Fiscal multipliers and the level of economic activity: a structural threshold VAR model for the UK

Rozina Shaheen^a and Paul Turner^b

^a Effat University, Saudi Arabia; ^b School of Business and Economics, Loughborough University, United Kingdom

Abstract

This paper examines the impact of fiscal policy shocks in the UK economy using a nonlinear structural threshold vector autoregression (TVAR) model which links Gross Domestic Product (GDP), government expenditure and tax receipts. The model is structural in the sense that the contemporaneous linkages between the variables are determined by economic theory and by our assumptions about the institutional structure of the tax and transfer system. This structure is also influenced by the state of the economy as measured by the deviation of GDP from the Hodrick-Prescott trend. We find that the state of the economy is important, with fiscal policy having very different multiplier effects during ‘boom’ periods relative to ‘normal’ periods. However, we find low values for the government expenditure multiplier in all regimes.

Keywords: fiscal policy, business cycle, nonlinear analysis, fiscal multipliers

JEL Classification: E32,E62, C54.

CONTACT: Professor Paul Turner, School of Business and Economics, Loughborough University, Loughborough, LE11 3TU, United Kingdom. Tel (44)1509 222722. e-mail p.m.turner@lboro.ac.uk

I. Introduction

The effects of fiscal policy on output and employment has been a renewed topic of debate in the macroeconomics literature since the Great Recession of the late 2000s. There are various views about the strength of fiscal policy tools and the channels through which these tools are implemented under different economic conditions. The size of fiscal multipliers is a major concern especially in the context of an economy experiencing persistent recession. Recent developments in the literature on fiscal policy have renewed the Keynesian argument that, in recession, private consumption and investment are less likely to be crowded out and hence expansionary government spending has large multiplier effects. As discretionary fiscal policy is a key tool to influence aggregate demand in recessions, the size of the multiplier during different phases of the business cycle is a critical topic in empirical research. An understanding of this subject is therefore important for policy makers to formulate stabilization policies and also provides insight to researchers to develop consensus about the effects of fiscal policy shocks under different macroeconomic frameworks.

Theoretical literature presents divergent standpoints about the effectiveness of fiscal tools. For example, Real Business Cycle (RBC) models argue that a positive shock in government consumption spending will be completely offset by a reduction in private consumption (Baxter and King 1993, Christiano *et al* 1992 and Fatas and Mihov 2012). On the other hand, standard Keynesian models assume that households are non-Ricardian¹ and a positive shock in government consumption spending stimulates aggregate demand (Blanchard 2003). However, the extent of fiscal policy effectiveness varies across different macroeconomic situations and can best be explained through nonlinear policy analysis (Corsetti *et al*, 2010). During expansionary periods government spending can replace private consumption (Buiter, 1977), but in recessions, when excess capacity is available, a fiscal stimulus has the ability to affect the real sector of the economy (Knoppel, 2008). On the demand side, during recessions a restrictive credit environment for households and firms means that fiscal expansion can have a large impact on household disposable income and consumption (Gali *et al*. 2007).

If the structure of the macroeconomy is nonlinear, application of linear Vector Autoregression (VAR) methodology may lead to spurious interpretations. The empirical

¹ Those households with less access to financial markets and tend to consume all their current income.

literature has employed many approaches to modelling nonlinearities in macroeconomic time series such as the threshold autoregressive (TAR) model, smooth transition models and Markov switching time series models. This paper uses a threshold approach which divides the sample period into various regimes based on a selected threshold variable. Behaviour differs between different regimes but, within each regime, behaviour is assumed to be linear.

This paper contributes to the literature on fiscal policy in the UK through the nonlinear analysis of fiscal shocks on output growth over the business cycle while considering the size, direction, and timing of the impact. The UK implemented a strong counter-cyclical fiscal expansion at the time of Great Recession in 2008, although this was reversed in 2010, which led to a debate on austerity measures and their impact on the economy. More recently there is considerable policy debate concerning the implications of Brexit for fiscal policy and UK economic growth. The rest of the paper is organised as follows: section II discusses the literature; section III presents our model and discusses the issue of identification and the relationship between structural and reduced form disturbances. Finally, section IV presents our conclusions.

