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Granger Causality, Exogeneity, Cointegration, and Economic Policy Analysis

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Abstract

Policy analysis had long been a main interest of Clive Granger's. Here, we present a framework for economic policy analysis that provides a novel integration of several fundamental concepts at the heart of Granger's contributions to time-series analysis. We work with a dynamic structural system analyzed by White and Lu (2010) with well defined causal meaning; under suitable conditional exogeneity restrictions, Granger causality coincides with this structural notion. The system contains target and control subsystems, with possibly integrated or cointegrated behavior. We ensure the invariance of the target subsystem to policy interventions using an explicitly causal partial equilibrium recursivity condition. Policy effectiveness is ensured by another explicit causality condition. These properties only involve the data generating process; models play a subsidiary role. Our framework thus complements that of Ericsson, Hendry, and Mizon (1998) (EHM) by providing conditions for policy analysis alternative to weak, strong, and super-exogeneity. This makes possible policy analysis for systems that may fail EHM's conditions. It also facilitates analysis of the cointegrating properties of systems subject to policymaker control. We discuss a variety of practical procedures useful for analyzing such systems and illustrate with an application to a simple model of the U.S. macroeconomy.

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1 Introduction

Although just three of Clive Granger's many papers explicitly focus on aspects of policy analysis (Granger, 1973; Granger, 1988; and Granger and Deutsch, 1992), a central and long-standing concern evident throughout his work is that econometric theory and practice should be informative and useful to policymakers. In this paper, we further this objective by providing a novel framework for economic policy analysis that blends together a number of concepts at the heart of Granger's contributions to time-series econometrics: causality, exogeneity, cointegration, and model specification.

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