 10 YEARS

Expanding the sample to all 34 economies defined as ‘advanced’ by the IMF over the past 10 years supports these findings. Following Keith Marsden’s approach, we define 11 economies as having “small governments” (i.e. where both government outlays and receipts were on average below 40% of GDP for the years 1999 to 2009) while all others are labelled as having “big governments”.<sup>18</sup>

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<sup>15</sup> Statistically significant at the 1% level – this result is presented in Column 1 of Table 1 in the Appendix.

<sup>16</sup> Statistically significant at the 5% level – this result is presented in Column 2 of Table 1 in the Appendix.

<sup>17</sup> For example, A Afonso and D Furceri estimated that a percentage point increase in the tax revenues to GDP ratio, on average, reduces output growth by 0.12% for OECD and EU countries. See *Government Size, Composition, Volatility and Economic Growth*, European Central Bank Working Paper Series No 849, 2008. Similarly, an influential work of Robert Barro has previously shown that growth is inversely related to the share of government consumption in GDP. See “Economic Growth in a Cross Section of Countries”, *The Quarterly Journal of Economics*, Vol. 106, No. 2, 1992.

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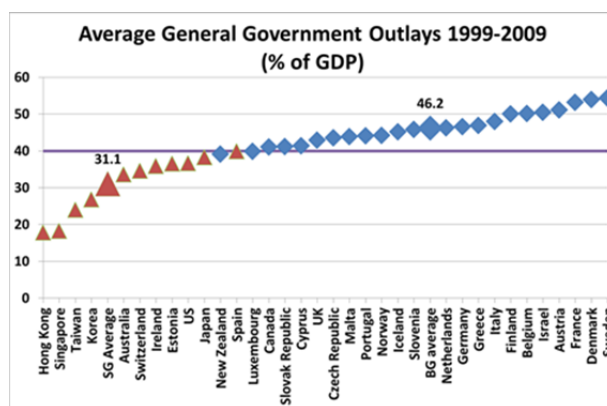
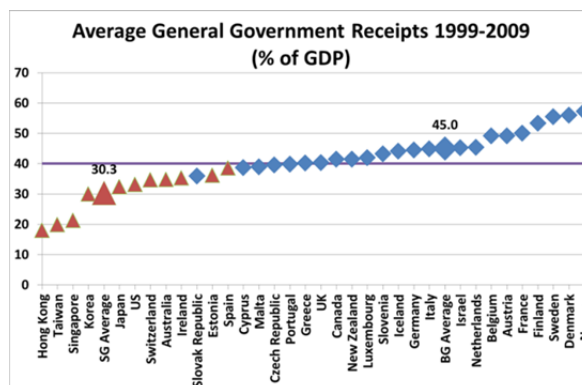
<sup>18</sup> K Marsden, *Big, not better? Evidence from 20 countries that slim government works better*, CPS, 2008.



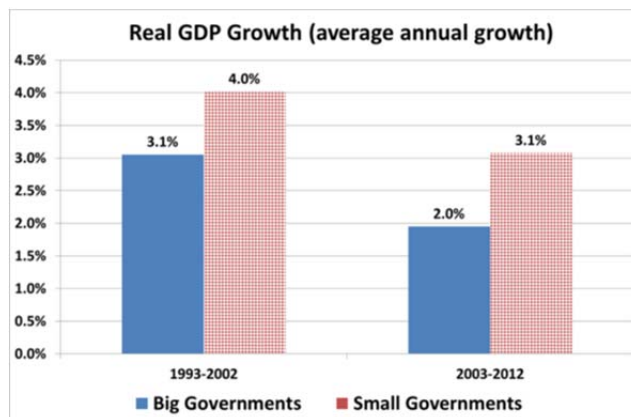
The two sets of countries are:

Small government countries	Big government countries
Australia	Austria
Estonia	Belgium
Hong Kong	Canada
Ireland	Cyprus
Japan	Czech Republic
Korea	Denmark
Singapore	Finland
Spain	France
Switzerland	Germany
Taiwan	Greece
US	Iceland
	Israel
	Italy
	Luxembourg
	Malta
	Netherlands
	New Zealand
	Norway
	Portugal
	Slovak Republic
	Slovenia
	Sweden
	UK

The charts below show the average size of the 34 economies between 1999 and 2009 according to the OECD, in terms of both General Government Receipts and Total Outlays as a proportion of GDP.<sup>19</sup> They show that average outlays have been 46.2% of GDP in big government countries – 15.1 percentage points higher than average outlays in small government countries. Similarly, the tax burden averaged 14.7 percentage points higher in big government countries in the years 1999-2009. This means that the average tax burden was around 48.5% higher in big government countries.



