

Stimulusgate

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Abstract

The Australian government's 2010 Budget Papers present econometric evidence that purports to show a positive and 'highly statistically significant' relationship between the size of stimulus spending and subsequent economic growth in a sub-set of G20 countries. The analysis concluded that those countries, such as Australia, that adopted early and large fiscal stimulus packages had subsequently outperformed those that had not done so. This analysis, however, turns on an untenable and substantial truncation of the available sample, and suggests a failure of quality-control processes with Treasury.

Introduction

Sometime over the weekend of 11–12 October 2008, then Secretary of the Treasury Ken Henry coined the phrase 'Go hard, go early, go households' (Taylor and Uren 2010: 78). By the time the Australian government had stopped pursuing this policy, some \$79.1 billion had been committed to be spent. This spending was announced over four packages. The Economic Security Strategy announced in October 2008 committed \$10.4 billion. The Nation Building package announced in December 2008 committed \$4.7 billion. The Nation Building and Jobs Package announced in February 2009 amounted to \$41.5 billion, while the 2009 Budget committed an additional \$22.5 billion. There can be little doubt that the government's fiscal response to the Global Financial Crisis (GFC) was large and rapid.

By early 2010 there was some debate as to whether the government had gone 'too hard'. Taylor and Uren (2010: 216) suggest that, 'it is hard to resist the conclusion that the government spent more than was needed, no matter how reasonable its actions appeared at the time'.

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The head of the Macroeconomic Group within Treasury, David Gruen, defended the early timing and size of the various packages in a December speech to the Australian Business Economics Annual Forecasting Conference. As to the size of the Australian fiscal response, Gruen (2009: 14) argued that Australia had been in a position to pursue a large fiscal response because the pre-existing fiscal position was strong. In addition, there was no reason why all economies should pursue a similar response to economic downturn. While both these arguments are reasonable, as far as they go, the problem is that Treasury forecasts were too pessimistic, as Gruen (2009: 6) conceded, and the economy performed much better than expected (see especially the charts at page 8). Gruen (2009: 6) consequently argued:

It appears that the expansionary macroeconomic policy response was large enough and quick enough to convince the community — both consumers and businesses — that the slowdown would be relatively mild (indeed much milder than most forecasters, including the Australian Treasury, had earlier expected). If that inference is correct, it is also important. It implies that, on this occasion, expansionary macroeconomic policy was able to generate a favourable feedback loop in the economy. Macroeconomic policy supported economic activity, which in turn convinced consumers and businesses that the slowdown would be relatively mild.

In December 2009 that view might have been conjecture. But the May 2010 Budget papers appeared to contain evidence — a chart — supportive of that proposition. At the time Scott Steel, of Crikey, characterised the chart as:

... arguably the most politically important piece of data in the entire budget, as it justifies not just the very existence of the stimulus program and the political baggage that is coming with it, but also shows the likely consequences of the alternative “what if the stimulus was smaller or didn’t exist” scenario (Steel 2010).

The present paper does not address whether the stimulus packages ‘worked’ or not. Economists will debate that issue for years, if not decades. Rather, this paper highlights the errors contained in the chart that purported to show that the then Rudd government policy of going hard, going early and going household had succeeded.

The Budget Chart

The Budget Papers are prepared by Treasury. Budget Paper No.1 includes a ‘Chart A’ supposedly showing that those economies that had ‘enacted large and

timely fiscal stimulus packages' subsequently outperformed growth expectations (Budget Strategy and Outlook: 2-23–2-24 Chart A). Chart A reports a regression analysis with a very specific claim: 'The relationship shown is highly statistically significant, with a t-statistic on the slope coefficient of 3.3.' The sample was the G20 economies.² The dependent variable was the excess of 2009 actual GDP growth over 2009 forecast GDP growth. (These data are from online IMF databases). The independent variable was the size of stimulus as a percentage of 2009 GDP. The data for the independent variable was drawn by Treasury from a table ('Annex Table 2 G20 Countries: Fiscal Expansion') prepared by the IMF and published in November 2009 (IMF 2009: 36). The problem with the analysis is that only 11 of the 19 observations presented in the IMF's Annex Table 2 were used in Treasury's Chart A. The table below shows the data that could have used relative to the data that was used.