II. Existing Literature

Empirical modelling of fiscal policy has used both structural model simulations and reduced form methods. Baunsgaard et al (2012) analyse the literature on fiscal multipliers (surveying a total of thirty seven studies) and find an average government spending multiplier of 0.8 for the first year after an increase in government spending and average value of 0.3 for a tax revenue stimulus. Coenen and Straub. (2005), Spilimbergo et al. (2009), and Hemming et al (2002) all find a wide range of revenue and spending multipliers. For example, these studies report one-year fiscal spending multipliers for Germany between -0.2 and 1.9 and US multipliers between 0.2 and 2. These studies indicate little consensus on the value of fiscal multipliers and indicate that the impact of fiscal shocks can vary significantly with changes in the economic environment (Corsetti et al. 2012).

The contemporaneous effects of fiscal policy have been mostly analysed through VAR models with a special focus on the structural identification of discretionary fiscal policy shocks. Such models include the recursive identification approach, the sign-restrictions approach, and the structural VAR approach (Blanchard and Perotti, 2002). The results of these models have

been sensitive to country specific factors such as the structure of the economy, fiscal policy institutions and the interaction between fiscal and economic development. The majority of these estimates are based on an average over the sample period for a specific country and are therefore specific to that period with no scope for country specific controlled and randomized trials. Most of these studies report multipliers values less than unity which implies that a fiscal stimulus is unable to enhance private activity or that a reduction in fiscal spending has no significant negative effects on the economy. However, it is arguable that most of these estimates are subject to simultaneous equation bias and may therefore misrepresent the true impact of fiscal policy (Ramey and Zubairy, 2014).

After the Great Recession of 2008, macroeconomic research began to focus on how fiscal multipliers vary with changes in economic conditions. Following the Keynesian argument, some studies suggested larger fiscal multipliers in recession e.g. Fazzari et al.(2015), Auerbach and Gorodnichenko (2012, 2013), and Barro and Redlick (2011). In addition, some researchers working in the New Keynesian DSGE framework, argued that the large size of estimated fiscal multipliers was the consequence of the zero lower bound on interest rates e.g. Coenen and et al. (2012), Christiano et al. (2009), and Cogan et al.(2010).

The existing literature has particularly focussed on the experience of the US economy; for example, Auerbach and Gorodnichenko (2012); Bachmann and Sims (2012); Ramey and Zubairy (2014). It is therefore interesting to investigate the extent to which the UK experience is consistent with this. By allowing for different fiscal responses depending on the state of the economy, our paper contributes to the debate on austerity versus fiscal stimulus. Austerity is favoured to restore financial market confidence through sustainable public debt (Rogoff, 2013) and also could possibly crowd-in private consumption and investment (Trichet, 2010). However, austerity has been criticised on the basis that fiscal multipliers are larger in recession and the constrained monetary policy (Krugman, 2015) and in this context austerity measures may produce severe negative effects on the economy. For example, DeLong and Summers (2012) suggest that austerity in a depressed economy can damage the long run fiscal balance.

Cimadomo and Benassy-Quere (2012) use rolling regressions in a VAR specification to assess the fiscal multipliers in the UK economy. They identify positive government spending multipliers in the 70s and 2000s but insignificant multipliers in the 80s and 90s. Baum, Poplawski-Ribeiro, and Weber (2012) examine the role of fiscal policy and business cycle for G-7 economies and conclude that, on average, government spending and revenue multipliers are larger in recession than in expansion. Crafts and Mills (2013) estimate the government

expenditure multiplier for interwar Britain (1919 -1938) based on quarterly data. They find that the expenditure multiplier is less than one (between 0.3 and 0.8) depending on the model specification and the sample period. Rafiq (2014) finds larger government spending multipliers in recession than in expansion for UK data while using a small scale Bayesian time-varying VAR model.

