What VAR Tell us about DSGE Models?*

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Summary. We examine the consequences of extracting structural shocks in VAR models using standard standard inertial restrictions, when the data has been generated by two stochastic dynamic general equilibrium (DSGE) models featuring different types of microfundations and different sources of sluggishness. We find that, in general, misspecification is substantial: short run coefficients often have wrong signs; impulse responses and variance decompositions give misleading representations of the dynamics; inexistent puzzles are created. We show that an omitted variables bias accounts for the results and propose an alternative identification technique which can cope with the inherent underidentification displayed by the DSGE models currently used in macroeconomics.

Key words: General equilibrium, Monetary Policy, Identification, Structural VARs

JEL Classification: C32, C68, E32, E52

> Per questo non abbiamo niente da insegnare: su cio' che piu' somiglia alla nostra esperienza non possiamo influire, in cio' che porta la nostra impronta non sappiamo riconoscerci.
> *Mr. Palomar, Italo Calvino*

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1 Introduction

The high correlation between monetary and real aggregates over the business cycle has attracted the attention of macroeconomists for at least forty years. Friedman and Schwartz [17] were among the firsts to provide a causal interpretation of this relationship: they showed that the comovements of money with output were not due to the passive response of money to the developments in the real and financial sides of the economy and argued that changes in money were good approximations to policy disturbances. Since their seminal work, several generations of macroeconomists have tried either to empirically refute Friedman and Schwartz's causal interpretation or to provide theoretical models which can account for such a relationship (see for examples, Lucas [20]; Cooley and Quadrini [11]; Chari, Kehoe and McGrattan [5]).

The empirical side of the literature has documented that unforecastable movements in money produce responses in macroeconomic variables, in particular interest rates, that are difficult to interpret - they generate the so-called liquidity puzzle (see Leeper and Gordon [19]). To remedy these problems Sims [25], Bernanke and Blinder [1] suggested to use short term interest rate innovations as indicators of monetary policy disturbances. However, also in this case, the responses of certain variables to policy disturbances are difficult to justify (in particular, the responses of the price level (Sims [26]). As a consequence of these difficulties, the last ten years have witnessed a considerable effort in trying to identify monetary policy disturbances using parsimoniously restricted multivariate time series models (see Gordon and Leeper [18]; Christiano, Eichenbaum and Evans [8]; Bernanke and Mihov [2]; Uhlig [31]).

This literature has stressed the pitfalls of an incorrect choice of variables and identification schemes and carefully documented the type of central bank reaction function in place in various historical episodes. However, by concentrating on the identification of monetary policy disturbances, this literature has disregarded possible feedbacks due to the general equilibrium nature of shocks. In particular, conventional "inertial" constraints are routinely imposed on equations other than the one under consideration in order to obtain the minimum number of restrictions needed to identify the full system of equations.

This paper examines the consequences of imposing (false) inertial restrictions on the inference a VAR econometrician draws when two classes general equilibrium models are used to generate the data. In particular, we are interested in knowing whether it is possible to recover the underlying policy rule and whether statistics characterizing the transmission properties of monetary policy shocks and the importance of policy disturbances in generating real fluctuations are reliable or not.

The mechanics underlying the transmission properties of monetary disturbances are as elusive as ever and current theoretical models, although a bit more microfunded and articulated than those used in the past, still fall short in accounting for many aspects of the monetary phenomena. For example, existing paradigms have difficulties in accounting for the unconditional correlation of output, interest rates, real balances and inflation observed in the last 40 years both in the US and Europe and for the persistence of inflation. Rather than taking a position in the dispute of what model better represents the data, we prefer to be agnostic: we take two pro-