Information-Driven Business Cycles: How Important are Noise Shocks? [EXTENDED ABSTRACT]

Ryan Chahrour* Robert Ulbricht†

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Abstract

We bound the potential business cycle contribution of non-fundamental shocks to beliefs using a partial identification approach that is minimally restrictive. Firms face exogenous and endogenous fluctuations in their ideal actions, but are imperfectly informed about them. No structural restrictions are imposed on the origin or nature of the economy’s fundamental shocks, the information structure of agents, or the process driving aggregate demand. Using data on the price level and output, we show that such non-fundamental shocks can contribute up to, but not more than, 28 percent of aggregate output fluctuations at short horizons and up to 45 percent of fluctuations unconditionally. Imposing additional economic restrictions and/or adding additional data tightens the bounds substantially, but without eliminating the potential for such shocks to play an important role in driving aggregate fluctuations.

1 Introduction

A growing macroeconomic literature explores theories of business cycles arising from private agents’ incomplete information. In these models, macroeconomic volatility results from purely informational shocks, i.e., shocks that influence agents’ beliefs but are orthogonal to the economy’s fundamentals. Theoretically, such “sentiment” or “noise” shocks have been offered as promising avenues to explaining the labor wedge (Angeletos and La’O, 2010), as a natural source of demand shocks (Lorenzoni, 2009), or more generally to explain fluctuations that are hard to reconcile with measured fundamentals (e.g., Angeletos, Collard and Dellas, 2014; Angeletos and La’O, 2013).

While these theories possess several appealing properties, they are also known to be hard to empirically validate. Specifically, a challenge in assessing the quantitative potential of these theories is the sensitivity of their predictions to structural assumptions regarding the nature of fundamentals in the economy and how these fundamentals map into the information available to the agents making decisions. In this paper, we quantify the potential importance of these information-driven fluctuations

*Boston College, Department of Economics. email: ryan.chahrour@bc.edu
†Toulouse School of Economics. email: robert.ulbricht@tse-fr.eu
using a robust-identification approach that does not rely on strong assumptions regarding either what fundamentals drive the economy or on the information structure faced by agents. Using our approach, we provide an upper bound on the contribution of noise shocks to observed business cycle volatility, showing in the data that such shocks can account for no more than 28 percent of aggregate output fluctuations at short horizons and no more than 45 percent unconditionally.

Our analysis builds upon a generic framework of price-setting firms who are potentially mis-informed about the profit-maximizing price they should charge. The framework consists of two elements: (1) a stochastic “target” price for each firm, which is subject to both firm-specific and aggregate shocks and may be endogenous to the decisions of other firms and (2) an accounting equation relating real output to nominal output and the price level. Other than this, the framework imposes no additional structure, making only minimal assumptions on the process driving nominal demand, on the origins of fluctuations in the target price, and on the information of firms at the time of their price setting. In several examples, we show how the framework encompasses a broad class of models, including standard Real Business Cycle and New Keynesian models, models with financial frictions, sunspot models and other formulations of bubbles.

With the framework established, we then follow the literature cited above by assuming that firms have incomplete information regarding their target price, and making inference regarding their target based on a set of noisy signals that relate to the factors shaping it. Rather than make specific structural assumptions regarding these signals, however, we build on the insights of Bergemann and Morris (2013) to provide a general characterization of the economy’s co-variance structure. In particular, we show that the simple framework described above provides a rich set of restrictions on the volatility and co-movements of macroeconomic variables both within and across periods. When combined with aggregate or firm-level data, the model-based restrictions are sufficient to rule out a broad set of a priori feasible covariance structures, effectively imposing an upper bound on the importance of the unobserved “noise” shock. Rather than to seek a unique identification of the role of noise, our approach thus opts for a less precise but more robust identification that characterizes a set of potential second moments that are consistent under any information structure and without taking a stand on what is the fundamental factors guiding firms’ decisions.

Our set-identification is governed by two sets of restrictions: First, we extend the approach by Bergemann and Morris (2013) to the dynamic setting necessary to study business cycles in order to obtain restrictions that derive from consistency of firm’s beliefs with Bayes’ law. Second, we use the economic structure of our business cycle model to augment these restrictions with data on observable moments. The interaction of these constraints is crucial; i.e., each by itself would give zero bite.

We use the identified set of second moments to decompose the output variance at various horizons into fluctuations due to (i) “fundamental” fluctuations in the target price (“supply shocks”), (ii) fluctuations in nominal demand, and (iii) fluctuations driven by “noise” shocks—that is correlated shocks to the information available to firms that are orthogonal to both (fundamental) supply and demand shocks. We identify a maximal contribution of noise shocks to total business cycle volatility that ranges from 28 percent at a 1-quarter forecast horizon to 45 percent unconditionally.
References