III. Model Specification

To analyse the impact of fiscal variables on real output in UK, this research employs a three variable model that includes government expenditures, net tax revenues and GDP. This research covers the time period from 1987Q1 – 2017Q1. All three data series were downloaded from the Eurostat database and were converted to constant prices using the GDP deflator. Unadjusted series were then seasonally adjusted using the X-13 algorithm in EViews. The augmented Dickey-Fuller test confirms that each series contains a single unit root. Finally, a GDP gap series was created by taking the difference between the log of GDP and its trend value as estimated by the Hodrick-Prescott filter. We specify a threshold vector autoregression (TVAR) that changes structure if economic activity crosses a critical threshold (Balke, 2000).

Our basic model is a structural vector autoregression which takes the form:

$$A_0 x_t = \sum_{i=1}^p A_i x_{t-i} + B \varepsilon_t \quad (1)$$

where x_t is a vector of endogenous variables $A_0, A_i (i = 1, \dots, p)$ and B are square matrices of coefficients and ε_t is a vector of independent random disturbances. Restrictions are necessary on the matrix of contemporaneous coefficients A_0 and the matrix linking the random disturbances to permit the model to be estimated. These restrictions derive from a mixture of economic theory and our assumptions about the institutional structure of the tax system.

For the purposes of comparison, we first estimate a linear VAR linking government spending, tax receipts and GDP. Since the three variables of the model can be shown to each contain one unit root, the variables in the VAR consist of the first differences of the logarithms of each series. Examination of the lag length criteria statistics does not give a clear decision for the lag length. The Akaike criterion indicates three lags, the Hannan-Quinn criterion indicates

a single lag while the Schwarz criterion indicates no lags. Examination of the VAR estimates indicates some individually significant second lags and we therefore settled on a lag length of two for the purposes of this exercise. Even for the linear version, we found that the results were highly sensitive to the Choleski ordering adopted. Our choice was for a structure of contemporaneous relationships in which both government expenditure and taxes affect GDP, taxes are affected by GDP but not government spending and spending itself is exogenous in the short run. We feel that this best represents our beliefs about the short run interaction of these variables in that it allows for both types of fiscal policy (expenditure and taxes) to affect GDP contemporaneously while allowing some feedback effects from GDP to taxes in the short run. We assume that the B matrix is diagonal so that the shocks to the system can be considered to be independent.

The impulse responses for our linear VAR are shown in Figure 1. The graphs show the central estimates of the impulse responses along with a two standard error band indicated by the broken lines. The key elements of this are the responses to changes in government spending (shock 1) and taxation (shock 2). While taxation has its predicted effect, i.e. an increase in taxation reduces GDP in both the short and long runs, the result for government spending is counter-intuitive in that an increase in spending leads to a fall, albeit insignificant, in GDP. In terms of other effects, we note that a GDP shock has a long run positive effect on tax revenues which is reasonable.

Figure 1: Cumulative impulse responses for unrestricted VAR

A key point of interest is whether the use of more explicit structural restrictions to identify the model and allowance for different states of the economy will alter the pattern of impulse responses we observe. Our next step is therefore to investigate the impact of placing more explicit structural restrictions on the contemporaneous relationships. To identify our model, we follow Perroti and Blanchard's (2002) procedure which relies on institutional information about tax and transfer systems and about the timing of tax collections in order to identify the automatic response of taxes and government spending to economic activity. The relationship between the structural and reduced form disturbances is given by $A_0 u_t = B \varepsilon_t$, where, u_t is the vector of reduced form disturbances and ε_t is the vector of structural disturbances. Hence, the reduced form disturbances are weighted averages of the uncorrelated structural errors. Identification is achieved by placing restrictions on the A and B matrices which allow the unknown parameters of (2) to be estimated using the sample moments of the reduced form disturbances. We assume that the structure of these matrices takes the form shown in (2):

$$A = \begin{bmatrix} 1 & 0 & -\alpha_1 \\ 0 & 1 & -\beta_1 \\ -\gamma_1 & -\gamma_2 & 1 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad (2)$$

