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Does Government Expenditure Multiply Output and Employment in Australia?

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Abstract

The debate on the use of fiscal policy as a tool of macroeconomic stabilization is quite vehement in Australia and abroad. This paper contributes to the discussion by estimating the response of Australian GDP and employment to government consumption shocks. Using a SVAR approach, the paper produces three key findings: (i) the cumulative government expenditure multiplier is greater than one, (ii) full time employment positively responds to a spending stimulus, and (iii) the multiplying effect of government expenditure has somewhat weakened after the Global Financial Crisis. The central policy implication is that counter-cyclical fiscal policy is an effective stabilization tool in Australia. In this regard, the fiscal stimulus of the Australian government in 2008-09 helped shield the economy from the effects of the GFC. However, a counter-cyclical pattern would have required a more significant reversal of this stimulus in the post-GFC phase.

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Key words: fiscal multiplier, SVAR, Australia, GFC.

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1. Introduction

The superiority of monetary policy as a tool for macroeconomic stabilization was first asserted by Romer and Romer (1994) and subsequently acknowledged by many others. This consensus was intellectually questioned by Blinder (2006) and challenged on practical grounds by the decisions of many countries to use fiscal policy to respond to the Global Financial Crisis. Today, there is still much discussion on the case for discretionary fiscal policy. The issue is particularly “hot” in Australia, as also suggested by the very recent exchange between The Treasury and Griffith University economist Anthony Makin.¹ This paper contributes to the ongoing debate by providing some new empirical evidence of the effect of Australian general government consumption expenditure on output and employment. If anything, results support the case for using fiscal policy as a stabilization tool in Australia: (i) the cumulative government expenditure multiplier is greater than one, (ii) full time employment positively responds to a spending stimulus, and (iii) the multiplying effect of government expenditure has somewhat weakened after the Global Financial Crisis (GFC).

In a standard Keynesian closed economy setting, one extra dollar of government expenditure increases national output and hence private consumption, which in turn leads to a further raise in national output. The multiplier of government expenditure is therefore positive, greater than one, and its size depends on private agents’ marginal propensity to consume and, possibly, the tax rate. Things might change dramatically when the economy is open to international flows of goods and capital and/or forward-looking agents optimize an inter-temporal utility function. In these more complicated models, the effect of increasing fiscal expenditure depends on a variety of factors, including how expenditure is financed, the level of outstanding public debt, and whether the extra money is spent on public consumption or public investment.² Theoretical ambiguities mean that ultimately the matter has to be settled empirically. Ramey (2011) and Parker (2011) provide comprehensive surveys of this voluminous applied literature. Results tend to differ significantly depending on the methodology used and the sample period/countries covered in the analysis. In a recent contribution, Ilzetzki et al. (2013) provide a detailed assessment of the size of fiscal multipliers accounting for a number of factors that might potentially condition the relationship between expenditure and output. They find that the multiplier is (i) larger in industrial than in developing countries, (ii) relatively large in economies operating under predetermined exchange rate but zero in economies operating under flexible exchange

¹ On September 3rd, the Minister of Finance launched a research monograph by Anthony Makin (Makin, 2014a) that was highly critical of the effects and merits of Labour government’s fiscal stimulus in 2008-09. The response of the Treasury was posted on September 5th on their web-site (<http://www.treasury.gov.au/About-Treasury/OurDepartment/News/response-to-prof-makin>). Makin replied with a front page article on The Australian on September 8th.

² See for instance Makin (2014b).

rates, (iii) smaller in open economies than in closed economies, and (iv) negative in high-debt countries.

The question of how big or small the fiscal multiplier is has attracted considerable attention in Australia since the GFC. In October 2008, the Labour government announced a first stimulus package of approximately AUD 8.8bn, which were largely paid before the end of the year. Early in 2009, a second stimulus package totalling around AUD 12bn was approved, with payments to be executed in the course of 2009 and 2010. The two packages together accounted for about 5% of Australian total GDP at the time and constituted one of the largest fiscal responses in the developed world. Did this protect Australia from the adverse effects of the GFC? A cursory look at some key macroeconomic data and one would be tempted to answer yes. GDP growth remained positive in Australia throughout the GFC. In fact, Australia was one of only two advanced economies (out of 36 included in the World Economic Outlook of the International Monetary Fund) that reported a positive growth rate in 2009. Moreover, employment growth was also positive in each quarter during the GFC. Again, Australia was one of only a handful of advanced economies where employment increased between 2008 and 2009. But of course, these trends might be attributable to different factors, such as spillover effects from the fiscal stimulus that the Chinese government implemented to support the local manufacturing sector. Leigh (2012) provides some more systematic analysis on the impact of the Australian stimulus package. Using survey evidence, he finds that 40% of households who said that they received a payment reported having spent it, with an estimated marginal propensity to consume slightly larger than 0.4 in the first quarter (and possibly significantly higher in the longer term). This suggests that the fiscal stimulus did stimulate aggregate demand. On the other hand, Makin (2014a) argues that claims that Australia's fiscal stimulus response saved 200,000 jobs are based on spurious Treasury modelling of the long-run relationship between GDP and employment, and that the fiscal stimulus was overall ineffective.

