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Intangible capital, the labor wedge and the volatility of corporate profits ☆

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ABSTRACT

Corporate profit is six times more volatile than output. We estimate a dynamic general equilibrium model with intangible capital (IC) using aggregate data on output, investment and hours and find that it generates profits that are over five times as volatile as output. A similar model without IC relies on preference shocks to generate profits that are 3.5 times as volatile as output. Variance decomposition analysis reveals that shocks to IC productivity account for 85% of the variance of output, and over 50% of hours and investment. The increased volatility of profits is associated with a time-varying wedge between wages and the marginal product of labor which is shown to be highly correlated with the data-based labor wedge. The estimation identifies the sixties and the nineties as periods of rapid IC accumulation.

1. Introduction

Large swings in the profitability of U.S. corporations is an important aspect of the business cycle. Fig. 1 demonstrates that aggregate corporate profits, as reported in the National Income and Product Accounts (NIPA) are much more volatile than output, rising and falling with the business cycle. Indeed, the standard deviation of the growth rate of real NIPA profits is 5.9 times as volatile as that of the growth rate of real GDP while the contemporaneous correlation of the two series is 0.63. Using the NIPA definition of corporate profit, we can construct a measure of accounting profit of a neoclassical firm as the difference between value added output and payments for labor services with an additional adjustment for physical capital depreciation. We find that a standard real business cycle model augmented with imperfect competition cannot generate sufficient volatility in profits relative to output. Since this model is estimated on aggregate output, hours and investment series and "matches them by construction", the inability to match the volatility in observed corporate profits is puzzling. In order to resolve this puzzle, we modify the production technology relative to the neoclassical model economy by introducing intangible capital as an additional input in order to generate additional volatility in profits. Our basic intuition is that the standard model does not generate the required fluctuations in labor share at the quarterly frequency in order to capture the

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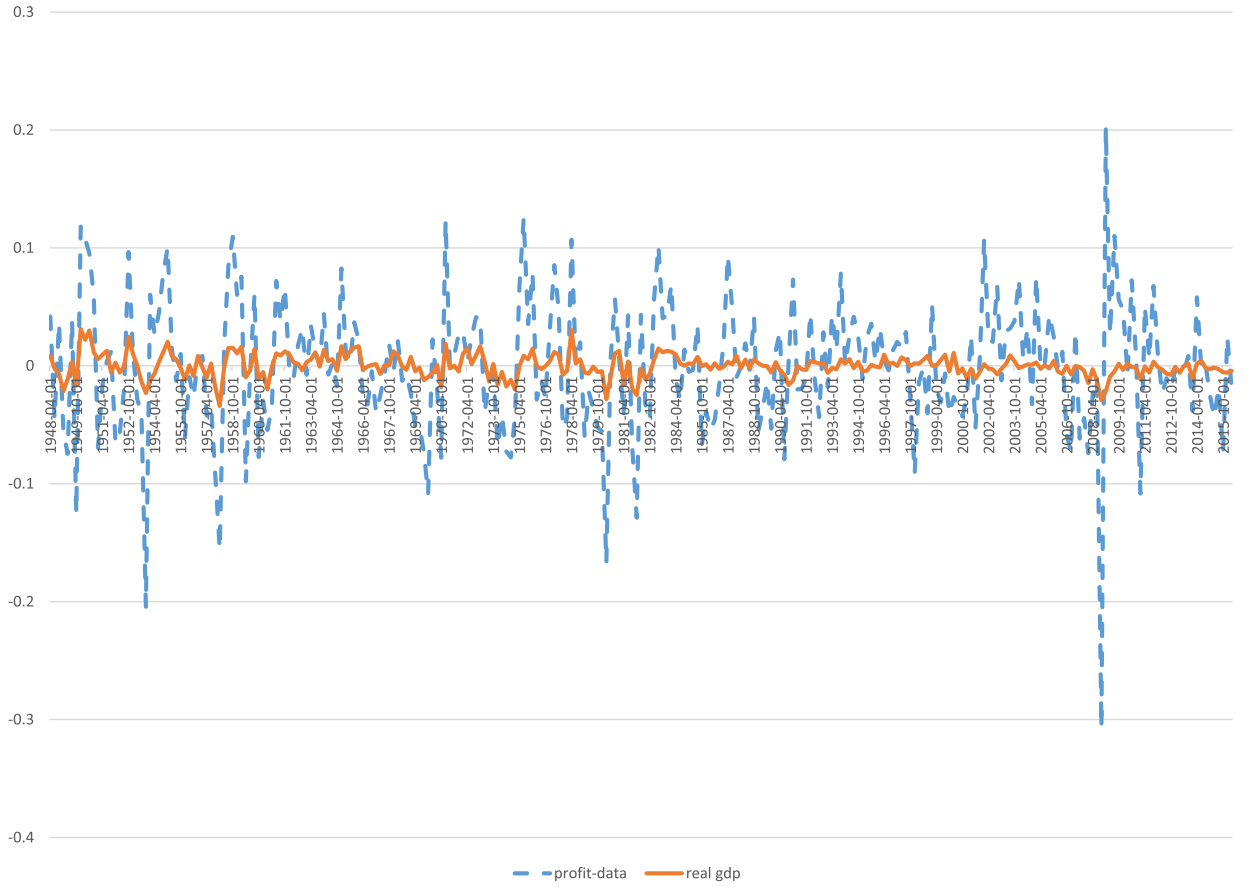

Fig. 1. Corporate profit and output.

observed fluctuations in profits. Given that output and hours are perfectly accounted for, we focus on intangible capital as the source of an endogenous, time varying wedge between wages and the marginal product of labor, which is often referred to as the labor wedge in the literature.

We find that an estimated version of the intangible capital model gets very close to the observed volatility of profits relative to output. The model generated relative volatility is 5.1 compared to 5.9 in the data. The model is estimated using standard Bayesian inference techniques taking key real macroeconomic aggregates such as output, investment and hours as observables. It is worth emphasizing that the ability of our intangible capital model to deliver highly volatile profits does not rely on using the profit data as an observable and as such it is an external validation of the importance of intangible capital in the economy. While we will discus intangible capital in more detail below, briefly, investments in intangible capital (IC) can be thought of as any expenditures by the firm (not included in physical capital investment) that raise its future ability to produce or that lower its costs of production for a given level of technology and conventional inputs of physical capital and labor. In this sense IC behaves like total factor productivity (TFP) but it requires costly outlays from the firm, unlike TFP, which arrives like “manna from heaven”.

In addition to IC, we add imperfect competition and shocks to investment specific technology (IST) to the standard RBC model. We will refer to this model as the IC model and compare it to a model without IC but with imperfect competition and IST shocks which we will call the no IC model. Comparing likelihood statistics for the two models reveals that the data strictly prefers the IC model to the No IC model even though both models are estimated on the same set of three observables and using an equal number of stochastic processes.

Variance decomposition analysis reveals that shocks to the IC technology play a very important role in accounting for US business cycles between 1948 and 2016. Even in the presence of investment specific technology shocks and shocks to the growth rate of goods productivity, IC productivity shocks account for 85 percent of the growth rate of output and over 50 percent of the growth rate of investment at horizons of 4 quarters or more. IC productivity shocks also account for over 90 percent of the observed variance of profits and intangible capital stock as well as over 50 percent of that of hours growth. In sharp contrast to these results, the no IC model relies heavily on preference shocks to explain the variation seen in hours. Preference shocks account for 90 percent of hours variation and 60 percent of output variation while IST shocks account for 84 percent of investment variation in the No IC model. Given that many macro-economists doubt that