Price et al (2015) estimate values for β_1 and α_1 , the short run responses of taxes and government expenditures to GDP, as 1.67 and -0.1. While we find their estimate of α_1 to be plausible and use this throughout, we believe the estimate of β_1 to be on the high side and prefer to estimate this parameter directly. This is achieved by regressing the residuals from the reduced form VAR for tax receipts on those for GDP. This yields a relationship of the form.

$$\hat{u}_t^T = 1.0634 \hat{u}_t^Y + \hat{\varepsilon}_t^T \quad (3)$$

(0.2985)

The standard error of the coefficient estimate is given in parentheses. Note that a two standard error confidence interval contains the value one and that this is therefore consistent with the hypothesis of a unit elasticity of taxes with respect to GDP. We therefore impose this restriction in all our subsequent estimation and model simulation.

To investigate the relationship between GDP and fiscal policy shocks we allow for the possibility of a nonlinear response which depends on the state of the economy. Note that we adjust both government spending and taxes by the automatic effects of GDP so that the variables on the right hand side of (4) reflect discretionary fiscal impulses. We therefore estimate a relationship of the form:

$$\begin{aligned} \hat{u}_t^Y = & \gamma_1 d_1 (\hat{u}_t^G + 0.1 \hat{u}_t^Y) + \gamma_2 (1 - d_1) (\hat{u}_t^G + 0.1 \hat{u}_t^Y) + \gamma_3 d_1 (\hat{u}_t^T - \hat{u}_t^Y) \\ & + \gamma_4 (1 - d_1) (\hat{u}_t^T - \hat{u}_t^Y) + \hat{\varepsilon}_t^Y \end{aligned} \quad (4)$$

$$d_1 = \begin{cases} 1 & \text{output gap} < \text{threshold} \\ 0 & \text{otherwise} \end{cases}$$

The specification adopted in equation (4) therefore allows the effects of fiscal impulses to switch according to some threshold value of the output gap. It therefore becomes necessary to estimate the threshold value at which this switch takes place. The output gap has a range from -0.03959 to 0.03585 and therefore we perform a grid search for values of the threshold starting

at 0.03 with interval -0.01 and choose the value of the threshold which minimises the standard error of the estimated model. The results of the grid search are shown in Figure 2 which indicates a clear minimum at a value of the threshold equal to 0.01. We then conducted a second grid search around this value using a finer interval equal to 0.0001 but this did not change the result.

Figure 2: Standard error of equation estimates for alternative threshold values.

Using a threshold value of 0.01, we are then able to divide the sample period up into two parts. The first, when $gap < 0.01$, we describe as ‘normal’, the second, when $gap > 0.01$, we describe as ‘boom’ periods. This contrasts with much of the discussion of this type of threshold model in the literature which tends to separate the state of the economy into ‘normal’ and ‘recession’ periods. We find no evidence for a threshold effect which divides the state of the economy in this way. Instead we find the strongest evidence for separation into the two regimes described above, where the ‘boom’ state accounts for 21 of the 121 observations and the ‘normal’ state for the remaining 100. This separation is illustrated in Figure 3.

Figure 3: Output gap (deviation of log GDP from Hodrick-Prescott trend) and estimated threshold value = 0.01

Based on this separation we next estimate the parameters of the short run relationship between the GDP residuals and those for the fiscal policy variables. Since we wish to estimate the effects of discretionary taxation policy, the taxation residuals are adjusted by subtracting the GDP residuals prior to estimation. This imposes the restriction of a unit short run elasticity for the automatic tax effects of changes in GDP which we noted in the discussion of equation (3). The estimation results are shown in equation (5). Standard errors are again given in parentheses below coefficient estimates to allow for the construction of hypothesis tests.