More generally, there is no consensus on what the size of the government expenditure multiplier in Australia might be. Perotti (2005) estimates that for Australia the spending multiplier falls within a range spanning from -0.1 to 0.4 at the one-year horizon and from 0.7 to 1.4 at the three-year horizon. In a subsequent paper, Perotti (2006) sets the multiplier at 0.6 at the one-year horizon and at 0.9 at the two-year and three-year horizon. IMF (2009) concludes that the fiscal multiplier for temporary discretionary fiscal expenditure in Australia is 0.5 for transfers to liquidity-constrained consumers, and between 1.2 and 1.4 for government investment. OECD (2009) reports that for Australia the multiplier in the first two years is between 0.9 and 1.3 for public investment and between 0.4 and 0.8 for transfers to households. Conversely, the simulations of Guest and Makin (2011) and Humphreys (2012) suggest that in the long-term the multiplier is significantly negative, possibly close to -1.5.

Against this background, this paper studies the multiplier of government consumption expenditure in Australia, adding three new contributions. First, it applies a structural vector auto-regression (SVAR) model akin to Ilzetzki et al. (2013) to the specific case of Australia. Second, it explicitly introduces employment in the SVAR system to determine the extent government consumption can create jobs. Third, it provides estimates for two different sample periods: the full sample period from Q1 1978 to Q1 2014 and the pre-GFC sub-period from Q1 1978 to Q4 2007. Comparing results across these two periods provides some insights on how multipliers might have changed following the GFC. The rest of the paper is organised as follows: section 2 discusses the econometric methodology, section 3 presents the results and section 4 concludes.

2. Econometric model and estimation

Estimating the government expenditure multiplier is essentially a problem of estimating the slope parameter β in the regression

$$(1) \quad y_t = \beta g_t + \mathbf{b}'\mathbf{x}_t + \varepsilon_t$$

where y is output, g is government consumption, \mathbf{x} is a vector of other regressors, ε is the error term, t is a time index and \mathbf{b} is a vector of other parameters to be estimated. Output and government consumption may be expressed in deviations from a non-stationary trend while vector \mathbf{x} includes a constant and possibly lagged values of the dependent variable.

The obvious problem in estimating this regression is that causality might go in both directions, i.e. government spending could affect output and/or output could affect government spending. It is therefore necessary to design a strategy to identify the shocks to government expenditure. To this purpose, two approaches have emerged in the literature. Following Barro (1981), Ramey and Shapiro (1998) use a narrative approach to isolate political events that led to large military build-ups in the United States. They then regress output (or other endogenous dependent variables) on a time trend, its lagged values, and dummy variables corresponding to the military build-ups. As military build-ups are taken to be exogenous to the economy, this specification consistently estimates the total effect of military spending on the endogenous variables. Drawing on this argument, one could then estimate equation (1) by two-stage least squares using military expenditure as an instrument for public expenditure. This identification strategy is valid under two conditions. One is that military expenditure and war are driven by geopolitical factors and not domestic economic conditions. The other is that military expenditure and war efforts affect output only through their effect on public expenditure. The second approach, initially explored by Blanchard and Perotti (2002), consists in estimating a SVAR whereby identification is achieved through restrictions on the timing of macroeconomic variables' response to innovations in other macroeconomic variables. These restrictions, in turn, are drawn

from an underlying theory and/or institutional information about the system of public transfers and payments.

