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Trends and cycles in small open economies: Making the case for a general equilibrium approach

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ABSTRACT

Economic research into the causes of business cycles in small open economies is almost always undertaken using a partial equilibrium model. This approach is characterized by two key assumptions. The first is that the world interest rate is unaffected by economic developments in the small open economy, an exogeneity assumption. The second assumption is that this exogenous interest rate combined with domestic productivity is sufficient to describe equilibrium choices. We demonstrate the failure of the second assumption by contrasting general and partial equilibrium approaches to the study of a cross-section of small open economies. In doing so, we provide a method for modeling small open economies in general equilibrium that is no more technically demanding than the small open economy approach while preserving much of the value of the general equilibrium approach.

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1. Introduction

The veracity of business cycles differs dramatically across countries. Fig. 1 presents a comprehensive view: it displays the standard deviation of annual output and consumption growth rates computed over the period 1971–2011 for 66 countries (countries are ranked from the most to least volatile).¹ The standard deviation of output growth ranges from an astounding 24.3% in Iraq (not shown) to a mere 1.58% in Australia; the median country is Luxembourg (3.53%). An important goal of quantitative business cycle theory is to explain these differences.

In this respect, the work-horse small open economy model has considerable appeal because it is possible to treat the world interest rate as given (i.e. determined in the rest-of-the-world), an exogeneity assumption and conduct a partial equilibrium analysis. Aguiar and Gopinath (2007) is a recent leading example of this approach. They argue persuasively that much of the cross-country heterogeneity in the veracity of business cycles is accounted for by differences in the relative importance of permanent and transitory shocks to total factor productivity. The logic is simple. A permanent shock leads to larger jump in consumption than a persistent, but transitory, shock because it entails a larger wealth effect. Output, to a reasonable first-approximation, follows the path of productivity and therefore inherits the volatility and persistence properties of the shock itself. Altering the relative importance of the two shocks therefore allows one to match the standard deviation of output and consumption patterns displayed in Fig. 1. Applying this method to 13 emerging and 13 developed

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E-mail address: mario.j.crucini@vanderbilt.edu (M.J. Crucini).¹ The PWT 8.1 starts from 1951 and ends in 2011. The starting year of 1971 allows for a comprehensive and balanced cross-country panel.

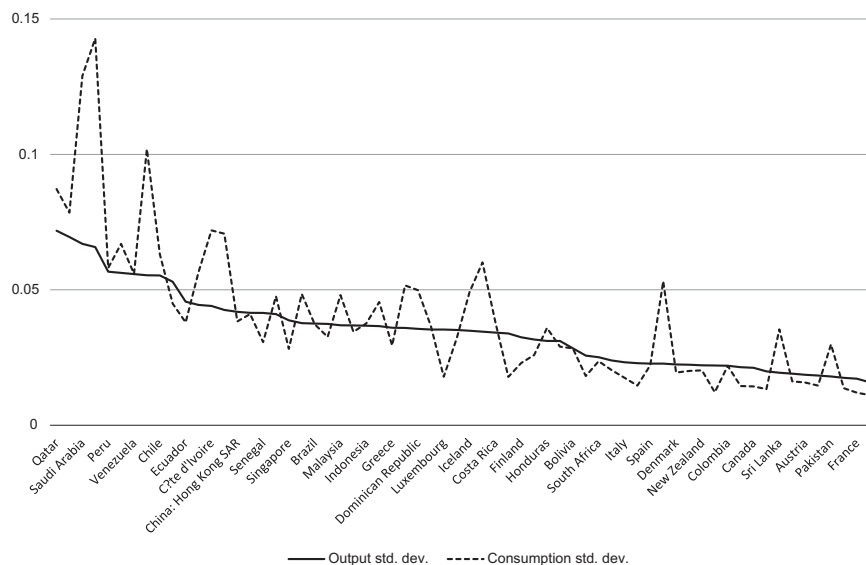


Fig. 1. International business cycles.

economies, Aguiar and Gopinath find that the permanent component accounts for 84% of productivity growth for emerging markets compared to 61% for developed countries.²

The use of a partial equilibrium model comes at a cost however, as it fails to capture any meaningful economic interactions across nations. The most obvious is the international correlation of business cycles. To fill this gap, we revisit the study of AG, using the two-country general equilibrium model developed by Baxter and Crucini (1995). The BC model is a natural choice because it shares virtually all features of preferences, technology and the asset market structure of AG, while closing the model by imposing world market clearing in the goods market and the market for one-period non-contingent bonds.

In our simulations, the 'home' country is parameterized to mimic the business cycle of an aggregate of (listed in descending economic size) the United States, Japan, the United Kingdom, Germany, Italy, France, Canada and Australia (hereafter the G-8). This massive economic block effectively determines the world interest rate (marginal product of capital). The 'foreign' country is one of the 58 economies in our panel dataset. Individual countries are rotated through in separate model simulations to produce the entire cross-section of business cycle implications that are consistent with the domestic and foreign business cycle facts.

Total factor productivity in the G-8 is the sum of a pure random walk component and a transitory but persistent component. Matching the standard deviation of: (i) consumption growth, (ii) income growth and (iii) the consumption-GDP ratio for the G-8 block yields an estimated standard deviation of 0.9% (1.2%) for the innovation to the permanent (transitory) component. The persistence of the transitory component is 0.9. The implication of these estimates is that the transitory component contributes 58% to the standard deviation of TFP growth, compared to 42% for the stationary component. These estimates are broadly consistent with the less structural approach of Crucini and Shintani (2015) they estimate a bivariate error-correction model of output and consumption growth for each country of the G-8 and find comparable contributions of stochastic trend and cycle shocks to output growth.

For each country outside of the G-8, we match the standard deviation of output growth, the standard deviation of consumption and the correlation of output and consumption growth of each country with the output and consumption growth of the G-8 block. To accomplish this—in addition to an idiosyncratic permanent and transitory shock to productivity in each country—we allow for a spillover from the G-8 permanent and transitory shock. The productivity spillovers from the G-8 is the point of departure from the partial equilibrium approach and allows us to match international business cycle comovement of consumption and output.³

On average (across countries), the permanent shocks account for 45% of output growth in developing countries compared to 51% in developed countries. These results contrast sharply with AG who attribute 84% of productivity growth to permanent shocks for emerging markets compared to 61% for developed countries. While there are a number of differences in terms of the sample of countries and sample period, the main driver of the difference is our general equilibrium approach

² Note that they do not report a variance decomposition of output growth in their paper, though productivity and output tend to move closely in neoclassical models of the business cycle.

³ Consistent with the partial equilibrium approach, there are no productivity spillovers from the small countries to the large countries: a block-exogeneity assumption.

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