$$\begin{aligned} \hat{u}_t^Y = & \underset{(0.0378)}{0.0982}(\hat{u}_t^G + 0.1\hat{u}_t^Y)(gap < 0.01) - \underset{(0.0605)}{0.0213}(\hat{u}_t^G + 0.1\hat{u}_t^Y)(gap > 0.01) \\ & + \underset{(0.0318)}{0.0614}(\hat{u}_t^T - \hat{u}_t^Y)(gap < 0.01) - \underset{(0.0619)}{0.1360}(\hat{u}_t^T - \hat{u}_t^Y)(gap > 0.01) + \hat{\varepsilon}_t^Y \end{aligned} \quad (5)$$

From equation (5) we note that government spending has a significant positive short run effect in the ‘normal’ regime but that it is negative and insignificant in the ‘boom’ regime. This is consistent with a view of the economy in which the multiplier effects of spending increases lose their effectiveness when the economy is operating at high levels of capacity utilisation. Turning to taxation shocks, we find that tax changes have a positive effect in ‘normal’ times. This runs counter to the standard predictions of economic theory where we would expect an increase in discretionary taxes to result in a fall in output. However, this

coefficient is not quite significant at the 5% level with a t-ratio of $0.0622 / 0.0319 = 1.95$. In ‘boom’ periods however, taxation behaves as expected with an increase in discretionary taxes resulting in a significant negative short run effect on GDP.

Using the estimates of the contemporaneous interactions given in equations (3) and (5) we next conduct two alternative simulations; the first for normal conditions and the second for boom conditions. The results for normal conditions are shown in Figure 4. In contrast with the linear case we now find that the cumulative multiplier for GDP is positive throughout. However, apart from the immediate short run effect, the standard error bands around the impulse response contain zero, indicating that this effect is not significant. Again, we find that this version of the model predicts a consistently positive effect of taxation, though this is also not significant.

Figure 4: Impulse response functions for normal conditions

Next, we conduct a simulation using the parameter values for boom conditions. This produces the impulse responses shown in Figure 5. In this case we find that GDP responds

negatively to changes in government spending, though again the effect is not significant with the standard error bands including zero. In this case however, we find a significant negative effect of taxation.

Figure 5: Impulse response functions for boom conditions

To summarise the policy implications of these results, we next calculate elasticities and marginal effects of changes in the policy variables on GDP. The results for government spending are shown in Table 1 and those for taxation are shown in Table 2. The elasticities are calculated as the ratio of the cumulative change in GDP to the cumulative change in the policy variable and the marginal effects are calculated as the ratio of the elasticity to the average ratio of the policy variable to GDP over the sample period. In our case the average ratio of government spending to GDP was 0.4085 and the average ratio of tax receipts to GDP was 0.3289.

	Unrestricted VAR		Normal Conditions		Boom Conditions	
Quarters	Elasticity	Marginal Effect	Elasticity	Marginal Effect	Elasticity	Marginal Effect
1	0.0017	0.0051	0.0992	0.2419	-0.0212	-0.0645
2	-0.1050	-0.3191	0.0767	0.1871	-0.1461	-0.4441
3	-0.0890	-0.2707	0.0922	0.2249	-0.1306	-0.3971
4	-0.1215	-0.3694	0.0821	0.2002	-0.1678	-0.5103
8	-0.1354	-0.4118	0.0806	0.1966	-0.1846	-0.5614
12	-0.1370	-0.4166	0.0805	0.1963	-0.1866	-0.5673

Table 1: Effects of government spending – elasticities and marginal effects

	Unrestricted VAR		Normal Conditions		Boom Conditions	
Quarters	Elasticity	Marginal Effect	Elasticity	Marginal Effect	Elasticity	Marginal Effect
1	-0.0930	-0.2828	0.0579	0.1760	-0.1575	-0.4788
2	-0.1648	-0.5011	0.0884	0.2687	-0.3135	-0.9531
3	-0.4035	-1.2269	0.0993	0.3018	-0.9102	-2.7675
4	-0.3304	-1.0045	0.0905	0.2751	-0.6789	-2.0642
8	-0.4017	-1.2213	0.0958	0.2913	-0.8968	-2.7267
12	-0.4117	-1.2519	0.0963	0.2929	-0.8400	-2.5500

