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When does it pay to tax? Evidence from state-dependent fiscal multipliers in the euro area☆

George Hondroyiannis [a,b,*], Dimitrios Papaoikonomou [a]

[a] Bank of Greece, Greece
[b] Harokopio University, Greece

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ABSTRACT

The impact of fiscal policy on economic growth is investigated within a panel of euro area member states over the period 2004–2011. We mainly consider fiscal impulses identified by (a) changes in the structural primary balance, complemented by evidence from (b) the IMF narrative shocks developed by Devries et al. (2011) and (c) a VAR-based measure of unanticipated policy announcements. Aggregate fiscal multipliers are estimated in the region of 0.5, although we find considerable variation depending on the fiscal mix, the degree of openness and the state of the economy. During episodes of recession, tax hikes become significantly more costly in terms of output than expenditure cuts. This appears to be related to increases in the share of hand-to-mouth consumers, proxied by the unemployment rate. Fiscal effects are generally more muted in open economies and during periods of positive growth. Country-specific features in Greece lead to significantly higher estimates, possibly in excess of unity in 2011, reflecting predominantly sizeable revenue effects.

1. Introduction

The long-standing debate regarding the effects of fiscal policy on economic activity has produced a voluminous body of empirical evidence. At the risk of over-simplifying, analyses can be grouped into two broad categories, depending on whether fiscal shocks are (a) generated endogenously, or (b) determined exogenously.

Studies in the first category involve the estimation of dynamic systems, in which policy shocks are identified through various forms of restrictions on the model's dynamics. Recent T-VAR studies (Baum and Koester, 2011; Auerbach and Gorodnichenko, 2012; Batini et al. 2012; Baum et al., 2012; and Hernandez de Cos and Moral-Benito 2013) allow for threshold non-linearities in the fiscal effect and typically find that spending multipliers increase significantly during periods of economic slack. However, despite introducing parameter flexibility, T-VAR analyses typically rely on the identification scheme proposed by Blanchard and Perotti (2002), which requires an exogenous estimate of the tax elasticity.[1] A more fundamental criticism is that in the presence of "fiscal foresight" the MA representation of the VAR is not invertible and the fiscal shocks are not identified.[2]

Studies falling under the second category use direct observations on fiscal shocks obtained either through conventional cyclical adjustment, or via the narrative approach. The appeal in this approach lies in its addressing the "fiscal foresight" critique. However, valid fiscal shocks which are uncontaminated by other fluctuations are difficult to come by and conventional cyclical adjustment is well-documented to be far from perfect.[3] Narrative measures, on the other hand, offer an increasingly popular alternative. Recent studies employing narrative fiscal shocks report sizeable revenue multipliers, typically in excess of unity, (Cloyne, 2013; Mertens and Ravn, 2012; Perotti, 2012; and Romer and Romer, 2010),[4] while the effects on public spending tend to be comparatively modest (Ramey, 2011; Ramey and Shapiro, 1998).[5] Parameters, however, are typically assumed to be time-invariant.[6]

The purpose of the paper is to estimate the effect of fiscal policy on economic activity combining elements from the two approaches. Hence we consider fiscal impulses identified by (a) changes in the structural primary balance, complemented by evidence from (b) the IMF narrative shocks developed by Devries et al. (2011) and (c) a VAR-based measure of unanticipated policy announcements. We employ direct observations

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* Corresponding author at: Fiscal Affairs Division, Economic Research Department, Bank of Greece, 21, E. Venizelos Avenue, Athens 102 50, Greece. Tel.: +30 210 3202429.
E-mail address: ghondroyiannis@bankofgreece.gr (G. Hondroyiannis).

[1] Auerbach and Gorodnichenko note that tax elasticities may vary over the cycle and report revenue multipliers to be very sensitive to the assumed elasticity.

[2] See for example Favero and Giavazzi (2012).

[3] See Guajardo et al (2011).