Small government countries in our sample have grown significantly faster than the big government countries. GDP grew in the slimmer government group at a 3.1% average annual rate from 2003-2012 (including its forecast for the current year), compared to 2.0% per year in the bigger government countries.

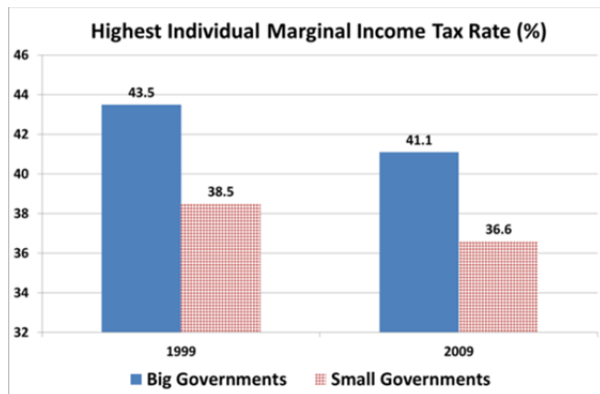


<sup>19</sup> Statistics taken from OECD, *Economic Outlook 90*, December 2011, Annex Tables 25 and 26.

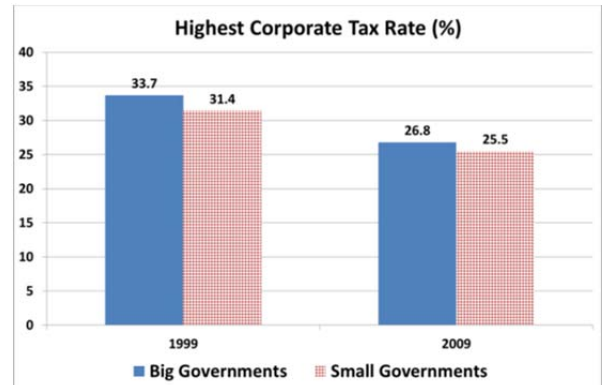




One of the major legacies of supply-side thinking has been the general downward trend of the top rates of individual income and corporate income tax. According to the World Bank, both big and small government countries have reduced their highest marginal income tax rate since 1999, though big government countries started from a higher base. Big government countries reduced theirs from an average of 44% to 41% from 1999 to 2009, whilst smaller governments have gone from 39% to 37%.<sup>20</sup>



The same is true of the average highest corporate tax rate for each group. Big governments have seen their highest average rate fall from 34% to 27%, while small governments have seen their average fall from 31% to 25%.<sup>21</sup>



The effect that the financial crisis has had on growth means that examining the effects of the lowering of these marginal rates over time on growth is unlikely to be revealing. However, at an individual country level, there is evidence to suggest that low marginal tax rates are associated with higher economic growth.

The two small government economies with the lowest marginal tax rates, Singapore and Hong Kong, were also those which experienced the fastest average real GDP growth.

Meanwhile, the three economies with the fastest growth in the big government countries group – Czech Republic, Israel and the Slovak Republic – all saw significant cuts in their corporate tax rates between 1999 and 2009 (by 15, 10 and 21 percentage points respectively). This coincided with average annual real GDP growth rates of 3.2%, 4.0% and 4.7%. These three countries by 2009 had the lowest tax burdens of any of the 'big government' countries, when receipts were 39.1%, 39.3% and 33.5% of GDP respectively.<sup>22</sup>

<sup>20</sup> Data from World Bank World Development Indicators (2001) Table 5.5 and World Bank World Development Indicators 2010 Table 5.6.

<sup>21</sup> The difference in the highest marginal tax rate is not statistically significant at the 0.10 level (using a one-tailed test) for 2009, reflecting the fact that the difference between the groups became smaller. The difference between the two groups in terms of the highest corporate tax rate is statistically insignificant for 1999 and 2009.

<sup>22</sup> The reduction in the average top marginal tax rate for the big government group is largely driven by the huge rate cuts in the Slovak Republic and Czech Republic. Excluding these two countries from the bigger government sample, the highest marginal rate was largely unchanged. There is one exception: Greece, where tax receipts have plummeted.