Table 1: Available data and utilised data

Data that could have been used			Data that was used		
Country	2009 Stimulus % GDP	IMF Forecast Error	Country	2009 Stimulus % GDP	IMF Forecast Error
Argentina	1.5	2.365			
Australia	2.9	2.774	Australia	2.9	2.774
Brazil	0.6	1.116	Brazil	0.6	1.116
Canada	1.9	-0.103	Canada	1.9	-0.103
China	3.1	2.215	China	3.1	2.215
France	0.7	0.766	France	0.7	0.766
Germany	1.6	0.641	Germany	1.6	0.641
India	0.6	1.145			
Indonesia	1.4	2.051			
Italy	0.2	-0.588	Italy	0.2	-0.588
Japan	2.4	1.000	Japan	2.4	1.000
Korea	3.6	4.211	Korea	3.6	4.211
Mexico	1.5	-2.867			
Russia	4.1	-1.923			
Saudi Arabia	3.3	1.059			
South Africa	3	-1.471			
Turkey	1.2	0.357			
United Kingdom	1.6	-0.834	United Kingdom	1.6	-0.834
United States	2	0.311	United States	2	0.311

Source: IMF (2009), IMF World Economic Outlook Database April 2009, IMF World Economic Outlook Database April 2010.

² The list of G20 countries is shown in Table 1. As the EU is a member in its own right, only 19 countries are shown.

There is no obvious reason why those countries should have been excluded. The sample isn't just advanced economies and isn't just resource-rich economies.

What is the effect of using the truncated sample? Table 2 estimates the regression analysis that Treasury must have undertaken in order to determine the t-statistic of 3.3 that they report. The Treasury result is shown in the first column. As indicated, the slope coefficient is statistically significantly different from zero, it has a t-statistic of 3.3 and a corresponding p-value of 0.0090. If correct, this result would strongly vindicate stimulus spending as Quiggin (2010) indicated. Unfortunately that result is not sustained when the full sample that could be employed is actually used in the regression. This result is shown in the second column. The coefficient is now much smaller (about one-fifth of its previous size) and the statistical significance has declined from a t-statistic of 3.3 to a t-statistic of 0.5 and a corresponding p-value of 0.68.

Table 2: Replicating the Treasury t-statistic

Dependent Variable	Treasury Sample IMF Forecast Error	Full Sample
Intercept	-0.8807 (-1.3265)	0.2801 (0.3374)
2009 Stimulus % GDP	1.0290*** (3.3161)	0.1856 (0.5006)
Adj-R2	0.4999	-0.0434
Observations	11	19

Values in parenthesis are t-statistics. No adjustment is shown for potential heteroskedasticity.

*** statistically significant at the 1 percent level.

This result then does not support the 'go early, go hard, go household' argument. To be sure, this does not mean that stimulus spending did not assist the Australian economy withstand the adverse effects of the financial crisis, but it does mean that the government did not have a quick and easy 'proof' that its policies had succeeded as advertised. The question as to whether fiscal policy works to stimulate economic activity in downturns is not ever going to be resolved in a single variable regression with 11 (or even 19) observations.

How did this happen?

This error was pointed out in a blog, *Catallaxyfiles*, on 13 May 2010. In response to a line of questioning from Senator David Bushby in Senate Estimates on 2 June 2010, the head of the Macroeconomic Group within Treasury, David Gruen, read

a prepared statement concluding that the chart and the explanation to the chart contained errors (Gruen 2010. See also Senate Estimates 2010: E26–E27). The explanation he provided was that a series of compounding errors had occurred. An initial coding error led them to an erroneous conclusion, and Treasury had then truncated the sample from 19 to 11 for expositional simplicity, to see whether the same (or similar) result held. As it did, the chart was published. A subsequent quality-control check also failed to pick up the coding error.