Table 2: Effects of tax changes – elasticities and marginal effects

Tables 1 and 2 show our estimates of the multipliers for the first four quarters of the simulation period followed by the values at the end of years 2 and 3. From the graphical presentations, it is clear that, by the end of year 3, any multiplier effects have worked themselves out and the cumulative effects of shocks have converged to constant values. Table 1 shows that, even when government spending has positive multiplier effects, the size of the multiplier is small, with a value of just under 0.25 at its maximum. This puts our estimates at the lower end of the range

of values normally reported for the multiplier. In contrast we find a powerful negative effect of taxation during boom periods, with a multiplier value greater than 2.5 in absolute value.

IV. Conclusions

This paper has investigated the response of real GDP to fiscal policy using a structural vector autoregression framework in conjunction with the assumption that these effects are sensitive to the state of the economy. We allow for the state of the economy by estimating a threshold model in which the responses are sensitive to the deviation of GDP from trend as measured by the Hodrick-Prescott filter. Our evidence indicates that in ‘normal’ times, government spending has a positive, though mostly insignificant effect on GDP. This contrasts with the results of standard VAR estimation in which spending has a negative (though insignificant) effect. In ‘boom’ periods this positive effect disappears, and we find a consistently negative effect. In contrast, the effects of taxation are counter to expectations in ‘normal’ conditions, where we find a positive effect, but consistent with expectations in ‘boom’ periods where we find a significant negative effect.

References

- Auerbach, A., and .Gorodnichenko. 2012. "Measuring the Output Responses to Fiscal Policy." *American Economic Journal: Economic Policy* 4(2): 1–27.
- Auerbach, A., and Y. Gorodnichenko. 2013. "Output Spillovers from Fiscal Policy." *American Economic Review*, 103 (3): 141-46.
- Bachmann, R., and E. Sims. 2012. "Confidence and the transmission of government spending shocks," *Journal of Monetary Economics*, 59(3): 235-249.
- Balke, N (2000). "Credit and Economic Activity: Credit Regimes and Nonlinear Propagation of Shocks", *Review of Economics and Statistics* 82(2): 344-349.
- Barro, R. and C. Redlick. (2011). "Macroeconomic Effects from Government Purchases and Taxes." *Quarterly Journal of Economics* 126(1): 51–102.
- Batini, N., Callegari, G. and G. Melina. 2012. "Successful Austerity in the United States, Europe, and Japan," *IMF Working Paper 12/190* (Washington: International Monetary Fund).
- Baum, A., Poplawski-Ribeiro, M., and A. Weber. (2012). "Fiscal Multipliers and the State of the Economy." *IMF Working Paper 12/286*
- Baunsgaard, T., Mineshima, A., Poplawski-Ribeiro, M. and Weber , A. (2012). "Fiscal Multipliers." In Carlo Cottarelli, Philip Gerson and Abdelhak Senhadji, eds. *Post Crisis Fiscal Policy*. Washington: International Monetary Fund.
- Baxter, M., and R. King (1993). "Fiscal Policy in General Equilibrium", *American Economic Review* 83(3), pp. 315-334.
- Blanchard, O. (2003), *Macroeconomics*, Third Edition, Pearson.
- Blanchard, O. and R. Perotti (2002). "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", *Quarterly Journal of Economics* 117 (4): 1329-1368.
- Buiter, W., (1977), " 'Crowding out' and the effectiveness of fiscal policy", *Journal of Public Economics*, 7(3): pp. 309-328.
- Crafts, N., and T. Mills. 2013. "Rearmament to the Rescue? New Estimates of the Impact of ,Keynesian Policies in 1930s' Britain." *The Journal of Economic History* 73(04): 1077–1104.
- Christiano, L. , Aiyagari, S. R. and M. Eichenbaum.1992, "The output, employment, and interest rate effects of government consumption", *Journal of Monetary Economics* 30(1): 73-86.
- Christiano, L., Eichenbaum M. and S. Rebelo. 2009. "When Is the Government Spending Multiplier Large?", *NBER Working Paper, No. 15394*.
- Cimadomo, J., and A. Benassy-Quere. 2012. "Changing patterns of fiscal policy multipliers in Germany, the UK and the US." *Journal of Macroeconomics* 34(3): 845-873