Both the Slovak Republic and the Czech Republic have also cut their top rates of marginal income tax by 25 and 23 percentage points (the Czech Republic from 40% to 15%, and the Slovak Republic from 42% to 19%).

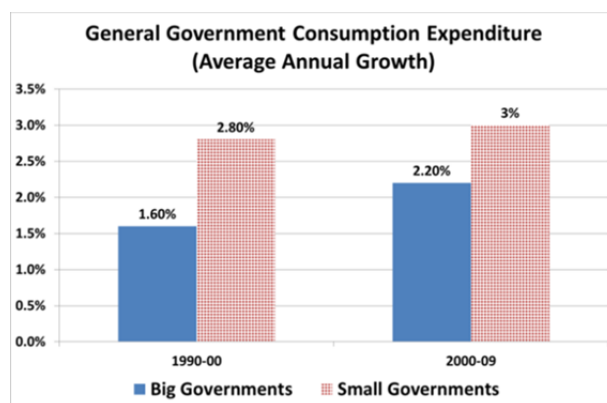
## 5. BIGGER GOVERNMENT, BETTER SOCIAL OUTCOMES?

The evidence presented so far appears to support the bulk of academic literature on the subject – rich countries with smaller governments tend to grow more quickly than big governments. A recent World Bank study found that this effect is particularly pronounced when government spending exceeds 40% of GDP.<sup>23</sup>

Of course the goal of public policy is not just to maximise economic growth and attention must be paid to the effect of reducing the size of government on social outcomes like health and education. A vast array of factors determines these outcomes, including social and cultural factors, which are beyond the scope of this report. Clearly, some countries with big governments, such as Sweden, have very good social outcomes. Similarly, it is possible to find examples of countries with small governments with relatively bad performance in health and education. The key question is whether small government countries do systematically worse in terms of social outcomes.

One of Margaret Thatcher's key claims was that the wealth created through her economic liberalisation produced increased funds to improve public services. The evidence below shows why: the higher growth rates in small government countries for our sample in the

previous section has allowed government consumption (that is, government spending on public services, excluding social benefit transfers) to grow faster than in big government countries.<sup>24</sup>



This indicates that the assertion made by the supply-side economists (that small governments will not deliver worse public services than big governments) might be true. At least, the amount of resources that are available for the provision of public services has grown more rapidly in small government countries than in big government countries over the past 20 years.

This is not surprising, given that small government countries have experienced higher economic growth. If government consumption relative to GDP stays about constant over a given time period (an assumption that is more or less fulfilled for the countries in our sample), government consumption will grow at the same rate as the economy. If the economy in small government countries grows faster than in big government countries, government consumption in small government countries will therefore grow faster as well.

<sup>23</sup> World Bank, *Golden Growth*. Chapter 7: Government, 2010.

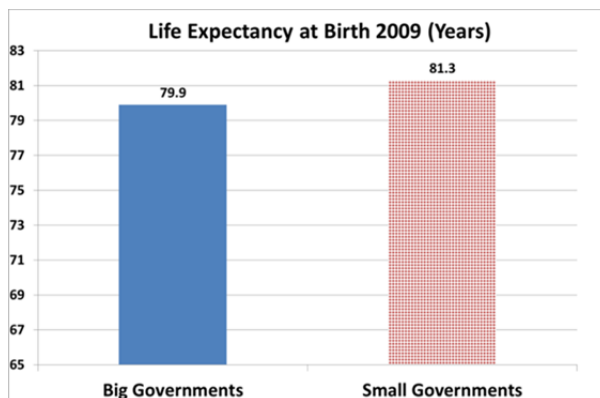
<sup>24</sup> World Bank, *World Development Indicators*, 2011, Table 4.9.



However, it is important to distinguish the resources devoted to public services from the outcomes generated. The evidence on the question of whether small governments deliver better social outcomes than big governments is mixed, but does not imply that small government results in systematically undesirable outcomes.

