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Introduction to the special issue on the sources of business cycles

A quarter of a century ago, Edward Prescott (1986) inaugurated a revolutionary research agenda by claiming that "technology shocks account for more than half the fluctuations in the postwar period, with a best point estimate near 75 percent." Since then, this claim has been the subject of intense scrutiny. First came a literature questioning whether Solow residuals represent a correct measure of exogenous shifts in technology. A number of factors were found to contaminate measures of technology based on Solow residuals, including labor hoarding, variable capacity utilization, imperfect competition, and deviations from constant returns to scale. The first paper in this issue, by Amir Petrin, Kirk White, and Jerome Reiter, takes this type of analysis much further. It estimates aggregate productivity growth via aggregation of plant level data in 459 4-digit SIC industries over twenty years. Their paper decomposes changes in productivity into changes in technological efficiency and reallocation effects. The methodology employed by Petrin, White, and Reiter is robust to the presence of imperfect competition, fixed costs, and frictions in input markets. The paper finds that although changes in technological efficiency explain a small fraction of the mean growth rate of aggregate productivity growth, they are highly volatile and therefore represent a potentially important source of business cycles.

A second, more recent and more econometrically oriented literature departs from the first-generation RBC literature in two important dimensions: first, it explicitly models business cycles as potentially driven by a multitude of shocks, as opposed to just a single productivity shock. Second, it implicitly assumes that productivity shocks are unobservable. In this literature, productivity shocks compete with other shocks in explaining the business cycle. An emblematic example of this line of research is Smets and Wouters (2007). These authors find that productivity shocks explain about 30 percent of variations in output.[1] Of the two premises on which this result rests, namely, treating technology shocks as unobservable and making them compete with other shocks in the econometric estimation, the more relevant is the latter. For even when a depurated measure of total factor productivity is included as an observable variable in the estimation, technology shocks are typically found to explain no more than 30 percent of movements in output (see, for example, Schmitt-Grohé and Uribe, 2010). The remaining papers gathered in this issue can be collectively interpreted as shedding light on the 70 percent of the business cycle that is unexplained by unanticipated innovations in labor augmenting technological change. They showcase three major developments in business-cycle research over the past decade: the role of anticipation in the identification and propagation of exogenous shocks, the emergence of investment-specific technology shocks as an important source of aggregate fluctuations, and the significance of global factors linking business cycles around the developed world.

An important development in recent business-cycle theory has been the recognition that in general exogenous shocks may contain anticipated and unanticipated components. This recognition has implications both for the identification of shocks and for modeling their transmission mechanism. The paper by Karel Mertens and Morten Ravn develops a methodology to estimate the macroeconomic consequences of anticipated and unanticipated tax shocks and applies it to U.S. data. It shows that an unanticipated tax cut stimulates output, employment, consumption, and investment, whereas an anticipated tax cut induces an initial contraction in these variables until the tax cut is realized. The central contribution of the paper is to show that the observed response of the macroeconomy to anticipated and unanticipated tax innovations are consistent with the predictions of a neoclassical model of the business cycle augmented with a number of real rigidities. The effect of tax shocks is estimated and predicted to be large, explaining on average about 20 percent of movements in aggregate activity. The contribution by Eric Leeper and Todd Walker compares a model with anticipated shocks to one in which the innovations to the exogenous shocks are moving average processes. It shows conditions under which these two specifications induce identical equilibrium dynamics. When these conditions are not met, the moving-average approach is shown to require less real frictions to generate hump-shaped impulse responses in endogenous variables.

A recurrent issue in the literature on business cycles driven by anticipated technology shocks is the so-called comovement problem. Specifically, a positive anticipated productivity shock carries, in the short run, a pure wealth effect which increases consumption but depresses labor supply and thereby also output. By contrast, in the data, consumption and em-

[1] Specifically, in their Fig. 1, Smets and Wouters report that at forecasting horizons of 10 and 40 quarters productivity shocks explain 30 percent of the forecast error variance of output.