[4] Less sizeable revenue effects have been reported for the US by Favero and Giavazzi (2012), although their analysis is challenged by Perotti (2012).

[5] Guajardo et al (2011) present very similar evidence using narrative panel data on both revenue and spending for 17 OECD member states.

[6] Owyang et al (2013) have recently introduced threshold effects in an analysis of narrative spending shocks for the US and Canada. They allow the spending multiplier to differ according to a single, exogenously determined threshold in unemployment, finding mixed evidence.

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on fiscal shocks to provide estimates of state-dependent fiscal multipliers for the euro area, with explicit references to the case of Greece. We simultaneously consider multiple sources of non-linearity, allowing fiscal effects to differ according to exogenously determined states for the degree of openness, the state of the economy and the policy mix.

Apart from a generic interest in the euro area, looking at a currency union has one important practical advantage. As noted, for example, in Guajardo et al. (2011) differences in the estimated effects of taxation and government spending could arise due to the conduct of monetary policy. While this may be a valid criticism when monetary policy is set at the national level, in the context of a currency union monetary policy can be convincingly argued not to respond systematically to any individual country's fiscal policy.

Focusing on the euro area, however, also comes at a cost, as it does not allow us to carry out our main analysis using narrative shocks.[7] Instead, we use the measure of the structural primary balance, providing an informal indication on possible bias using the available narrative shocks. Also, our approach rids us from the curse of dimensionality of VAR analyses, allowing us to include a non-trivial set of control variables.

The rest of the paper is organized as follows: Section 2 presents the main findings, building up from a baseline specification. Section 3 reports (a) robustness checks for panel dimensions; (b) provides an informal comparison with evidence based on the IMF narrative data and (c) estimates of time-varying impact multipliers. Section 4 concludes.

2. Methodology and empirical results

2.1. Baseline specification

We estimate the following baseline specification:

$$Y_{it} = \mu_i + \lambda_t + \delta Y_{i,t-1} + \alpha F_{it} + \boldsymbol{\beta}' \boldsymbol{X}_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} is the real GDP growth rate observed for country $i = 1, 2, \ldots, M$ during period $t = 1, 2, \ldots, T$, μ_i and λ_t are country and period-specific effects, respectively, F_{it} is the fiscal impulse with impact multiplier α, $\mathbf{X}_{it}$ is a k-vector of non-fiscal regressors with constant loadings $\boldsymbol{\beta} = [\beta_1, \beta_2, \ldots, \beta_k]'$, and ε_{it} is a zero-mean error term.

We define the fiscal impulse F_{it} as the annual change in the structural primary balance. We include in $\mathbf{X}_{it}$ the following core variables: (i) economic sentiment growth, (ii) Δ(unemployment rate), (iii) current period and first lag of real credit growth, (iv) trade balance growth rate and (v) Δ(private investment).[8]

Accounting for endogeneity and the lagged dependent variable, Eq. (1) is estimated with GMM. We apply first-differences in the tradition of Arellano and Bond (1991), hereafter GMM_1, as well as the forward orthogonal deviations proposed by Arellano and Bover (1995), hereafter GMM_2. In both cases, we employ the two-step estimator using White diagonal weighting matrices.[9] White-period robust standard errors are reported throughout.[10]

Estimates of (1) are reported in Table 1 under column I for both GMM_1 and GMM_2. All coefficients are found to be significant and are signed in line with our priors. Both estimators return identical values for $\alpha = -0.34$. However, this estimate does not take account of possible non-linearities arising from the degree of trade openness or the state of the economy, nor does it account for the effect of the policy mix.

