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Abstract

This paper examined the asymmetric effect of fiscal policy uncertainty on real economic activity in South Africa. Quarterly time series data spanning from 1990:Q1 to 2018:Q2 are used. Fiscal policy uncertainty is defined as the GARCH (1,1) conditional variance in capital tax, consumption tax, labour income tax and government spending. The results based on linear projection models that allow for asymmetry show that in general high fiscal policy uncertainty exhibits a negative effect on real GDP while low fiscal uncertainty exhibits a positive effect on real GDP. High volatility (bad news) has larger effect in general than low volatility (good news).This disparity is significant especially for the response of real GDP to capital tax uncertainty and spending uncertainty. Therefore fiscal policy uncertainty has asymmetric effect on real economic activity in South Africa.

Keywords: Fiscal policy uncertainty; asymmetry; economic activity; impulse responses

JEL Classification: C32, E62, O4

1. Introduction

South Africa is still struggling to recover from the 2008/2009 global economic and financial crisis. In the Monetary Policy Review (MPR) of April 2018, it was reported that while the global recovery gained pace, South Africa was conspicuous as the only major economy not in an expansion phase. This slow recovery and consequent economic hardship have raised renewed interest among different stakeholders on the effect of uncertainty on the macro economy. The existence of uncertainty in South Africa is no longer in doubt. In the MPR of April 2018 (SARB, 2018), the word uncertainty appeared 22 times in a 65-page document. In the same report, it was clearly stated that the economic aspect of uncertainty resulting from the removal of the finance minister in December 2015 included a severe growth slowdown (growth fell to 0.6% in 2016) and an investment recession (investment contracted by 4.1% over the year).

Policy uncertainty, which is one of the various forms of uncertainty, has been blamed for the contraction of the economy and poses further risk of contraction (Ferreira, 2018). Uncertainty about future policy affects agents' expectations such that perceived changes have real and nominal effects (Mumtaz and Zanetti, 2013). Uncertainty may rise because of negative news, which lowers expectations of future economic activity. It may also be as a result of delays in policy announcement or implementation In other words the future path of government policy is uncertain. Quoting from The Economist (2013):"Governments, however, are still breeding fears about the future. The most glaring form of uncertainty in the rich world is fiscal. [...] This is self-

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imposed uncertainty. If the fiscal path were a little clearer, the reduction in uncertainty should spur investment and output, which in turn should improve the fiscal picture." This summarises the argument about the importance of understanding fiscal policy uncertainty and its impacts on the economy and how this is drawing attention in the media, research and policy cycles.

Theoretically, higher uncertainty affects economic activity through irreversible investments, marginal revenues and precautionary savings. Rising uncertainty causes firms to wait before investing and hiring, and causes consumers to wait before purchasing certain consumption goods (Bernanke 1983, Pindyck, 1991). In other words, uncertainty could delay both investment and consumption plans as there is a real option effect to waiting (Aye et al., 2019). These consequently could slow down economic growth (Bloom 2009; 2014). Another theoretical view of uncertainty is that high uncertainty increases the borrowing costs for firms (Christiano et al., 2014).

There are large studies on the role of uncertainty on macroeconomic fluctuations and financial markets among others. However, there are only a few that consider the effect of fiscal policy uncertainty on economic activity (e.g. Johannsen, 2014; Hollmayr and Matthes, 2015; Fernández-Villaverde et al, 2015; Ricco et al., 2016; Murray, 2017; Balcilar et al., 2017; Kotzé, 2017). The papers in general found the adverse effect of fiscal policy uncertainty on economic activities. Among, these existing studies the common assumption is that the effect of fiscal policy on economic activity is symmetric. This may not necessarily be the case.

Although, economic theory proposes that economic activity will decline following increases in uncertainty while it will rise following decreases in uncertainty. Theory does not necessarily predict the magnitude of the effect. Changes in uncertainty may depend on both the sign and the size of the changes. When uncertainty decreases, economic activity may rebound, but not necessarily immediately. This suggests that uncertainty could have asymmetric effect. Therefore, this study extends previous studies which have assumed symmetric effect of fiscal policy by investigating the asymmetric effects. Specifically, this study considers whether low and high fiscal policy uncertainty produces similar effects on economic activity in South Africa. Expectations about future government spending or taxes can generate asymmetric effects. For instance, cuts in government spending can cause an economic expansion if they induce agents to believe that government spending will be higher in the future (Bertola and Drazen, 1993; Bi et al.2013). Bi et al. (2013) also suggested that changes in agents' expectations about fiscal policy (the timing of it and instruments used) can generate positive or negative effects on economic activity depending on other elements of the economy.

