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## News about aggregate demand and the business cycle

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## ABSTRACT

The plausibility of expectations-driven cyclical fluctuations in an otherwise standard one-sector real business cycle model with variable capital utilization and mild increasing returns-to-scale in production is examined. Due to a dominating wealth effect, our model is able to generate qualitatively as well as quantitatively realistic aggregate fluctuations driven by news impulses to future consumption demand or government spending on goods and services. When the economy is subject to anticipated total factor productivity or investment-specific technology shocks, the relative strength of the intertemporal substitution effect needs to be enhanced for our model to exhibit positive macroeconomic co-movement and business cycle statistics that are consistent with the data.

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## 1. Introduction

Since the work of [Beaudry and Portier \(2004, 2007\)](#), it is now well known that under the assumptions of perfectly competitive markets and constant returns-to-scale in production, a standard one-sector real business cycle (RBC) model is unable to exhibit qualitatively realistic expectations-driven cyclical fluctuations, *i.e.* simultaneous expansions of output, consumption, investment and hours worked in response to good news about future technological progress. Due to the dominating intertemporal income effect, forward-looking agents will raise their current consumption and leisure, which in turn leads to decreases in today's output and investment. As a result, a news-driven prototypical one-sector RBC model fails to generate the positive co-movement among key macroeconomic aggregates observed in the data. Subsequent research resolves this “co-movement puzzle” by incorporating combinations among some of the following features into a RBC-type economy: a convex production possibility frontier, multiple production sectors, non-separable preferences, investment adjustment costs, knowledge capital, imperfect competition, countercyclical markups, sticky prices, and costly technology adoption, among others.<sup>3</sup>

Parallel to the early development of the original real business cycle literature, almost all the existing studies have focused on news shocks to imminent productivity improvements (a supply disturbance). In this paper, our primary attention is turned to examine the theoretical as well as quantitative plausibility of expectations-driven business cycles (EDBC) within a

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E-mail addresses: [guojt@ucr.edu](mailto:guojt@ucr.edu) (J.-T. Guo), [Anca-Ioana.Sirbu@www.edu](mailto:Anca-Ioana.Sirbu@www.edu) (A.-I. Sirbu), [mark.weder@adelaide.edu.au](mailto:mark.weder@adelaide.edu.au) (M. Weder).<sup>1</sup> Tel.: +1 360 650 2134; fax: +1 360 650 6315.<sup>2</sup> Tel.: +61 8 8303 4664; fax: +61 8 8223 1460.<sup>3</sup> Representative examples include [Christiano et al. \(2008\)](#), [Jaimovich and Rebelo \(2009\)](#), [Karnizova \(2010\)](#), [Nutahara \(2010\)](#), [Dupor and Saif Mehkari \(2011\)](#), [Gunn and Johri \(2011\)](#), [Wang \(2011\)](#), [Tsai \(2012\)](#), and [Pavlov and Weder \(2013\)](#).

one-sector RBC model subject to aggregate demand impulses.<sup>4</sup> Specifically in our benchmark formulation, shocks to the marginal utility of consumption à la [Baxter and King \(1991\)](#) that may affect the household's urge to consume are considered. As a result, this preference disturbance creates a wedge between the marginal rate of substitution between consumption and leisure versus the marginal product of labor.<sup>5</sup> The main objective of this paper is striving for *parsimonious departures* from a canonical one-sector RBC formulation, driven by expectational shocks to future consumption demand, that is able to account for, not only qualitatively but also quantitatively, the postwar U.S. business cycle. In particular, variable capital utilization and positive productive externalities are incorporated into our analytical framework.