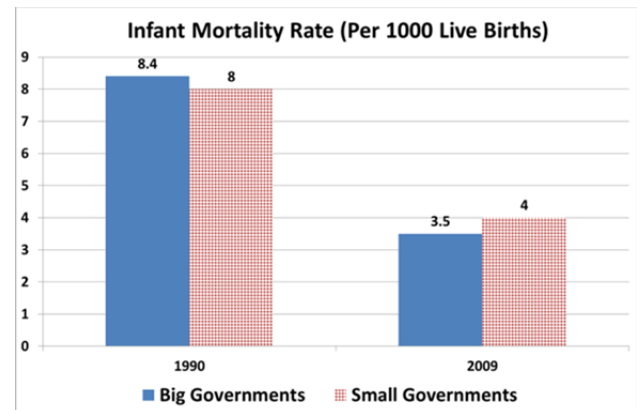
Examining the effect on health outcomes, for example, does not point in any particular direction. Regressing life expectancy and infant mortality on initial income and the government outlays to GDP ratio results in statistically insignificant coefficients on the government size variables.<sup>25</sup> Similarly, directly comparing the outcomes for big and small government countries over the last 10 years gives mixed results.

On the one hand, life expectancy at birth in 2009 was higher in small government countries than in big government countries.<sup>26</sup>



On the other, infant mortality was both lower and had fallen faster in big government countries than in small government countries

(though the difference was statistically insignificant).<sup>27</sup>



In education, the primary school pupil-teacher ratio in 2009 was on average more favourable in big government countries than in small government countries (13.9 versus 17.0). The tertiary education gross enrolment rate as of 2009 is more or less the same for the two groups: in big government countries, the rate is only 0.02 percentage points higher than in small government countries.<sup>28</sup>

What is more interesting than the input in the education sector, though, is its output in terms of achievement.<sup>29</sup> Comparing the PISA Mathematical Literacy of pupils in small government countries with pupils in big government countries, one can see that the mean score in small government countries is

<sup>25</sup> See Appendix.

<sup>26</sup> World Bank, *World Development Indicators*, 2011.

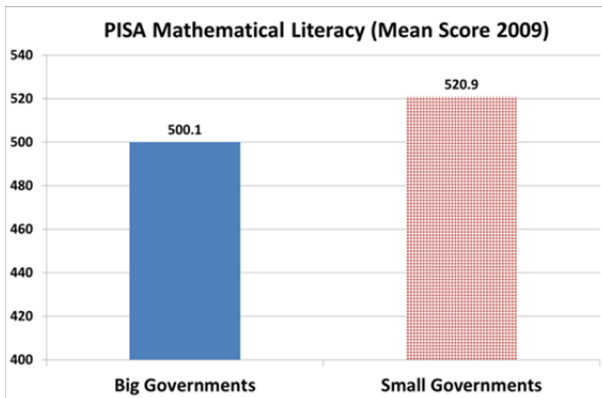
<sup>27</sup> Data from World Bank, *World Development Indicators*, 2011, Table 2.22. Neither the difference in life expectancy nor the difference in the infant mortality rate (for 1990 and 2009) is statistically significant.

<sup>28</sup> Obviously, this difference is not statistically significant.

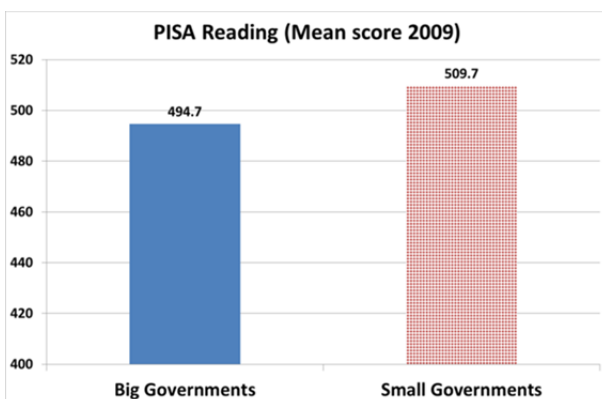
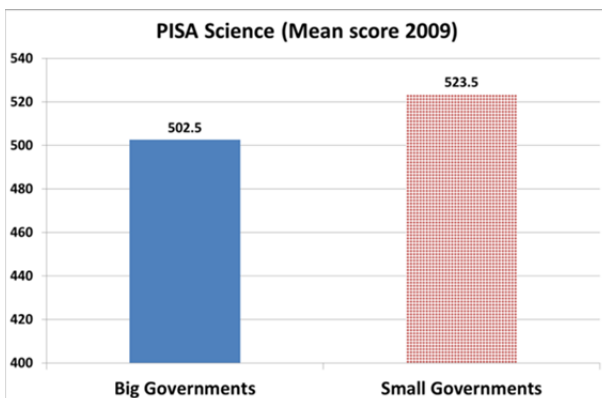
<sup>29</sup> The same is, of course, true for other variables as well. For example, in *Five Fiscal Fallacies* (CPS, 2011), Tim Morgan showed that increasing resources towards the NHS had occurred at the same time as a significant decline in its efficiency.



significantly better, being 20.8 points higher than in big government countries.<sup>30</sup>



The same is true in terms of PISA scientific and literacy outcomes: our small government countries do better than big government countries.