The remainder of the paper is structured as follows: The data are presented in the next section. The empirical model is presented in Section 3. In section 4, the results are presented and discussed. Section 5 concludes.

2. Data

Quarterly time series data covering from 1990:Q1 to 2018:Q2 are used. The sample period is based on data availability. Data on real GDP at market prices, company taxes, property taxes,

income taxes, consumption taxes, final general government spending, real gross fixed capital formation (investment), real final consumption expenditure by households and total employment in the non-agricultural sectors were sourced from the South African Reserve Bank (SARB). The government taxes were available on monthly basis and hence were converted to seasonally adjusted quarterly series with seasonal adjustment done using Census X-13.

Capital taxes were computed as the sum of company and property taxes as a percentage of gross fixed capital formation. Labour income taxes were calculated as the percentage of income tax to compensation of residents. Consumption taxes were computed as the percentage of domestic taxes on goods and services to final household consumption expenditure. Government spending (GG was computed as the percentage of consumption expenditure to GDP. From fiscal policy variables, the paper obtains four components of fiscal policy uncertainty namely: capital tax uncertainty, labour income uncertainty, consumption uncertainty and government spending uncertainty and these were constructed from GARCH (1,1) model. The main dependent variable is real GDP while the main independent variable is fiscal policy uncertainty. The rest variables serve as control. All variables were seasonally adjusted All variables except the volatility series are non-stationary and hence are transformed into first log difference (Figure 1). From Figure 1, it can be seen that there have been periods of high volatility in the fiscal policy variables. This include periods around 1994, when South Africa had their first democratic election, 2000/2001 corresponding to to the introduction of capital gains tax in South Africa, which has been in existence since 1 October 2001 and between 2008 and 2010 corresponding to the global economic and financial crisis and its aftermath.

