Discussion Paper

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EXECUTIVE SUMMARY

ARE FISCAL VAR'S NON-FUNDAMENTALNESS EASILY REVERSIBLE THROUGH THE ADDITION OF INFORMATIVE VARIABLES?

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The aim of this paper is to verify if the solution presented by Leeper et al. (2011), to the non-fundamentalness problem they found in Blanchard and Perotti's (2002) fiscal VAR (Vector Auto Regression) model and data, has indeed allowed them to arrive at a model with a fundamental representation.

In order to achieve this goal, this research employed the Forni and Gambetti's (2014) and the Canova and Sahneh's (2018) tests for fundamentalness.

Blanchard and Perotti's (2002) paper (BP) was a seminal contribution, virtually initiating the Fiscal VAR literature in the USA. That was the first time the timing of fiscal policies and fiscal revenue responses was considered in the identification of a fiscal SVAR (Structural Vector Auto Regression) model.

Nevertheless, Leeper et al. (2011) concluded that BP's model and data are non-fundamental, so their results are not trustworthy. They employed an additional variable to avoid the missing information presented in the data set and therefore concluded that they corrected the model and data for non-fundamentalness, in what they claimed was a successful attempt.

The VAR/SVAR models are the cornerstone of the contemporaneous empirical macroeconomic research, in particular for measuring the impact of fiscal policy shocks. They may be employed as atheoretical models, as well as a mean to support the estimation and testing of DSGE (Dynamic Stochastic General Equilibrium) models – the main theoretical tool for modern macroeconomics.

Nevertheless, VAR models may be subject to econometric pathologies, such as non-causality and non-fundamentalness. They are capable of biasing the estimates in any direction or intensity. The presence of non-fundamentalness is related to the existence of explosive roots in the autoregressive polynomials of stationary processes and both refer to the insufficiency of the econometrician's data to estimate the model's correct parameters. The latter is closely associated with the former, and it consists of the non-invertibility of the MA (Moving Average) representation in positive powers of the lag operator, in covariance-stationary processes. Strictly in the case of covariance stationary series, both non-causality and non-fundamentalness are equivalent concepts.

As mentioned before, the goal of this paper is to employ more recent fundamentalness tests to check these conclusions.

A VAR model is considered fundamental if there is only one MA (Moving Average) representation of the model; therefore, the MA representation is invertible in positive powers of the lag operators. A non-fundamental VAR does not fulfill this invertibility requirement, thus there are more than one MA representation of the VAR. This implies the estimated coefficients are subject to biases of any size and direction.

The non-fundamentalness problem may occur because of misspecification, including missing information. The Leeper et al. (2011) proposed solution for BP's data is the addition of a variable the authors believed was missing, so that the model missing information is resolved and this should solve the non-fundamentalness problem found in BP's application. The problem is that they test that hypothesis through

1. See Sahneh (2015).
2. See Lanne and Saikkonen (2013).

a necessary conditions test, which is overpowered by the more complete sufficient condition test proposed by Forni and Gambetti (2014) and later by Canova and Sahneh (2018).

The results from both tests corroborated Canova and Sahneh (2018) conclusion that BP data is non-fundamental.

Nevertheless, both tests rejected fundamentalness in BP data even when the Leeper et al. (2011) spreads were included in the main dataset. This leads to the conclusion that the spread variable did not solve the data insufficiency problem and, therefore, did not solve the non-fundamentalness problem as described in Leeper et al. (2011).

This suggests it may be much more difficult than previously thought to solve non-fundamentalness with handpicked variables that supposedly contain the missing information in those systems, as proposed by Kilian and Lütkepohl (2017).

Due to the nature of the non-fundamentalness problem, which may generate biases of any size and direction on the estimates, this conclusion is disturbing. Even though the rejection of a single case of the employment of this type of solution is not at all a definitive denial of the method of finding variables that contain the missing data, such applications are, up to this date, pretty rare and the prospect of the failure of one such rare application is discouraging.

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