<sup>30</sup> Data taken from World Bank World Development Indicators 2011 Table 2.14. This difference is statistically significant at the 0.05 level (using a one-tailed test).

Of course, one must be careful not to associate these statistics as being a consequence of smaller government, or indeed faster economic growth. But what is certainly clear is that there is no clear evidence – in either the health or the education data – that small governments do substantially worse than big governments in delivering social outcomes.

What about in other areas?

- Employment: small and big government countries saw almost identical average annual employment growth between 2000 and 2009 (1.2% compared to 1.1%).
- Youth unemployment: female youth unemployment was, on average, lower in small government countries than big government countries between 2006 and 2009 (14.2% vs. 17.4%), whilst male youth unemployment was almost identical (17.6% vs. 17.5%).
- Household consumption growth was faster, on average, for small government countries than big government countries between 2000 and 2009 (3.2% per year vs. 2.5%).

Whilst each of these subjects is worthy of detailed analysis, there does not seem to be any evidence of a systematic relationship between the size of government and a range of objective social outcomes.

## 6. CONCLUSIONS

The statistical analysis presented here is supportive of the assertion made by supply-side economists that the growth performance of countries with smaller governments will be better than those with bigger governments. Furthermore, small governments do not appear to deliver worse social outcomes.



It is important to note that, if a small state with a low tax burden leads to significantly higher growth, it is likely that it will have more resources to devote to public service provision, even if it dedicates less as a proportion of GDP.

The example of Singapore illustrates this point: life expectancy in Singapore is 81, despite just 3.3% of national income being devoted to health expenditure. In other words, their high GDP allows them to achieve first-class health outcomes and still devote a larger part of their income to the consumption of goods and services than most other countries.

There are several policy implications of the statistical findings:

1. Politicians should recognise the potential for tax rate cuts to stimulate economic growth.
2. Financed tax cuts – i.e. tax cuts paid for by cutting government expenditure – might be a way to cut the size of the state while generating economic growth by improving the efficiency of the economy and encouraging entrepreneurial behaviour.
3. Policymakers should focus on outcomes rather than on inputs when discussing public services. The success of policies should be judged against objective, desirable aims, not the proportion of GDP that is spent.



## APPENDIX

The countries included in the regression analysis are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States.

The further countries added for Section 4 are: Cyprus, Hong Kong, Korea, Malta, Singapore and Taiwan.

Variable	Definition	Source
<b>Dependent variable</b>		
<b><i>Gr</i></b>	Growth of output per capita (PPP Converted GDP Per Capita (Laspeyres), derived from growth rates of c, g, i, at 2005 constant prices)	Penn World Table 7.0
<b>Independent variables</b>		
$\frac{TAX}{GDP}$	Total tax to GDP ratio	OECD Country Statistical Profiles
$\frac{OUTLAYS}{GDP}$	Government expenditure to GDP ratio	OECD Country Statistical Profiles
$\frac{I}{GDP}$	Investment to GDP ratio (Investment Share of PPP Converted GDP Per Capita at current prices, %)	Penn World Table 7.0
<i>y</i>	Initial output per capita (PPP Converted GDP Per Capita, G-K method, at current prices, in \$) for each period	Penn World Table 7.0
LFG	Average annual growth rate of the labour force, proxied by growth of population aged 15-64	OECD Country Statistical Profiles
<b><i>HCG</i></b>	Annual growth rate of the average years of schooling in the total population	Barro-Lee Educational Attainment Dataset
<b>Openness</b>	The sum of exports and imports as a percentage of GDP	World Development Indicators, World Bank
<b>Population</b>	Percentage of population aged either younger than age 15 or older than age 64 (proxy for number of dependents)	World Development Indicators, World Bank