The narrative approach has been mainly designed for and applied to the U.S. There, the wars in Vietnam and Korea and foreign policy changes following the Soviet invasion of Afghanistan in 1979 effectively constitute “natural experiments”. This makes the identification of exogenous military build-ups rather straightforward. Moreover, the fact that wars were not fought on US soil assures that the effect of military spending on output effectively operates through government expenditure only. Applying this approach to Australia is more controversial, albeit it could be an interesting direction of future research. Therefore, preference is here given to the SVAR approach.³ Accordingly, the following system of equations is estimated:

$$(2) \mathbf{A}(L)\mathbf{z}_t = \boldsymbol{\alpha} + \mathbf{u}_t$$

where $\mathbf{z}_t \equiv [y_t, g_t, l_t]$ is a three-dimensional vector in the logs of real GDP (y), general government final consumption (g), and employment (l); $\boldsymbol{\alpha}$ is a vector of constant terms, \mathbf{u} is a vector of residuals that may have nonzero cross correlations, and $\mathbf{A}(L)$ is a matrix polynomial in the lag operator:

$$(3) \mathbf{A}(L) \equiv \mathbf{I} - \mathbf{A}_1(L) - \dots - \mathbf{A}_p(L)$$

where \mathbf{I} is the identity matrix, p is the maximum number of lags, k denotes a generic lag and \mathbf{A}_k is a 3x3 matrix of coefficients to be estimated.

Equations (2) and (3) define a standard p th-order VAR that can be estimated by Ordinary Least Squares (OLS). However, this system is just a reduced-form model which does not allow the researcher to make any definite statement about the sequence of causation. Additional identifying assumptions are required to predict the dynamic impact of fiscal policy in a way that recognizes the complex interactions among the endogenous variables. Drawing on Blanchard and Perotti (2002) and Ilzetzki et al. (2013), it is assumed that current government consumption is unaffected by the contemporaneous shocks to GDP and employment. The rationale underlying this assumption is that policymakers need more than a quarter to observe shocks to other macroeconomic variables, design a fiscal policy response, have it approved in the parliament, and finally implement it. Therefore, when using quarterly data, it safe to restrict the contemporaneous effect of innovations in macroeconomic variables on government consumption to be zero. The other identifying assumptions apply a Cholesky decomposition whereby employment is ordered after GDP. This means that (i) GDP is assumed to be unaffected by contemporaneous shocks to employment, but

³ SVAR are not immune from criticisms. Perotti (2005) provides a comprehensive discussion and responses to the most common methodological objections.

it is affected by contemporaneous shocks to government consumption, and (ii) employment is affected by contemporaneous shocks to employment and output. The theoretical a-priori for this ordering might not be too strong; however reversing the order does not change results to any significant extent. With these identifying restrictions, the model is a SVAR that can be estimated and used to generate impulse response functions (IRF).

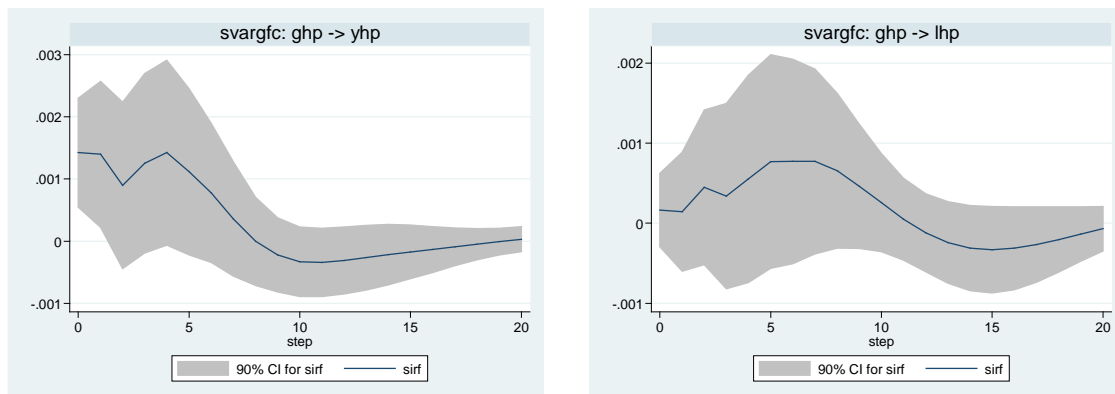
For the purpose of estimation, the sample is set from Q1 1978 (the first quarter in which employment data are available) to Q1 2014 (the last quarter in which information is available). Separate results for the pre-GFC sub-period Q1 1978 – Q4 2007 will also be presented. All the variables are originally non-stationary and therefore they enter the SVAR in deviations from a trend estimated with the Hodrick-Prescott filter. The use of alternative filters (i.e. Baxter-King, Christiano-Fitzgerald) or trends (i.e. linear, quadratic) does not alter the results. Finally, based on values of the Akaike Information Criterion, the order of the lag is selected to be $p = 4$.⁴ Data for GDP and government consumption are sourced from the OECD Statistical Database while data for employment are from the Australian Bureau of Statistics. As series for total employment and full-time employment are available, the model is separately estimated for both. This exercise is non-trivial because an interesting difference emerges between full time employment and total employment with respect to the effect of government consumption.