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ployment are procyclical. The paper by Christopher Gunn and Alok Johri proposes a solution to the comovement problem consisting in augmenting the neoclassical model with a learning-by-doing technology. In their model, the anticipation of a positive increase in productivity induces firms to increase production as a way to raise the productivity of workers via on-the-job training. The piece by Paul Beaudry, Martial Dupaigne, and Franck Portier aims at explaining comovement induced by anticipated productivity shocks not only within but also across countries. The key friction in their model is the assumption that factors of production cannot freely move between the consumption and the investment sectors.

An important development in business-cycle research over the past decade has been the emergence of investment-specific technology shocks as a potentially important source of short-run fluctuations. Three contributions to the present issue reflect on this development. The paper by Alejandro Justiniano, Giorgio Primiceri, and Andrea Tambalotti innovates upon the existing literature by considering investment-specific shocks that do not have as an observable counterpart the relative price of investment. The shock it introduces is a shifter to the investment adjustment cost function. The paper embeds this shock, along with a number of other shocks commonly studied in the related literature, into a neo Keynesian DSGE model. Using Bayesian estimation on postwar U.S. data the paper finds that the shock to the investment adjustment cost function is the single most important source of business cycle movements in output, investment, and hours. Interestingly, this shock can be interpreted as reflecting financial frictions. The paper shows that it played an important role in the great U.S. contraction of 2008–2009. The paper by Schmitt-Grohé and Uribe documents, using postwar U.S. data, that total factor productivity and the relative price of investment are cointegrated. The paper then demonstrates that within a large class of business-cycle models, the cointegration of these two variables is possible if and only if neutral and investment-specific productivity shocks are themselves cointegrated. This result gives rise to a new driver of business cycles, namely, the common stochastic trend in neutral and investment-specific productivity. The contribution by Federico Mandelman, Pau Rabanal, Juan Rubio-Ramírez, and Diego Vilán studies the cross-country comovements attributable to investment-specific productivity shocks. The paper contributes to the empirical literature by estimating the joint behavior of investment-specific productivity shocks in the United States and the group of remaining OECD countries. It then feeds this process to a two-country international business-cycle model and finds that investment-specific technology shocks contribute little to explaining the well-known quantity, Backus–Smith, and price puzzles.

Oil shocks are perhaps a primary example of a global disturbance. And how the major global economies react to oil-price shocks can have repercussions for the rest of the world. The paper of Anna Kormilitsina introduces oil shocks in an estimated medium-scale DSGE model of the U.S. economy and finds that the Fed's reaction to oil-price shocks has on average exacerbated the welfare losses caused by this type of disturbance. The paper by Mario Crucini, Ayhan Kose, and Christopher Otrok uses dynamic factor analysis to determine the sources of international business cycles. In addition to oil shocks, the paper includes other potential drivers, such as total factor productivity disturbances, the terms of trade, and the money supply. The methodology employed allows for an orthogonal decomposition of business cycles into global, national, and idiosyncratic components. The paper finds that global factors represent an important source of business cycles, and that, in turn, the global factor is driven to a large extent by movements in productivity. The contribution of Haroon Mumtaz, Saverio Simonelli, and Paolo Surico adds a regional dimension to the analysis of international business comovements and places emphasis on the joint dynamics of inflation and output. Using a long-run sample that starts in the nineteenth century, the paper finds that regional factors have become more important over time and explain the bulk of international comovements in output and inflation in the postwar period. The paper also finds that since the 1980s prices have become much less countercyclical.

Taken together, the papers collected in this issue represent a step forward in our understanding of the domestic, regional, and global sources of short-run fluctuations. It is our hope that they will inspire more research in this area.

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Stephanie Schmitt-Grohé
Columbia University, USA
CEPR and NBER, USA
E-mail address: ss3501@columbia.edu

Martín Uribe
Department of Economics, Columbia University, MC 3308, 420 W 118th Street, New York, NY 10027, USA
NBER, USA
E-mail address: martin.uribe@columbia.edu

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