Cyclical asset returns in the consumption and investment goods sector [☆],[☆☆]

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ABSTRACT

We document the empirical fact that asset prices in the consumption-goods and investment-goods sector behave almost identically in the U.S. economy. In order to derive the cyclical behavior of the equity returns in these two sectors, we consider a two-sector real business cycle model with habit formation, sector-specific growth and adjustment costs of capital. The model is able to replicate the equity premium and the Sharpe values observed empirically, reflects the similarity of the cross-correlation structure between asset returns and aggregate output in the two sectors, and generally succeeds in capturing both the weak predictability of the real risk-free rate and the good predictability of excess returns at the bi-sectoral level.

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1. Introduction

Recent extensions of the standard representative-agent models of a production economy have been successful in matching the equity premium implied by the model with the empirical one.[1],[2] Among others, Boldrin et al. (2001) propose a two-sector model where labor is immobile between the investment and consumption goods sector for one period after the

[1] In their seminal paper, Mehra and Prescott (1985) estimate an equity premium of 6.18 percent p.a. for the United States over the period 1889–1979.

[2] A pioneering work in this area is the production-based asset pricing model of Jerman (1998). Assuming exogenous labor supply, his model has been demonstrated to replicate the empirically observed equity premium successfully. Heer and Maußner (2013) compare the relative performance of one- and two-sector models of production economies with endogenous labor supply with respect to their asset price and labor market implications.

observation of the shock. In their model, the equity premium results from the variation in the relative price of the two goods. In Uhlig (2007), a sizeable equity premium is generated if real wages are sticky to a considerable degree. Wage stickiness is introduced as in Blanchard and Galí (2007).[3] Most recently, Albuquerque et al. (2012) introduce preference shocks in the production economy in order to successfully model the weak correlation of stock returns with consumption and output growth.

All these models above only consider the effects of a supply-side or demand-side shock on aggregate stock returns. In the present paper, we explicitly study the dynamics of sectoral asset prices in two production sectors of the economy: a capital goods and consumption goods sector. In Section 2, we first document the empirical regularities that both asset returns and the Sharpe value are moderately higher in the capital goods sector than in the consumption goods sector using data from the U.S. economy from the 1980s to the end of the 2000s. The same applies to the more narrow period ranging from 1980 to 1999 which excludes equity price crashes due to asset price bubbles. In both cases, the differences are not significantly different from zero at the conventional levels. In addition, the contemporaneous correlation of stock returns with output are found to be insignificant in both sectors.

We construct a new dataset of bi-sectoral price–dividend ratios to assess the predictability of sectoral excess returns and of the risk-free rate. Relying on these data, we confirm the well-documented financial market facts of a good predictability of equity premium series and of a poor predictability of the real risk-free rate also at the sectoral level of consumption goods and capital goods industries. Additionally, we find a substantially lower variance of the risk-free rate compared to the one of the sector-specific excess returns series.

In Section 3, we propose a two-sector business cycle model that is able to replicate these qualitative findings. The model is an extension of the Boldrin et al. (2001) model. In particular, we introduce sector-specific adjustment costs of capital allowing us to identify the asset price (Tobin's q) in each sector. In line with Greenwood et al. (2000) we also consider sector-specific growth of total factor productivity. The essential feature of the model are frictions in the allocation of labor and capital. Without these frictions and with identical technology shocks in both sectors, the model reduces to the standard one-sector model. We thus demonstrate that relatively small departures from the standard model are sufficient to explain our stylized facts on asset returns.

The study most closely related to ours is provided by Ireland and Schuh (2008). They also consider a real business cycle model with two production sectors similar to those in the model of the present paper. Ireland and Schuh identify the sources of changes in total factor productivity in the postwar U.S. economy and show that the main and persistent contributor is the slowdown of the consumption goods sector. In addition, they also introduce a preference shock and find, in accordance with the study of Albuquerque et al. (2012), that this shock helps to reconcile the business cycle properties of the model with the data. However, Ireland and Schuh do not study the asset price implications of their model.

As one of the very few business cycle studies that also considers disaggregate stock market behavior, Covas and Den Haan (2012) analyze an economy with small and large firms that have different access (costs) to bank debt markets. As a consequence, they are able to explain different behavior of these firms with regard to equity issuance, asset prices, and the prices of risk. However, in their model, the required rate of return for investors is specified as an exogenous process while it is endogenous in ours.

The paper is organized as follows. In Section 2, we present the empirical asset price statistics for the investment and consumption goods sector in the U.S. economy during the period 1980–2009. Section 3 introduces our model and Section 4 reports the results from simulations of this model. Section 5 concludes. The interested reader will find the detailed description of the model in the Appendix.

2. Empirical facts

2.1. Business cycle behavior of sectoral asset returns in the U.S.

The time series used in this section are of quarterly frequency and refer to the U.S. economy. They cover the period from the first quarter of 1980 to the fourth quarter of 2009. In order to avoid a downward bias due to equity price crashes in the 2000s, we also consider a narrowed period ranging from 1980:Q1 to 1999:Q4 (as well as an extended period ranging from 1973:Q1 to 2002:Q4 in Sections 2.2 and 2.3). Asset price series are drawn from the Datastream Global Equity Indices (GEI) database. The source for the time series to construct an adequate deflator is the U.S. Bureau of Economic Analysis (BEA). The series are individually described as follows.

Asset prices for the consumer goods sector are obtained from an equally weighted average of the breakdown of the Datastream GEI at its Industry Classification Benchmark (ICB) Level 2 "Consumer Goods (CNSMGUS)" and "Consumer Services (CNSMSUS)," respectively. Note that all indices contained in the GEI database are constructed based on a representative sample of stocks covering a minimum 75–80 percent of total market capitalization.

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[3] In addition, Uhlig introduces habits in consumption and leisure.