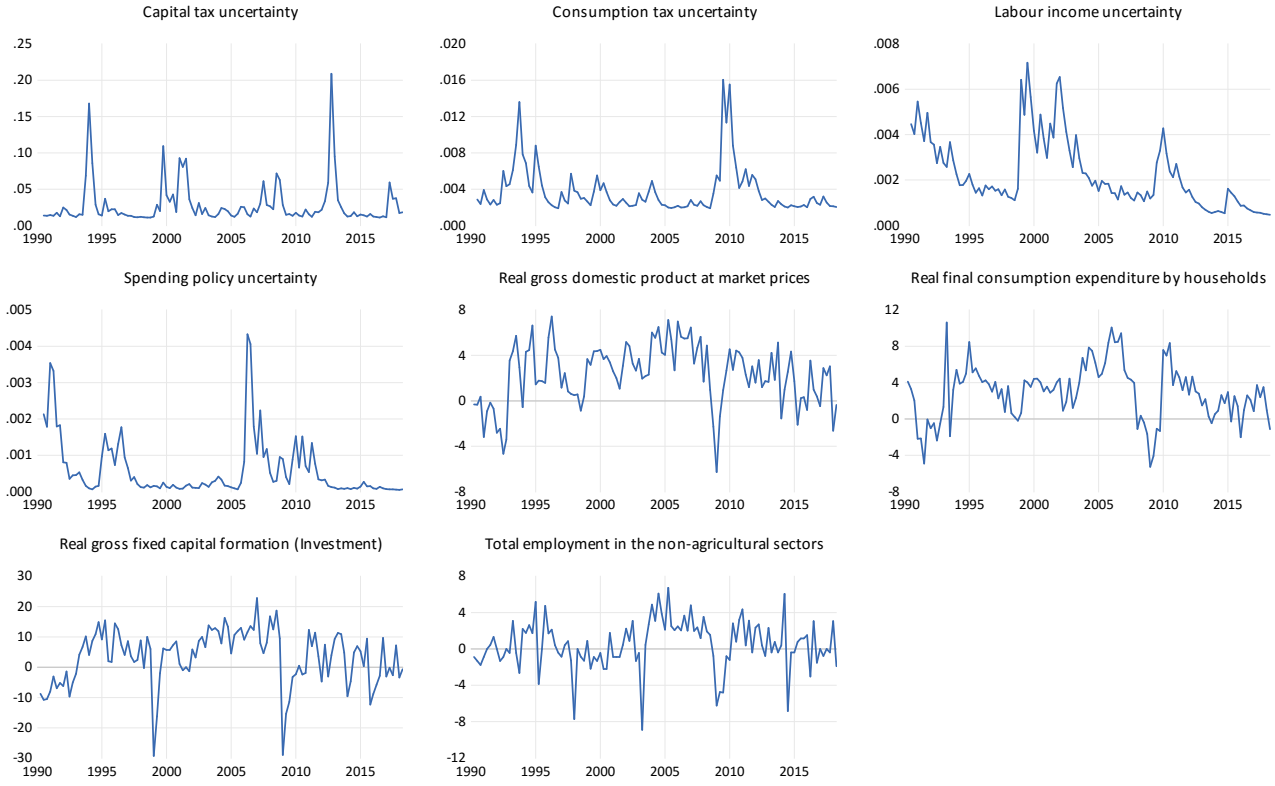

Figure 1: Fiscal policy uncertainty and real economic variables

3. Empirical Model

The local linear projection (LP) method is used. As an impulse response is a function of forecasts at increasingly distant horizons, misspecification errors are compounded with the forecast horizon. Models such as the VAR whose estimations are based on the sample, represent a linear global approximation to the data generating process (DGP) and are optimally designed for one-period ahead forecasting. However, Jordà (2005) suggests that it is preferable to use a collection of projections local to each forecast horizon instead, thus matching design and evaluation. The LP method entails running a sequence of predictive regressions of a variable of interest on a structural shock for different prediction horizons. The impulse response is then obtained from the sequence of regression coefficients of the structural shock. Therefore, the method can produce the response of GDP to fiscal policy volatility at different horizons, h.

It has advantages in general and compared to the standard vector autoregressive (VAR) model (Jordà, 2005; Ocakverdi, 2016). It is simple to implement. The impulse response functions are consistent and asymptotically normal. The LP method is robust to misspecification of the data generating process. In other words one do not need to know the exact data generating process before using the LP method. Further, it captures potential nonlinearities better than the standard VAR. The basic LP model can be specified as follows:

$$y_{t+h} - y_{t-1} = \alpha^h + \sum_{i=1}^{I} \gamma_i^h y_{t-i} + \sum_{j=1}^{J} \beta_j^h x_{t-j} + v_{t+h|t-1};$$

$$h = 0,\ 1 \ldots . H \tag{1}$$

where y is the measure of economic activity, real GDP, x is the fiscal policy uncertainty structural shock, β_j^h provides the impulse response function of GDP to fiscal policy volatility shock at horizon h =0….H. Equation (1) Assumes a symmetric effect. However asymmetric effect is investigated by specifying the model as:

$$y_{t+h} - y_{t-1} = \alpha^h + \sum_{i=1}^{I} \gamma_i^h y_{t-i} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{High} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{Low}$$

$$+ v_{t+h|t-1}; \quad h = 0,\ 1 \ldots . H \tag{2}$$

$High$ relates to high fiscal policy uncertainty defined as a dummy which takes 1 if the value of fiscal policy uncertainty at time t, is above the mean, 0 otherwise. Low relates to low fiscal policy uncertainty defined as a dummy which takes 1 if the value of fiscal policy uncertainty at time t, is below the mean, 0 otherwise. These are then multiplied by the fiscal policy uncertainty values to obtain the corresponding high and low fiscal policy uncertainty indices.

To capture the different channels through which fiscal policy uncertainty might affect the real GDP, the control variables (Real gross fixed capital formation (investment), Real final consumption expenditure by households and Total employment in the non-agricultural sectors) are included in the vector z. For the asymmetric specification of this model, we have:

$$y_{t+h} - y_{t-1} = \alpha^h + \sum_{i=1}^{I} \gamma_i^h y_{t-i} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{High} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{Low} + \sum_{m=1}^{M} \vartheta_k^h z_{t-m}$$

$$+ v_{t+h|t-1}; \quad h = 0,\ 1 \ldots . H \tag{3}$$

As a robustness check low and high uncertainty are also defined alternatively in terms of 25th[th] and 75th[th] percentile respectively. Equation(4) shows the specification without the z vector

$$y_{t+h} - y_{t-1} = \alpha^h + \sum_{i=1}^{I} \gamma_i^h y_{t-i} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{75th} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{25th} +$$

$$+ v_{t+h|t-1}; \quad h = 0,\ 1 \ldots . H \tag{4}$$

With the z vector included, we have:

$$y_{t+h} - y_{t-1} = \alpha^h + \sum_{i=1}^{I} \gamma_i^h y_{t-i} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{75th} + \sum_{j=1}^{J} \beta_j^h x_{t-j}^{25th} + \sum_{m=1}^{M} \vartheta_k^h z_{t-m}$$

