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Impact factors ☆

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Abstract

In this paper we discuss sensitivity of forecasts with respect to the information set considered in prediction; a sensitivity measure called impact factor, IF, is defined. This notion is specialized to the case of VAR processes integrated of order 0, 1 and 2. For stationary VARs this measure corresponds to the sum of the impulse response coefficients. For integrated VAR systems, the IF has a direct interpretation in terms of long-run forecasts. Various applications of this concept are reviewed; they include questions of policy effectiveness and of forecast uncertainty due to data revisions. A unified approach to inference on the IF is given, showing under what circumstances standard asymptotic inference can be conducted also in systems integrated of order 1 and 2. It is shown how the results reported here can be used to calculate similar sensitivity measures for models with a simultaneity structure.

JEL classification: C53; C32; C52

Keywords: Sensitivity; Forecasting; Cointegration; I(1); I(2); Dynamic multipliers; (Generalized) Impulse Responses; VAR

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1. Introduction

Forecasting is one of the major enterprises in time-series econometrics, see Clements and Hendry (2002) and reference therein. In this paper we consider model-based long-run forecasts and their sensitivity with respect to information variables. We define a sensitivity indicator, called impact factor, IF. It is shown how this indicator allows to formulate questions on policy effectiveness and on the forecast uncertainty due to data revisions.

Sensitivity indicators have long been advocated in econometrics; see Banerjee and Magnus (1999, 2000) for recent references. By definition, they describe the sensitivity of a given procedure with respect e.g. to some possible source of model mis-specification. In the present case we apply this concept to mis-measurement of the information variables that are used in long-run forecasts.

Variations in the information variables can be caused by data revisions. Data revisions may hence alter the long-run forecasts of key macroeconomic indicators. Given that many economic decisions are based on forecasts made using preliminary data, it would be of interest to measure forecast uncertainty due to this source of data errors. Improving the quality of preliminary figures for variables to which forecasts are most sensitive would greatly improve the quality of the associated economic decisions. Conversely if data revisions on some variables do not have any impact on long run forecast, then there would be no need to obtain more timely or precise data.

Variations in the information variables may also be associated with the effects of policy interventions. In this perspective, it is of interest to find how long-run forecasts of key indicators are affected by possible policy actions. Absence of sensitivity would indicate long-run ineffectiveness of the policy measure.

Although policy analysis and data revisions are the main economic areas of applications of this concept, the notion of IF can be defined and discussed in general for any dynamic system and forecast function. The IF is not calculated on actual forecasts, but it is defined as a function of the model parameters and possibly of sample data. It measures long-run properties of the system; it is hence suggested as a tool of model interpretation, rather than of forecast performance. Quite obviously, the notion of IF does not account for the possible occurrence of model breaks between the past and the future.

The concept of IF is related to many standard econometric notions, like dynamic multipliers and impulse responses. Like a dynamic multiplier, the IF measures the sensitivity of a function. However, a dynamic multiplier is defined only between some endogenous variable y and some exogenous variable x; impact factors, instead, are well defined for any dynamic systems, including VARs. Moreover long-run multipliers are usually defined in terms of the static relation implied by a dynamic model for y and x, see e.g. Hendry (1995, p. 339), Gourieroux and Monfort (1995, p. 34, 35), whereas the IF measures the accumulated effects on forecasts of perturbations in past information.

Impact factors turn out to be the limit of cumulated impulse responses (IR) in case of VARs. The definition of (economically meaningful) shocks is the subject of a vast debate in the VAR literature, to which the present paper does not contribute.