3. Results

Figure 1 reports the impulse response functions (IRF) based on full sample period estimates. The diagrams show the response of GDP (yhp) and total employment (lhp) to a 1% increase in government consumption (ghp). The response is traced from the quarter of the impulse (step 0) to the last quarter of the fifth year after the impulse (step 20). A 90% confidence interval is also provided. Note that the values reported on the vertical axis are percentage changes (e.g. 0.001 = 0.1%).

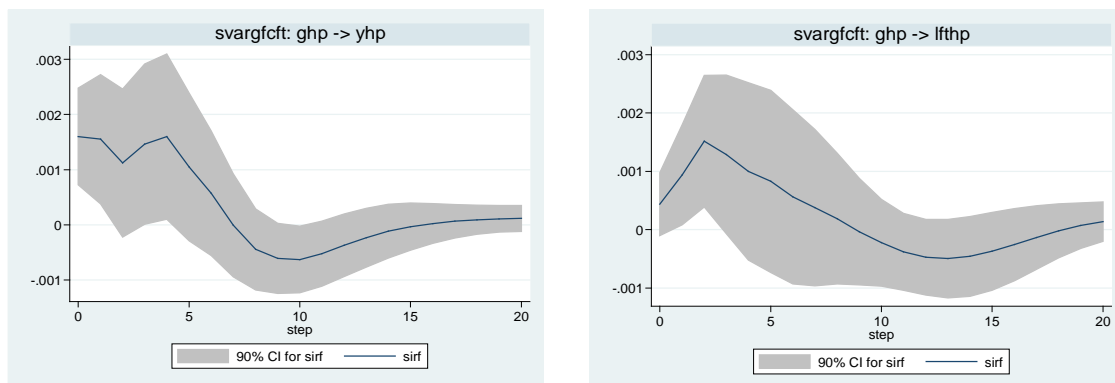
⁴ This implies that the sample is effectively Q1 1979 – q1 -2014.

Figure 1. Impulse response functions, full sample estimates (total employment)



Notes: Percentage change response of GDP (left panel) and employment (right panel) to a 1% shock to government consumption over a period of 20 quarters following the initial impulse. Shaded areas represent 90% confidence intervals. The SVAR is estimated on the full sample Q1 1978 – Q1 2014, employment is measured by total (full time and part time) employment.

Figure 2. Impulse response functions, full sample estimates (full time employment)



Notes: Percentage change response of GDP (left panel) and employment (right panel) to a 1% shock to government consumption over a period of 20 quarters following the initial impulse. Shaded areas represent 90% confidence intervals. The SVAR is estimated on the full sample Q1 1978 – Q1 2014, employment is measured by full-time employment.

Starting with the panel on the left of Figure 1, the IRF indicates that GDP increases by 0.14% on impact. This response is statistically significant at the 90% confidence level and quantitatively larger than what estimated by Ilzetzi et al. (2013) for the group of high income countries (0.08%). The response remains positive, albeit declining, until quarter 7 after the impulse, then becomes marginally negative before returning to zero at the end of the simulation. It must be however noted that the 90% confidence interval crosses the zero line in all quarters but the first one after the impulse,