$$+ v_{t+h|t-1}; \quad h = 0,\ 1 \ldots . H \tag{5}$$

4. Results

In this section the results on the asymmetric effect of different components of fiscal policy uncertainty to economic activity are presented. First the results with the model that includes the real GDP and each of the high and low fiscal policy uncertainty are presented. Next the results controlling for other variables are presented. Figure 2 shows the asymmetric response of real GDP to a generalized one standard deviation fiscal policy uncertainty shock with the 68% confidence bands. The results also indicate the p-values of two null hypotheses: i) "Joint"refers to the null that all the response coefficients are jointly zero, ii) "Cumulative" refers to the null that the accumulated impulse response after 10 periods is zero. Results on the first column relates to the response of GDP to high fiscal policy uncertainty while results on the second column relates to the response of GDP to low fiscal policy uncertainty. Focusing first on the response of GDP to high capital tax uncertainty in the first row and first column, it can be observed that GDP declined immediately following a one standard deviation shock to capital tax uncertainty. The response remained negative until around the 7th quarter it turned to positive briefly before turning to negative in the 9th quarter. The impact is persistent. Although the response is neither jointly nor cumulatively significant, there are periods where the responses are significant and these are in the 1st horizon, 3rd horizon, between the 5th and 6th horizons and between the 8th and 9th horizons. The response of GDP to low capital tax uncertainty is the reverse of its response to high capital tax uncertainty as expected. A high capital tax uncertainty shock tends to reduce real GDP growth immediately, inducing a downward revision in the annualized growth rate of real GDP by about 40 basis points after one quarter. Similarly, a low capital tax uncertainty shock tends to increase real GDP growth immediately, inducing an upward revision in the annualized growth rate of real GDP by about 35 basis points after one quarter. The Wald equality test in Table 1 confirms the rejection of equality of responses of high and low capital tax uncertainty. It can therefore be concluded that the effect of high and low capital tax uncertainty on real GDP in South Africa is asymmetric with the former having a larger impact.

Turning to the response of real GDP to a shock in consumption tax uncertainty in the second row, the results show that following a high consumption tax uncertainty shock, the real GDP fell immediately by about 20 basis points while it rose by about the same magnitude following a low consumption tax uncertainty shock. The Wald test could not reject the equality of the responses of high and low consumption tax uncertainty, implying that the null hypothesis of symmetric effect is valid and hence there is no asymmetry in the response of real GDP to high and low consumption tax uncertainty. In other words, the effects are quantitatively the same. Similar results in terms of asymmetry are found for the response of real GDP to labour income tax uncertainty. However, there seems to be a puzzle here where the high labour income tax uncertainty results in positive but declining response by GDP while the low labour income tax uncertainty results in a negative but rising response by GDP.

The response of real GDP to spending uncertainty as depicted in the fourth row, shows that the real GDP declined by about 15 basis point following high government spending uncertainty shock while it rose by about 25 basis point following a low spending uncertainty shock. The impact of a high spending uncertainty remained negative throughout with a maximum impact of 60 basis points in the 6th quarter. The impact of a low spending uncertainty also remained positive except between the 3rd and 4th quarter and the maximum impact of about 50 basis points occurred around the 8th quarter. Again the impact seems persistent. The null hypothesis that the accumulated impulse response of real GDP to a one standard deviation shock in both high and low spending uncertainty after 10 periods is zero is rejected at 1% and 10% respectively. To determine whether, the response of GDP to high and low spending uncertainty is asymmetric, the Wald test in Table 1 is employed. The Wald test rejects the equality of responses of real GDP to high and low government spending uncertainty. This implies that the effect of government spending uncertainty on South Africa's real GDP is asymmetric.

To control for the channels through which fiscal policy uncertainty may affect real GDP, real household consumption, real investment and employment are included in the analysis. The asymmetric response of

GDP and these other variables to a one standard deviation shock in the spending uncertainty has been chosen for the illustration since it produced cumulatively significant responses and also significant asymmetric effect.[2] These are presented in Figure 3. First we focus on the first row corresponding to the response of GDP to high and low spending uncertainty since these are comparable to the fourth row in Figure 2. The results are consistent with the ones in the fourth row of Figure 2 in terms of the sign and significance of the responses. However, the responses here are quantitatively larger with 20 basis point fall and 30 basis point increase in real GDP following a high and low spending uncertainty respectively. The responses of real consumption, investment and employment follow a similar trend as that of the real GDP in that a high spending uncertainty shock led to basically an immediate fall in these variables while they rose given a low spending uncertainty shock.

