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Estimating fiscal policy reaction functions: The role of model specification☆

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ABSTRACT

The literature has not yet come to a consensus on the actual responses of fiscal policy to output and to past public debt levels within industrialized countries. While the cyclical adjustment literature has suggested a strong response of the primary surplus to the output gap, the time-series literature has tended to report a far smaller response. However, recent theoretical findings suggest that some of this difference may be due to the way in which the time-series literature has typically handled the issue of autocorrelation, in a way which is incompatible with the timing of automatic stabilizers. In order to find a way around this problem, we formulate and estimate a set of fiscal policy reaction functions for the euro area, which allow for the primary surplus to feature three components: a fast-moving (stabilizing) response to the output gap, a consolidating response to the debt-GDP ratio, and an exogenous, persistent fiscal policy shifter. When we formulate a fiscal reaction function in this way, our estimates are compatible in magnitude with previous estimates from the cyclical adjustment literature. Furthermore, based on a set of model comparison exercises in line with what has been done in the monetary policy literature, we argue that our specification explains the data better than does the more commonly used specification.

1. Introduction

The crisis in the euro area, the desire for macroeconomic stability, and the need to consolidate public finances have provoked a renewed discussion about the positive systematic conduct of fiscal policy as well as the design of normative fiscal policy rules. Despite this interest in fiscal policy, however, not much consensus exists in the literature on the actual degree of counter-cyclical stabilization policy or consolidation in response to the debt ratio that euro area governments have historically pursued. While the cyclical adjustment literature implies a strong stabilizing response of the primary surplus to the business cycle, the time-series literature on fiscal reaction functions has come to conflicting conclusions. Time-series studies that employ first differences have usually found results broadly in line with the cyclical adjustment literature, while studies that estimate a fiscal reaction function in levels with a lagged dependent variable on the right hand side have usually found an acyclical primary surplus.[1] Somewhat puzzlingly, these results seem to hold both for cyclically-unadjusted and cyclically-adjusted data. These results are puzzling because one would expect the differences of these responses to be on the order of 0.5. These discrepancies with the cyclical adjustment literature, as argued by Golinelli and Momigliano (2009), may occur because a specification with a lagged

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[1] See Golinelli and Momigliano (2009) and Reicher (2014b) for a review of this literature.

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dependent variable implies a different model of automatic stabilizers than the fast-moving automatic stabilizers implied by the cyclical adjustment literature. If this were the case, then a specification with a lagged dependent variable would be misspecified, and any resulting coefficient estimates would be inconsistent and biased toward an arbitrary number. This is likely to be a serious problem in practice, resulting in extremely low estimates of the degree of stabilization policy even when there is a large degree of stabilization policy in reality.

With the results of Golinelli and Momigliano (2009) in mind, we develop a way around this problem, which results in a workable, parsimonious way to estimate a fiscal reaction function in the presence of autocorrelation. We show that our approach, when applied to data from the euro area, delivers estimates that are consistent with the cyclical adjustment literature. To do this, first, we specify a fiscal reaction function that allows for the primary surplus to respond to deviations of actual GDP from potential GDP (the output gap) and to the public debt. Then we assume that the error to this equation, which represents any omitted drivers of fiscal policy, follows an AR(1) process, in line with Mendoza and Ostry (2008) but not in line with most of the remaining literature. This assumption gives us a nonlinear estimation equation, which we then go on to estimate numerically. We estimate this equation under different assumptions about the panel structure of our dataset, under different assumptions about the endogeneity of output, and for different orders of integration (assuming an AR(1) coefficient below or at one). In all of these cases, we find a strong and positive response of the primary surplus to the output gap (on the order of 0.4 to 0.7) and we find a positive response of the primary surplus to the debt-GDP ratio (on the order of 0.05 to 0.08). We then show, based on a model comparison exercise, that this specification outperforms a specification that controls for autocorrelation by using a lagged dependent variable, as in most of the literature, and that our specification also behaves well in comparison with a more general model specification (see Section 4).

Our baseline fiscal reaction function features an automatic adjustment of the primary surplus to the current output gap and the lagged debt-GDP ratio, alongside a slow-moving, exogenous fiscal policy shifter which may exhibit autocorrelation or unit-root behavior. As Taylor (2000) points out, a fiscal reaction function along these lines would be analogous in its form to a monetary policy reaction function. There is a parallel between these two ideas, in that the specification of the fiscal reaction function reflects the goal of fiscal policymakers to jointly stabilize output and the public debt, just as monetary policymakers seek to stabilize output and inflation. Furthermore, both kinds of reaction functions face the issue of model specification in the presence of autocorrelation. In the context of monetary policy reaction functions this issue has already been discussed by Rudebusch (2002) and empirically investigated by English et al. (2003).[2] In fact, we follow a similar approach to that taken by English et al. (2003) to show that our specification of a fiscal reaction function is more in line with a general model than is the lagged dependent variable specification.

Based on our baseline fiscal reaction function, we then go on to revisit further issues that have been discussed so far in the literature on fiscal reaction functions. First, we revisit the issue on how the systematic conduct of fiscal policy has changed over time (Section 5). On this issue, our results differ somewhat from previous results on how European fiscal policy has changed in response to the Maastricht Treaty and EMU.[3] Moreover, our results indicate that the period before the 2008 financial crisis may have been characterized by a lack of attention to fiscal consolidation in response to the past debt, while the period after the crisis has seen a renewed interest in fiscal consolidation. This result is particularly interesting insofar as it coincides with the onset of the crisis in the euro area.

Next, we estimate our reaction function using data on the cyclically-adjusted primary surplus, which allows for a closer look at the discretionary reaction of fiscal policy (Section 6). We find evidence for a slightly counter-cyclical discretionary reaction, i.e. one that increases with output. Most importantly, in line with the cyclical adjustment literature, we find that the difference between the counter-cyclical discretionary reaction and the counter-cyclical overall reaction of fiscal policy is around 0.5 for those subperiods for which we have data. Based on this result, we argue that our specification helps to reconcile the time-series literature with the cyclical adjustment literature.

Then, we go on to investigate the role of high debt levels and asymmetric reactions to the output gap (Section 7). Our results suggest that euro area governments have pursued economically and statistically significant consolidation policies only if their debt-GDP ratios have exceeded the 60% (Maastricht) threshold. Our results also suggest a stronger response of the primary balance to a positive output gap than to a negative output gap. Both of these results are in line with previous literature on these issues, which suggests that these results are not sensitive to model specification.

After looking at nonlinearities, we go on to investigate the role of data revisions and news about the future business cycle (Section 8). We find that fiscal authorities respond substantially to both the real-time and ex-post output gaps, which suggests that both measures of the output gap deliver important information as to the conduct of fiscal policy. In contrast, fiscal authorities do not seem to significantly respond to forecasts. Our estimates of the overall cyclical response of the primary surplus, however, are robust to the inclusion of output gap revisions or forecasts.

Finally, we present further robustness checks (trend GDP as a cyclical indicator, and the role of political variables) as well as country-specific estimates for our fiscal reaction function. We present these in the Appendix. We find that our results are robust

[2] Rudebusch (2002, p.1161) argues that "the illusion of monetary policy inertia evident in the estimated policy rules likely reflects the persistent shocks that central banks face", rather than an inherent motive for interest-rate smoothing.

[3] Galí and Perotti (2003), García et al. (2009), Bénétrix and Lane (2013), and others mention the choice of time period – particularly the 1993–1998 period – as exhibiting a particularly strong degree of cyclical stabilization policies. Our results on cyclicality, by contrast, show fewer changes over time; we find that this difference is mainly due to the treatment of one-off operations.