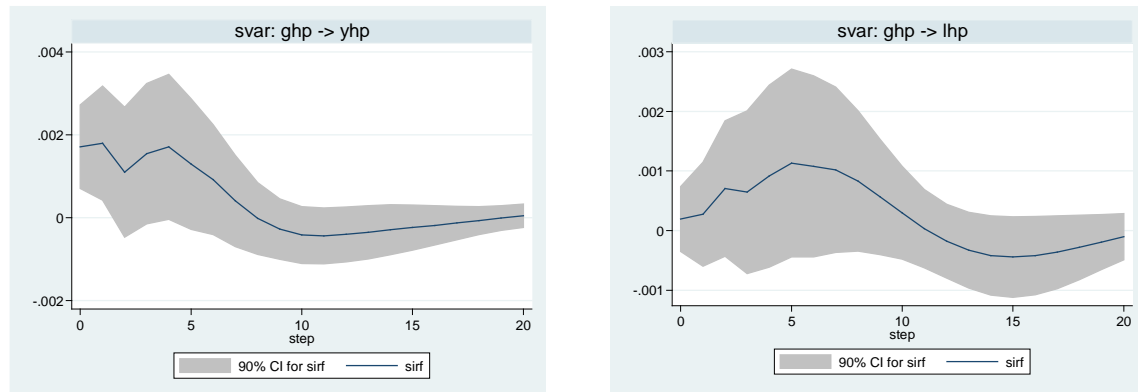
implying that from step two onwards, the output response is hardly statistically significant. The numerical value of the multiplier is determined by applying the percentage changes derived from the IRF to the period average levels of GDP and government consumption. On impact (i.e. at step 0), GDP increases by approximately AUD 288m in response to an increase in government consumption of AUD 461m. The impact multiplier is therefore 0.62, hence positive but smaller than one. In step 1 (e.g. one quarter after impulse), the increase in output relative to the initial value is another AUD 282m. This means that the cumulative multiplier at step 1 is 1.08. If one takes confidence level seriously, then all subsequent changes in output should be counted as zero, as they are not statistically significant. Therefore, the cumulative multiplier remains 1.08 throughout the simulation period.⁵ This is again significantly larger than the long-run multiplier estimated for high income countries by Ilzetzki et al. (2013). In other words, it would seem that in Australia, output is on average more responsive to government consumption shocks than in the other high income economies. The response of total employment (right panel of Figure 1) is initially positive until step 11, then slightly negative for the rest of the simulation. On balance, the cumulative effect on employment is positive, but the confidence interval is quite wide and the response is statistically never different from zero.

Results change somewhat when the SVAR includes full-time employment only (rather than total employment). The impulse responses are reported in Figure 2. On impact, GDP increases by 0.16%; this response is largely significant at the 90% confidence level. The response remains significant in subsequent quarters (except quarter 2) up until quarter 4, implying that the long-term multiplier is larger than the one obtained from the IRF in Figure 1. But what is perhaps more interesting is that the response of full-time employment is now statistically significant in the first and second quarter after the impulse: in response to the 1% increase in government consumption, full-time employment increases by 0.09% in quarter 1 and by 0.15% in quarter 2 of the simulation (changes in the other quarters are not statistically significant). This is equivalent to a cumulative increase of almost 20,000 full-time jobs. Hence, it takes an increase in government consumption of AUD 27,525 to generate one extra full-time job.

Figures 3 and 4 report the impulse response functions corresponding to the SVAR estimated over the period Q1 1978 to Q4 2007; that is, the period prior to the GFC. The information in the figures is organised in the same way as in the corresponding Figures 1 and 2 above. Therefore Figure 3 is the IRF obtained from a SVAR where total employment is used as endogenous variable in addition to GDP and government consumption. Figure 4, instead, shows the IRF obtained from a SVAR that includes full-time employment as endogenous variable.

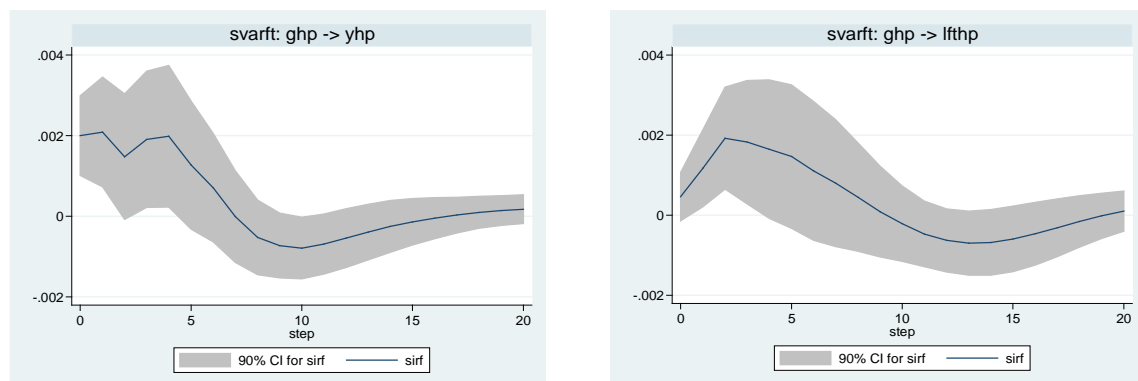
⁵ The cumulative multiplier computed without taking into account the statistical significance of the response throughout the simulation period is much larger (2.1).