2.2. Non-linear fiscal multipliers

We proceed by introducing non-linearity in the fiscal multiplier, allowing for state-dependent estimates. In particular, we reformulate Eq. (1) as

$$Y_{it} = \mu_i + \lambda_t + \delta Y_{i,t-1} + \alpha F_{it} + \boldsymbol{\beta}' \boldsymbol{X}_{it} + \sum_{j=0}^{p} \gamma_j F_{it} D_{it}^{j} + \varepsilon_{it} \quad (2)$$

where D_{it}^{j} is a binary variable taking values of either zero or unity, defining an exogenously determined state j. The γ_js capture the marginal effect of state j on the fiscal multiplier α, so that when $D_{it}^{j} = 1$ the fiscal multiplier is given by the sum $(\alpha + \gamma_j)$.

We expand the baseline $\mathbf{X}_{it}$ to include (vi) relative debt growth and (vii) Δ(coordinated_consolidation) and define the following indicator dummies: $D_{it}^{0} = spending\_based$, denoting expenditure share of at least 3/4 in the fiscal mix; $D_{it}^{1} = open\_economy$, denoting GDP share of exports plus imports above the EA average[11]; $D_{it}^{2} = recession$, denoting negative real GDP growth. We additionally allow the fiscal multiplier in Greece to be influenced by country-specific factors beyond those captured by trade openness, the fiscal mix and the incidence of recession, by defining the self-explanatory indicator dummies $D_{it}^{3} = Greece$ and $D_{it}^{4} = Greece\ in$ 2011.

Table 1, columns II–VIII report the estimates for both estimators, GMM_1 and GMM_2. Relative debt growth and coordinated consolidation are each found to have distinct negative effects on growth, beyond those explained by the core variables. In addition, we find unambiguous support in favour of non-linear fiscal effects. We find fiscal multipliers to be more muted in open economies, during periods of positive growth and for spending-based fiscal impulses. Both estimators find evidence of significantly more negative fiscal effects in Greece, beyond those captured by D_{it}^{0}, D_{it}^{1} and D_{it}^{2}. GMM_1 also reports a significant and sizeable increase in the fiscal multiplier in the year 2011, although GMM_2 finds no significant effect.

Fig. 1 plots the state-dependent effects of a fiscal consolidation by 1% of GDP, based on the estimates reported in Table 1, column VIII under GMM_1. The estimated multipliers are found to be rather muted, although there is considerable variation across different states. Values range from statistically insignificant non-Keynesian effects of less than 0.1, reported in the case of spending-based consolidation in open economies during periods of positive growth, to significant Keynesian effects around − 0.5, in the case of non-spending based consolidations undertaken in closed economies during periods of recession. Idiosyncratic features in Greece lead to magnified fiscal effects by an estimated − 0.2. Based on GMM_1, the multiplier in Greece exceeded unity in 2011.

2.3. Distinct revenue and expenditure shocks

The effect of the policy mix was captured in the context of Eq. (2) by means of the exogenously determined D_{it}^{0}. The definition of a spending-based fiscal impulse according to D_{it}^{0}, however, is arbitrary and estimates

[7] The single available data source on euro area countries in Devries et al. (2011) unfortunately covers only 10 member states (Austria, Belgium, Spain, Finland, Germany, France, Ireland, Italy, Netherlands and Portugal).

[8] Definitions and sources of all variables are provided in Appendix A. All data are collected for EA17 members, namely: Austria, Belgium, Cyprus, Germany, Estonia, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovenia and Slovakia.

[9] System GMM is another popular alternative, provided that changes in instrumenting variables are not correlated with fixed effects, e.g. Roodman (2009a). The presence of sizeable output gaps in EA17 during 2004–2011 indicates persistent deviations from steady-state, suggesting that the system GMM assumption is likely to be violated in the period under investigation.

[10] The large number of instruments generated by the GMM estimators is likely to result in downward bias in standard errors, as well as to a weak test of instrument validity, e.g. Roodman (2009b). While the former does not affect the consistency of the estimated parameters, the latter is potentially hazardous. In all cases we report Sargan-test p-values for full instruments and collapsed third-lag instruments.

[11] We use national accounts chain-linked volumes at 2005 exchange rates. However, trade figures may vary depending on the valuation method (PPP/PPS), which could affect the classification of "open economy".