The important point to note is that this isn't a debate about the meaning of the numbers, or even whether the research method is appropriate. Treasury was unable to accurately transfer data from a database to an econometrics package, and its quality-control process didn't pick up such a basic and obvious source of error.

The second analysis

Treasury then produced an additional analysis, this time employing OECD data (not G20 data), to demonstrate a positive and statistically significant relationship between the size of the fiscal stimulus and IMF forecast errors (Gruen 2010: 4). The independent variable, slightly different from before, is now the size of the 2009 stimulus as a percentage of 2008 GDP (OECD 2009: 63).³ This allowed Treasury to increase its sample size from 19 to 30 data points. Yet Treasury excluded four countries (Greece, Hungary, Iceland and Ireland) on the basis that 'their dire fiscal circumstances' were 'not relevant to the question of whether countries that implemented sizeable fiscal stimulus outperformed growth expectations to a significant extent relative to those that did less' (Gruen 2010: 3). It would be more appropriate to undertake a formal test to determine whether that set of countries are outliers or not. It appears that Treasury discarded those economies that had negative scores for the independent variable. But if that were the criterion for exclusion, why not also drop Italy from the analysis? The stimulus for Italy in 2009 was negative too. To be fair, Treasury admits that 'including Greece, Hungary, Iceland and Ireland in the regression generates a statistically insignificant slope coefficient' (Gruen 2010: 3). Various versions of the subsequent Treasury analysis are shown in Table 3.

³ The OECD (2009: 63) reports an overall size of the various fiscal packages and the timing of the packages. The Treasury then calculated a pro-rata share of the fiscal package for 2009. The OECD captured the data as at 11 June 2009.

Table 3: Replication the subsequent Treasury analysis

Dependent Variable	Full Sample	Treasury Sample	Italy excluded As well
	IMF Forecast Error		
Intercept	-0.0312 (-0.0824)	-0.8188 (-1.4062)	-0.8601 (-1.3331)
2009 Stimulus % GDP	0.2247 (1.1406)	0.6760** (2.0430)	0.6962* (1.9367)
Adj-R2	0.0103	0.1127	0.1028
Observations	30	26	25
Excludes		Greece Hungary Iceland Ireland	Greece Hungary Iceland Ireland Italy

Values in parenthesis are t-statistics. No adjustment is shown for potential heteroskedasticity. Data are sourced from IMF World Economic Outlook Database April 2009, IMF World Economic Outlook Database April 2010 and OECD Economic Outlook June 2009.

** statistically significant at the 5 percent level, * statistically significant at the 10 percent level.

The first column replicates the Treasury analysis with the entire dataset. As Treasury indicates, the slope coefficient is not statistically significantly different from zero — the t-statistic is 1.14 and the p-value is 0.2637. The Cooks distance criteria identify no country as being an outlier.⁴The second column replicates the analysis using the Treasury sample. The slope coefficient is 0.6760, with a t-statistic of 2.04 and a p-value of 0.0522. Column three shows the results of excluding all those economies with a negative score for the independent variable: this includes Italy and the four economies excluded by Treasury. The slope coefficient now has a t-statistic of 1.94 and a p-value of 0.0652.

The problem with the Treasury’s subsequent analysis is that the basis for excluding four economies from the analysis is not well explained and this difference in the sample selection gives rise to a large difference in the results. In any event, with a p-value of 0.0522 its preferred version is barely statistically significant and a strict interpretation of the 95 percent confidence level criterion would suggest that it isn’t.

⁴ The rule of thumb for this measure is a score of one or more. Iceland has the highest Cooks distance score of 0.66.

Conclusion

Ultimately, the chart was a political statement and it is the politicians, not the public servants within Treasury, who should be accountable for it. It is not unreasonable, however, to expect that Treasury could correctly estimate a 19-observation regression — something first-year students used to do with a hand calculator in the 1980s. Nor is it unreasonable that Treasury should advise government that a single regression cannot resolve a long-standing controversy in economics.

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