Bridging the Gap: Linking Economics and Econometrics*

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Summary. The marked gap that exists between macroeconomic theory models and applied econometric findings arises because most observed data variability in macro-econometrics is due to factors that are absent from economic theories, but which econometric models have to tackle (particularly various non-stationarities). *Ceteris paribus* may be fine for theoretical reasoning, but is unacceptable for empirical modelling. A 'minor influence' theorem is needed instead which can only be established empirically. Thus, the chapter considers an automatic selection approach to bring objectivity and credibility to empirical econometric modelling.

1 Introduction

The marked gap that exists between macro-economic theory models and applied econometric findings arises because much observed data variability in macroeconomics is due to factors that are absent from economic theories. Various sources of non-stationarity impinge on macroeconomic data, deriving from technical progress, new legislation, institutional change, financial innovation and political factors including conflicts, inducing both evolution and structural breaks which change the distributional properties of the data. In macroeconomics, forecast failure (defined as a significant deterioration in forecast performance relative to its anticipated outcome, usually based on historical performance) is the norm, and is almost certainly due to structural breaks (see e.g., Clements and Hendry [5, 6]).

Apart from general equilibrium theory (see e.g., Kirman [48], on its evolution) – where sameness would result, not non-stationarity – few economic theories claim completeness. Thus, theory relies on many implicit *ceteris paribus* clauses. These

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may seem valid for theoretical reasoning, but are not an acceptable basis for empirical modelling. Even if the impounded variables are strongly exogenous, it is meaningless to appeal to *ceteris paribus* when the potential effects are non-stationary, since 'other things' cannot be 'equal' (i.e., unchanged). Instead, 'minor influence' theorems or empirical evidence (preferably both) are needed, specifying why omitted factors can be neglected, not because they will not change, but because changes in them are of a smaller order of importance than the included effects. At present such results rarely exist.

Generalizations about 'macroeconomic theory' are hazardous, as a huge range of approaches and issues are addressed in the literature. Nevertheless, some generic aspects seem open to discussion. Many economic theory models are derived from constrained optimization, dating from the classic treatment in Samuelson [64]. Other approaches regard the fundamental laws of economics as being entailed by heterogeneity of endowments, (see e.g. Hildenbrand [39, 40]), perhaps with agents having incomplete information, or holding imperfect-knowledge expectations (see e.g., Aghion et al. [1]). Yet others advocate real-business cycle theories with rational expectations (see e.g., Kydland and Prescott [16, 51]). Dynamic stochastic general equilibrium (DSGE) models abound (see e.g., Smets and Wouters [66], for a recent implementation); yet Stiglitz [69] proposes the foundations of a new macroeconomics in asymmetric information inducing Keynesian effects, and derives completely different implications for economic policy from those of 'new classical' theories. Moreover, some aspects of economic theory models are *au choix*, such as forms of utility functions: but with non-stationary data, at best one transformation will be able to characterize the evidence in a constant relationship. For example, linear relationships between variables often arise from Euler equations (as in Hall [23]), but seem unlikely to be congruent descriptions in growing economies.

The absence from economic theories of the main forces for variability is common across different research arenas, but differs in form. In micro-economics, low R^2 values, usually ascribed to individual heterogeneity and idiosyncracies, reveal that most of the variability is not accounted for by the postulated models. Heterogeneity can generate high levels of unexplained variability, but there has to remain considerable doubt that all the major factors have been included. Likewise, in panel-data studies, most of the observed data variance is attributed to persistent 'individual effects' which need to be removed by (e.g.) differencing or deviations from individual means. Such evidence that most micro variability is due to individual heterogeneity hardly sustains using 'representative' agent theories for macro behaviour. Finally, cross-country studies rarely account for key institutional differences between the constituent economies, and often use averages of data over historical epochs where considerable changes occurred between periods (see e.g., Sala-i Martin [63], and the criticisms in Hoover and Perez [42], and Hendry and Krolzig [35]).

In the absence of clear and complete theoretical guidance on all relevant and irrelevant variables, functional forms, exogeneity, dynamics, and non-stationarities, empirical determination is essential. Economists are well aware of the importance of changes in constraints and in institutions, and devote considerable effort to modelling them, as in the vast literatures on credit rationing, policy rules, and economic crises,