As another robustness check, low and high uncertainty is defined alternatively as the 25th and 75th percentile. Figures 4 and 5 show the responses for with and without the other real variables respectively. The results are qualitatively similar to using below and above average values of the respective fiscal policy uncertainty measures. Overall, the foregoing analysis illustrates that high fiscal policy uncertainty is not good for the economy since it reduces economic activity while low fiscal policy uncertainty may be considered good news.

[2] Results for other fiscal policy uncertainty measures are available from the author upon request.

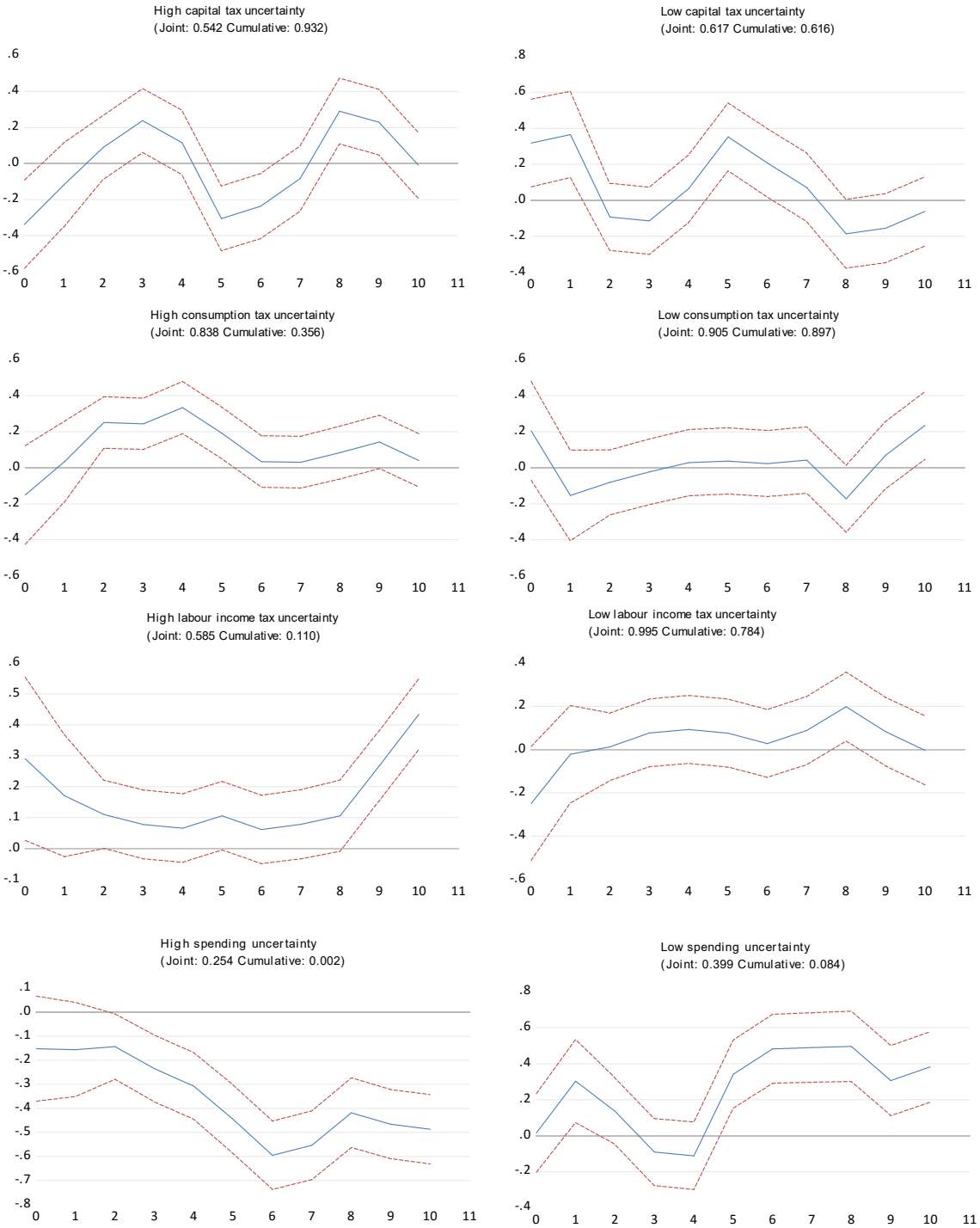

Figure 2: Asymmetric response of real GDP to generalized 1-S.D fiscal policy uncertainty shock