Our theoretic analysis shows that the *necessary* condition for consumption and investment to move in the same direction states that the equilibrium wage-hours locus is positively sloped and steeper than the labor supply curve. In a calibrated version of the model economy, the degree of aggregate returns-to-scale in production needed to satisfy the requisite condition for positive macroeconomic co-movement is found to be mild and empirically plausible *vis à vis* recent empirical findings of [Laitner and Stolyarov \(2004\)](#). Furthermore, in response to the favorable news about changes in future aggregate demand, a macroeconomic boom will occur in the economy as output, consumption, investment and labor hours all rise during the announcement period. Intuitively, an optimistic expectational impulse causes a leftward shift of the labor supply curve, which will raise the anticipated future real wage and hours worked. This in turn leads to an increase in current consumption, and in other key aggregates as well, because the household's higher expected permanent income yields a dominating intertemporal wealth effect. We also generate simulated second moments from the benchmark specification, and compare them with the Hodrick–Prescott (H–P) filtered U.S. time series data. It turns out that our baseline model performs quite well at matching the main empirical regularities, *i.e.* the relative standard deviations to output and contemporaneous covariances, of U.S. cyclical fluctuations after 1954. In terms of sensitivity analysis, we find that through the above-mentioned mechanism, the results from our benchmark model continue to hold under alternative demand disturbances commonly studied in the real business cycle literature, specifically news impulses to multiplicative consumption shocks or government spending shocks.

To obtain further insights about our proposed mechanism for generating expectations-driven business cycles, anticipated innovations to total factor productivity or investment-specific technology shocks are also examined. Under the same parameterizations as those in the benchmark formulation, the model economy slides into a macroeconomic recession during the current period. In either environment, a positive news shifts the upward sloping equilibrium wage-hours locus to the left, which will then yield exactly the opposite outcome to that within demand-driven configurations since the expected future real wage and labor hours are now lower. In order to overturn this counterfactual result, the relative strength of the intertemporal substitution effect originating from agents' expectations about an upcoming productivity improvement needs to be enhanced through the combinations of raising the household's intertemporal elasticity of substitution in consumption and incorporating convex adjustment costs into the law of motion for capital accumulation. Using empirically realistic calibrations associated with these two features, we show that qualitatively as well as quantitatively realistic EDBC may occur in our model economy subject to anticipated aggregate or investment-specific technology shocks.

The remainder of this paper is organized as follows. [Section 2](#) describes the model and analyzes its equilibrium conditions. [Section 3](#) analytically and quantitatively investigates the plausibility of expectations-driven business cycles under three formulations of news impulses to future aggregate demand. [Section 4](#) examines our proposed mechanism when the model economy is subject to anticipated innovations to aggregate or investment-specific technology shocks. [Section 5](#) concludes.

## 2. The economy

Our economy is populated by a unit measure of identical infinitely lived households, each endowed with one unit of time. The representative household maximizes a discounted stream of expected utilities over its lifetime

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[ \frac{(c_t - \Delta_t)^{1-\sigma} - 1}{1-\sigma} - A \frac{h_t^{1+\gamma}}{1+\gamma} \right], \quad 0 < \beta < 1, \quad \sigma > 0, \quad \gamma \geq 0 \text{ and } A > 0, \quad (1)$$

where  $E$  is the conditional expectations operator,  $\beta$  is the discount factor,  $c_t$  is consumption,  $h_t$  is hours worked,  $\gamma$  is the inverse of the (Frisch) labor supply elasticity, and  $\sigma$  governs the degree of risk aversion or the intertemporal elasticity of substitution (IES) in consumption. As in [Baxter and King \(1991\)](#),  $\Delta_t$  is a random shock to preferences that affects the household's marginal utility of consumption. For example, an increase in  $\Delta_t$  represents a positive disturbance to the economy's aggregate demand as it raises agents' urge to consume. We postulate that the unconditional mean of  $\Delta_t$  (or its

<sup>4</sup> See, for example, [Beaudry and Lucke \(2009\)](#) and [Schmitt-Grohé and Uribe \(2012\)](#) for empirical support that anticipated demand shocks play non-negligible roles in accounting for the U.S. business cycle. On the theoretical front, see [Ramey \(2011, section IV.B\)](#) for an analysis of expectational disturbances to government spending; and [Beaudry and Portier \(2007, section 4.4\)](#), [Mertens and Ravn \(2011\)](#) and [Sirbu \(2014\)](#) for studies on anticipated tax policy shocks.

<sup>5</sup> The ratio between the marginal rate of substitution of consumption for leisure and the marginal product of labor is dubbed as the "labor wedge" in the literature. See [Shimer \(2009\)](#) for a recent review on the labor wedge.

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