

Time Varying Irreversibility

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February 28, 2017

Abstract

Since the Great Recession economist continued to examine the effect of uncertainty on the real economy. The vast majority of studies find strong negative effects of uncertainty on the real economy. More recently empirical studies started to suggest that the effect of uncertainty on the real economy depends on the state of the economy. That is, the negative effects of uncertainty on the real economy appear to be stronger in recessionary times than during booms. In this study I examine a theoretical link that can explain this empirical observation. I start from the theoretical argument that the effect of uncertainty on investment depends on the degree of irreversibility of investment. In a first step I present evidence that the degree of irreversibility varies indeed with the business cycle and show that the degree of irreversibility increases during recessions and decreases in expansionary phases of the business cycle. In a second step I use a RBC model with time-varying second moments and extend it to allow for time varying irreversibilities. The model produces effects that are similar to those observed in the data and shows that time-varying irreversibility is indeed able to explain the state dependence of the effect of uncertainty. I conclude discussing the implication of these findings on policy and argue that economists should revisit the currently valid policy advice.

Keywords: irreversibility; adjustment costs; investment;

JEL code: D81; D84; E22;

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1 Extended Abstract

The economic literature experienced a surge in studies emphasizing the role of uncertainty in shaping the real economy. The majority of the studies examine the effect of fluctuations in uncertainty on various macroeconomic variables and find that an increase in uncertainty depresses industrial production, investment, consumption and employment. Recent studies started to explore the dependence of the effect of uncertainty shocks on the business cycle. First evidence suggests that the effect of uncertainty might be of non-constant nature and depend on the state of the business cycle. Caggiano et al. (2016) provide empirical evidence that the negative effect of uncertainty is much stronger in a recession than in a boom. In this paper I produce a framework that explains the observed dependency of the effect of uncertainty on the business cycle.

While the literature describes numerous channels and mechanism through which uncertainty affects the real economy, this study focuses on the real option theory and the associated importance of irreversibilities. Following real option theory, irreversibility prevents economic agents to take decisions under uncertainty. For instance, an increase in uncertainty delays irreversible business decisions, which in turn depresses investment. This prediction derives from the argument that an economic agent cannot reverse irreversible decisions and has to bear all future costs of its decisions. That is, under full irreversibility a firm cannot resell an investment and has to endure all future costs regardless its success. While full irreversibility might apply for certain type of investment, i.e. when no second market exists, it is usually the case that firms are able to resell their investment at a discount. Economic models present irreversibility as a resale loss that is defined as one minus the ratio of resell price over buying price. Theoretically, the size of the effect of uncertainty on investment depends on the degree of irreversibility. Caballero (1991) provides a framework that demonstrates that an increase in the degree of irreversibility increases the negative effect of uncertainty on investment. Furthermore, Guiso and Parigi (1999), Abberger et al. (2016) and Gulen and Ion (2016) provide empirical evidence that the negative effects of uncertainty are concentrated among irreversible investment.

Economic models assume that the degree of irreversibility is constant over time. In this paper I argue that the degree of irreversibility varies with the business cycle. I provide evidence that the degree of irreversibility increases in recessionary times and decreases in the expansionary phase of the busi-

ness cycle. In a first step, I use US price data on new and used cars and trucks to show that their ratio depends on the business cycle. The data suggest a strong negative relationship between irreversibility and the business cycle. In recessionary time the resale loss appears to be much higher than in expansionary times. In a second step, I use the SMM framework provided by Bloom (2009) to jointly estimate labor and capital adjustments cost under time varying irreversibility. Estimation results show that resale loss is approximately 3 percentage points higher during recessions than during booms.

After providing empirical evidence for time varying irreversibility, I enhance the existing state-of-the-art real uncertain business cycle (RUBC) model (Bloom et al., 2016) so that the degree of irreversibility is endogenously determined by the state of the business cycle. I use the parameters resulting from the SMM estimation to calibrate the model and show that DSGE model produces similar effects to those observed in the data. That is, the negative effect of an uncertainty shock on investment is stronger during a recession than during an expansionary phase of the business cycle.

Finally, the literature on uncertainty entails strong policy implications. Generally, it is believed that an increase in uncertainty decreases the responsiveness of firms to all kind of policies. An increase in uncertainty increases the regions of inaction, which implies that the effect of a policy decreases, i.e. to achieve the same effect a fiscal impulse must be larger in times of high uncertainty than in times of low uncertainty. My findings approve with this recommendation during a contractionary phase of the business cycle. However, policy responses to uncertainty shocks do not necessarily need to be stronger during an expansionary phase of the business cycle.

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