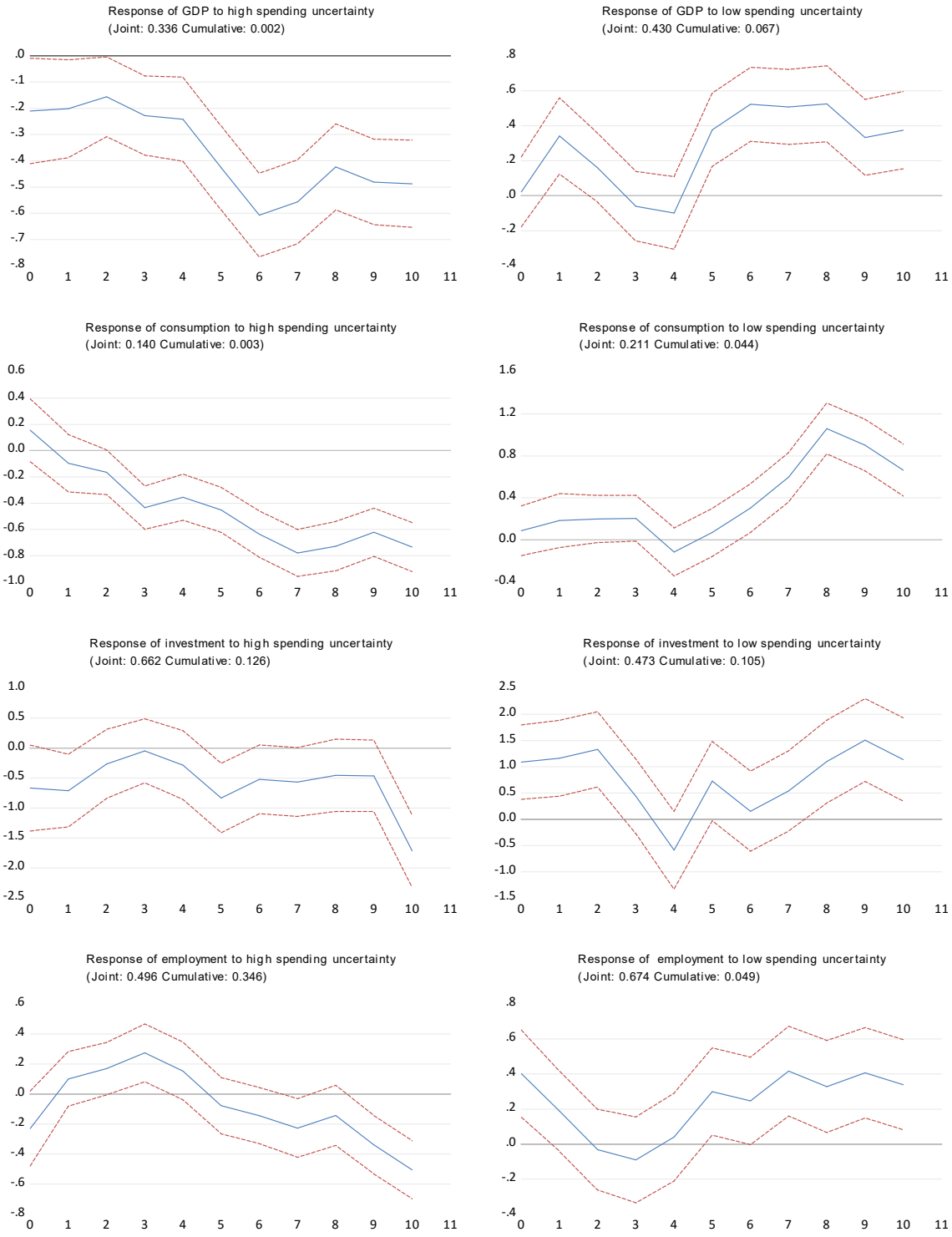

Figure 3: Asymmetric response of real GDP to spending policy uncertainty shock: controlling for other effects

Table 1: Wald Equality (Asymmetric) Test for the response of GDP to fiscal policy uncertainty

Test	P-value
High vs low capital tax uncertainty	0.065
High vs low consumption tax uncertainty	0.725
High vs low labour income tax uncertainty	0.543
High vs low spending uncertainty	0.100
High vs low spending uncertainty (plus other control variables)	0.100