Figure 3. Impulse response functions, pre-GFC sample estimates (total employment)



Notes: Percentage change response of GDP (left panel) and employment (right panel) to a 1% shock to government consumption over a period of 20 quarters following the initial impulse. Shaded areas represent 90% confidence intervals. The SVAR is estimated on the sample Q1 1978 – Q4 2007, employment is measured by total (full time and part time) employment).

Figure 4. Impulse response functions, pre-GFC sample estimates (full time employment)



Notes: Percentage change response of GDP (left panel) and employment (right panel) to a 1% shock to government consumption over a period of 20 quarters following the initial impulse. Shaded areas represent 90% confidence intervals. The SVAR is estimated on the full sample Q1 1978 – Q1 2007, employment is measured by full-time employment).

Qualitatively, the new IRFs are not very different from those generated from the full sample estimates. However, quantitatively, responses are now larger. For instance, the cumulative multiplier implied by the GDP response in Figure 3 is 1.45, with an impact multiplier of 0.7. Both the cumulative and impact multipliers increase further when total employment is replaced by full employment in the SVAR. Similarly, the increase in full time employment generated by the government consumption shock

amounts to 9,191 jobs in the first quarter after the impulse, 15,024 jobs in the second quarter, and 14,235 in the third quarter. The cumulative increase in employment is therefore 38,451 full-time jobs. The “cost” of creating one more full-time job is around AUD 12,820; that is, less than half the cost implied by the IRF simulated from full sample SVAR estimates.

4. Discussion and conclusions

The IRFs presented in the previous section yield three key results. First, an increase in government consumption increases GDP and the cumulative long-term multiplier is greater than one. In this sense, Australia seems to be characterised by a greater responsiveness of GDP to government consumption than most other high income economies. Second, an increase in government consumption increases full time employment, but not necessarily total employment. It takes between AUD 13,000 and AUD 28,000 (depending on the sample period used for estimation) of extra government consumption to generate one extra full-time job. Third, output and employment responses to government consumption are stronger when the model is estimated on a sample that excludes the GFC period and subsequent years.

Taken together, these results suggest that fiscal policy is an effective tool of stabilization in Australia. Of course, to achieve stabilization, fiscal policy has to be used counter-cyclically. This means that the increase in expenditure in time of contraction must be followed by a decrease in expenditure once the contraction has been reversed. The counter-cyclical pattern of government consumption also ensures that the overall budgetary position of the government remains sustainable and balanced over the medium term. Assuming that the tax rate is kept constant (as in Barro, 1981), the deficit potentially accumulated during a recession is off-set by the surplus accumulated during the subsequent expansion, so that debt does not accumulate in the long-term. While straightforward on paper, the implementation of a truly counter-cyclical fiscal policy is difficult in practice. Once a government has increased expenditure during a recession, political-economic mechanisms could make it difficult to cut it back. In this regard, the Australian government should not be blamed for designing and implementing the fiscal stimulus package, which in fact is likely to have played an important role in shielding the economy from the effects of the GFC, but for its inability to “normalize” the pattern of expenditure once the worst of the GFC was over. Even if the overall debt level in Australia is still low by all standards, the impression is that the government failed to use government consumption truly counter-cyclically. Yet, the estimates and simulation reported in this paper, especially those obtained from the period ending Q4 2007, confirm that without the fiscal impulse of the Labour government, the Australian economy would have been much more exposed to the global financial turmoil than it actually was.

Each of the three key results of this paper opens up a new direction of future research. A first interesting question to address concerns the differences between Australia and other high income economies whose output and employment seem to be less

responsive to government spending shocks. Does this have to do with the structure of the Australian economy or the nature of Australian policymaking? The second issue to investigate in the future concerns the labour market outcomes of government spending shocks. Taken at face value, the results of this paper seem to imply that in response to an increase in government spending, full-time employment substitutes part-time employment. Whether or not this is indeed the case, why and what this implies for the unemployment rate and unemployment duration are questions of obvious academic and policy relevance. Finally, future work should look more closely at the differences between pre-GFC and post-GFC effects. The results of the paper hint that after the GFC the responsiveness of output and employment to government consumption might have somewhat decreased (albeit the multiplier remains greater than one in the long-term). A possible explanation for this finding is that after 2007 fiscal policy has operated against particularly hard negative shocks. This in turn has resulted in worse macroeconomic outcomes for any given fiscal policy action. If this were indeed the case, then the merits of the fiscal stimulus undertaken by the Australian government should be further emphasised. To shed further light on the issue, one should probably estimate a SVAR with time-varying parameters, as for instance Primiceri (2005) has done for monetary policy.

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