Table 1: Baseline Results				
	(1)	(2)	(3)	(4)
	GDP Growth	GDP Growth	GDP Growth	GDP Growth
Tax	-0.1198*** (0.0344)	- -	-0.1396*** (0.0451)	- -
Govt Expenditure	- -	-0.1056** (0.0390)	- -	-0.1960*** (0.0329)
Investment	0.0335 (0.0545)	-0.1172 (0.0933)	-0.0137 (0.0508)	-0.1529 (0.0911)
Initial GDP	-0.0001*** (0.0000)	-0.0001*** (0.0000)	-0.0000 (0.0001)	-0.0001 (0.0001)
Labour Force Growth	0.2560 (0.1627)	0.1211 (0.2164)	0.2399* (0.1295)	0.1255 (0.2079)
Human Capital Growth	-0.0752 (0.1161)	-0.3122 (0.1893)	-0.1187 (0.0947)	-0.1976 (0.1800)
Year Dummies	No	No	Yes	Yes
N	222	130	222	130
R <sup>2</sup>	0.2723	0.2741	0.4786	0.5723
1) Sample Includes all IMF 'advanced' economies except Cyprus, Hong Kong, Korea, Malta, Singapore and Taiwan 2) All specifications include country-level fixed effects 3) Standard errors, clustered by country, in parentheses 4) * denotes significance at 10 percent level, ** denotes 5 percent level and *** 1 percent level.				





Table 2: Results With Additional Controls				
	(1)	(2)	(3)	(4)
	GDP Growth	GDP Growth	GDP Growth	GDP Growth
Tax	-0.1161*** (0.0359)	- -	-0.1430*** (0.0437)	- -
Govt Expenditure	- -	-0.0724 (0.0432)	- -	-0.1593*** (0.0303)
Openness	0.0258** (0.0115)	0.0439** (0.0172)	0.0348*** (0.012)	0.0566*** (0.019)
Population	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Investment	0.0396 (0.061)	-0.0761 (0.0976)	-0.0072 (0.0639)	-0.075 (0.0894)
Initial GDP	-0.0001*** (0.0000)	-0.0001*** (0.0000)	-0.0001** (0.0000)	-0.0002** (0.0001)
Labour Force Growth	0.1447 (0.1499)	0.0702 (0.2045)	0.1148 (0.1113)	0.0335 (0.1943)
Human Capital Growth	-0.0625 (0.1204)	-0.3148* (0.1619)	-0.0965 (0.0991)	-0.1858 (0.1622)
Year Dummies	No	No	Yes	Yes
N	222	130	222	130
R <sup>2</sup>	0.2947	0.3263	0.5113	0.6361
1) Sample Includes all IMF 'advanced' economies except Cyprus, Hong Kong, Korea, Malta, Singapore and Taiwan				
2) Standard errors, clustered by country, in parentheses				
3) All specifications include country-level fixed effects				
4) * denotes significance at 10 percent level, ** denotes 5 percent level and *** 1 percent level.				





Table 3: Effect on Life Expectancy		
	(1) Life Expectancy	(2) Life Expectancy
Tax	-0.0413 (0.0453)	- -
Govt Expenditure	- -	0.0068 (0.0415)
Initial GDP	0.0000 (0.0000)	-0.0000 (0.0000)
Year Dummies	Yes	Yes
N	222	130
R <sup>2</sup>	0.9100	0.9441
1) Sample Includes all IMF 'advanced' economies except Cyprus, Hong Kong, Korea, Malta, Singapore and Taiwan 2) All specifications include country-level fixed effects 3) Standard errors, clustered by country, in parentheses 4) * denotes significance at 10 percent level, ** denotes 5 percent level and *** 1 percent level.		

Table 4: Effect on Infant Mortality		
	(1) Infant Mortality	(2) Infant Mortality
Tax	-0.3004** (0.1420)	- -
Govt Expenditure	- -	0.0096 (0.0455)
Initial GDP	0.0003 (0.0003)	0.0000 (0.0000)
Year Dummies	Yes	Yes
N	222	130
R <sup>2</sup>	0.7771	0.9212
1) Sample Includes all IMF 'advanced' economies except Cyprus, Hong Kong, Korea, Malta, Singapore and Taiwan 2) All specifications include country-level fixed effects 3) Standard errors, clustered by country, in parentheses 4) * denotes significance at 10 percent level, ** denotes 5 percent level and *** 1 percent level.		



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