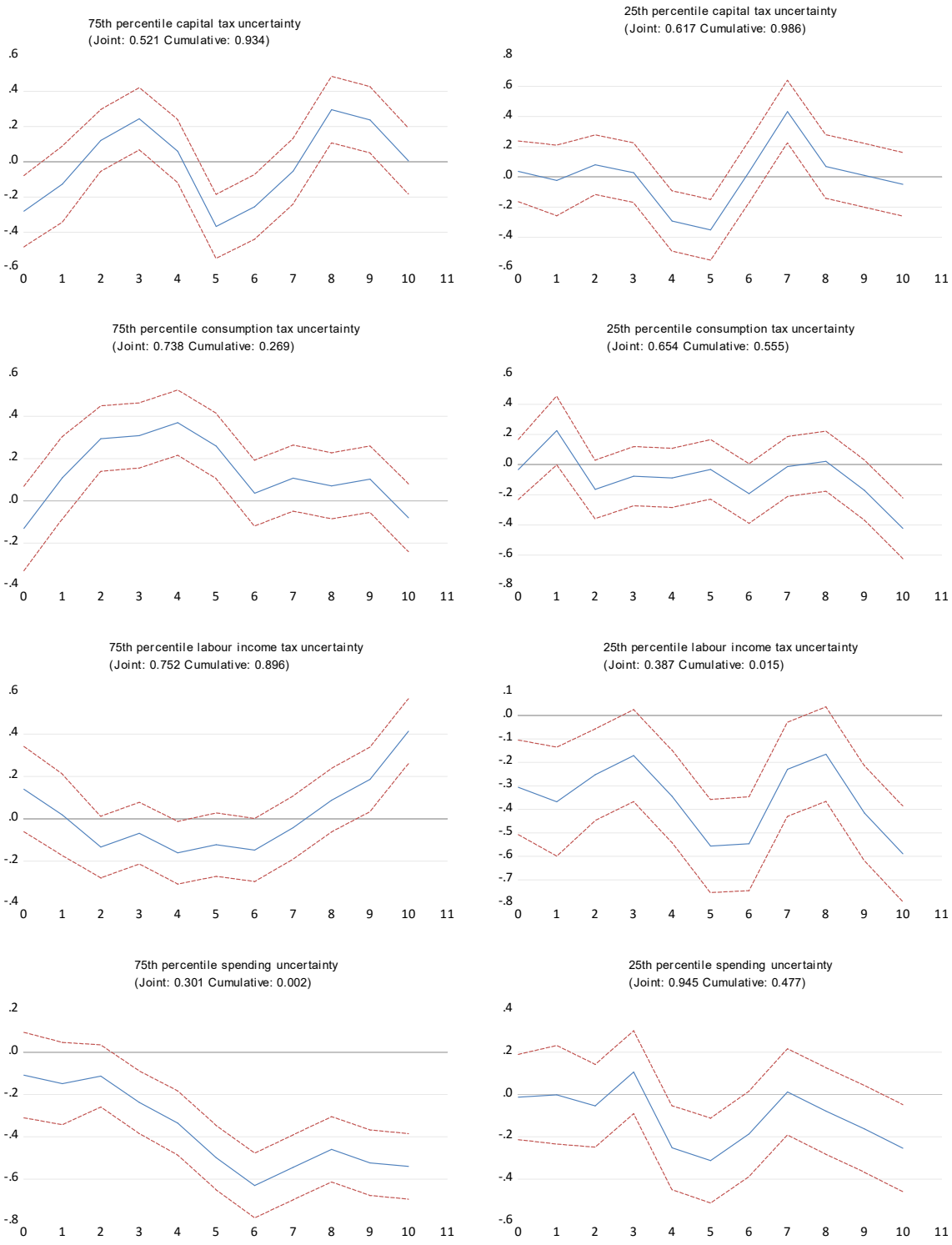

Figure 4: Response of real GDP to 75th percentile fiscal policy uncertainty shock