Coenen, G., and R. Straub. 2005. "Does Government Spending Crowd in Private Consumption? Theory and Empirical Evidence for the Euro Area", *International Finance* 8(3): 435-470.

Coenen, G., Erceg, C., Freedman, C., Furceri, D., Kumhof, M., Lalonde, R., Laxton, D., Lindé, J., Mourougane, A., Muir, D., Mursula, S., de Resende, C., Roberts, J., Roeger, W., Snudden, S., Trabandt, M., and J. in't Veld. 2012. "Effects of Fiscal Stimulus in Structural Models." *American Economic Journal: Macroeconomics*, 4 (1): 22-68.

Cogan, J., Cwik, T., Taylor, J., and V. Wieland .2010. "New Keynesian versus Old Keynesian Government Spending Multipliers." *Journal of Economic Dynamics and Control* 34: 281–295.

Corsetti, G., Kuester, K., Meier, A. and G. Muller.2010 "Debt Consolidation and Fiscal Stabilization of Deep Recessions", *American Economic Review* 100(2): 41-45,

DeLong, J. B. and L. Summers. 2012. "Fiscal Policy in a Depressed Economy" *Brookings Papers on Economic Activity*. 43(1): 233-297

Fatás, A. and I. Mihov. 2012. "Fiscal Policy as a Stabilization Tool," *The B.E. Journal of Macroeconomics*, 12(3): pp. 1-68.

Fazzari, S. , Morley, J. , and I. Panovska. 2015."State-dependent effects of fiscal policy." *Studies in Nonlinear Dynamics & Econometrics* 19(3): 285–315.

Galí, J, López-Salido, J.D. and J. Vallés. 2007. "Understanding the Effects of Government Spending on Consumption", *Journal of the European Economic Association*, 5(1): 227–270

Hemming R., Kell, M. and S. Mahfouz (2002), "The Effectiveness of Fiscal Policy in Stimulating Economic Activity: A Review of the Literature", *IMF Working Paper*, No. 208.

Knuppel, M. 2008. "Can Capacity Constraints Explain Asymmetries of the Business Cycle?", *Bundesbank Discussion Paper Series*, 01/2008.

Krugman, P. 2015 *The austerity delusion*. [https://www.theguardian.com/business/ interactive/ 2015/apr/29/the-austerity-delusion](https://www.theguardian.com/business/interactive/2015/apr/29/the-austerity-delusion)

Price, R., Dang. T. and J. Botev. 2015. "Adjusting Fiscal Balances for the Business Cycle : New Tax and Expenditure Elasticity Estimates for OECD Countries", OECD Economics Department Working Papers No. 1275.

Rafiq, S. 2014. "UK Fiscal multipliers in the post-war era: Do state dependent shocks matter?" *CESifo Economic Studies* 60(1): 213{245

Ramey,V & S. Zubairy. 2014. "Government Spending Multipliers in Good Times and in Bad: Evidence from U.S. Historical Data," *NBER Working Papers 20719*, National Bureau of Economic Research, Inc.

Rogoff, K. 2013. "Britain should not take its credit status for granted", *Financial Times*, 2nd October 2013.

Spilimbergo, A., Symansky, S., Blanchard, O. and C. Cottarelli. 2009. *Fiscal Policy for the Crisis* IMF Staff Position Note SPN/08/01

Trichet, J.. 2010. "Interview with la republica", 16 June 2010.
'<http://www.ecb.europa.eu/press/key/date/2010/html/sp100624.en.html>