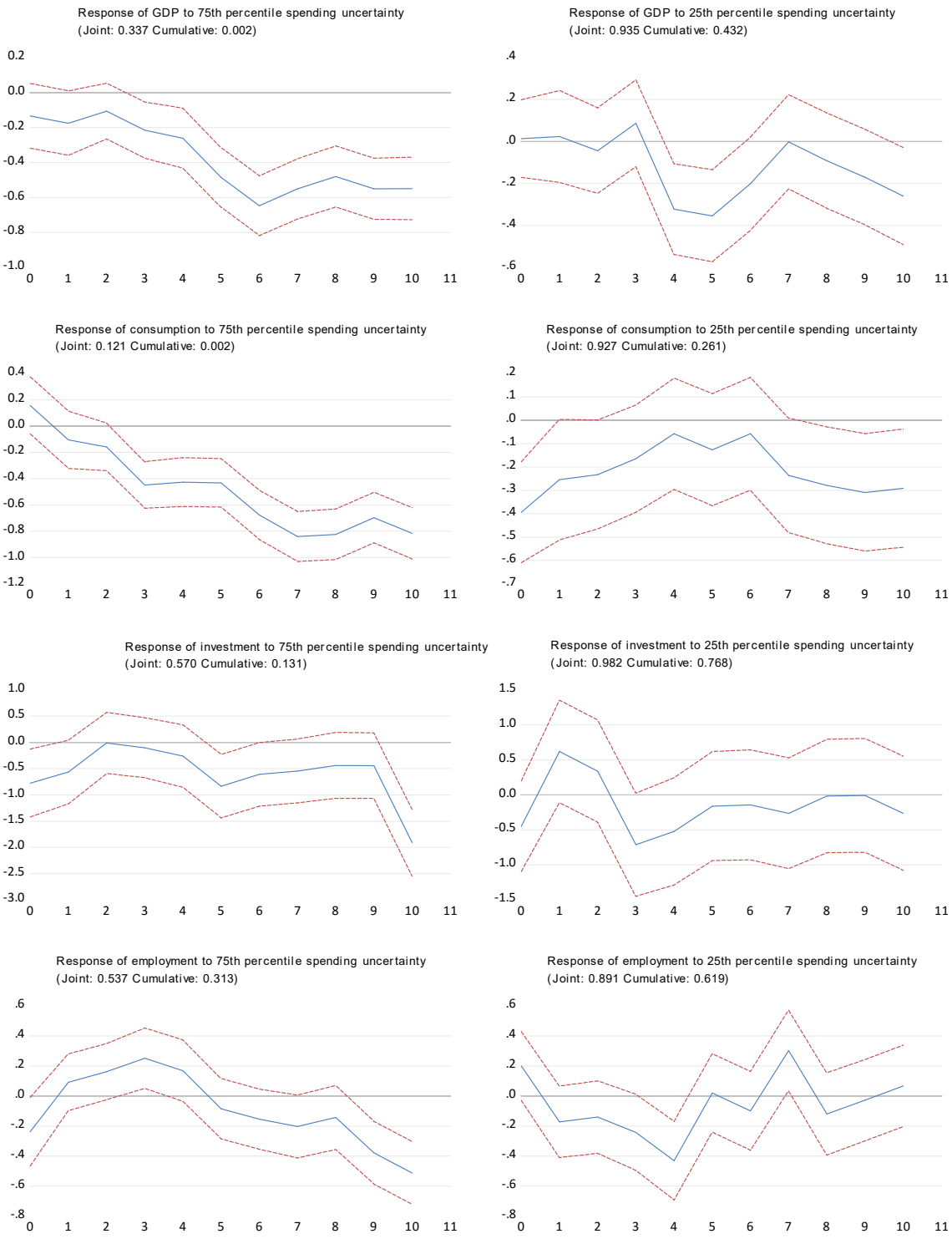

Figure 5: Response of real GDP to 25th percentile fiscal policy uncertainty shock

5. Conclusion

Doubts about the future path of fiscal policy could stall investment decisions and this could hamper economic growth. In this paper, the effect of fiscal policy uncertainty on economic activity has been investigated taking into account that this effect may differ with the magnitude of fiscal policy uncertainty. Specifically, the study addresses the question of whether high and low fiscal policy uncertainty has same or differing effect on economic activity. Results based on an asymmetric specification of the local projection method show that capital tax uncertainty and government spending uncertainty have asymmetric effect on real GDP while the effect of consumption tax and labour income tax appear symmetric. This is robust to inclusion of real consumption, real investment and employment in the specification. It is also robust to alternative definitions of high and low fiscal policy uncertainty. These results have important implications. The path of fiscal policy needs to be clear since this has the best chance of improving economic agents' confidence, business investment and consequently sustainable economic recovery. To meet the expectations of citizens, the government would need to come up with a better way of designing and implementing policies more effectively and efficiently ensuring that there is no information gap. This way the path of policy can become clearer to the citizens. Further, ignoring asymmetry in the nexus between fiscal policy uncertainty and economic activity may produce misleading conclusions. Lowering the level of fiscal policy uncertainty could enhance economic activity in South Africa. This requires immediate policy attention.

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