



Business cycle dynamics with duration dependence and leading indicators

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Abstract

Durland and McCurdy [Durland, J.M., McCurdy, T.H., 1994. Duration-dependent transitions in a Markov model of US GNP growth. *Journal of Business and Economic Statistics* 12, 279–288] investigated the issue of duration dependence in US business cycle phases using a Markov regime-switching approach, introduced by Hamilton [Hamilton, J., 1989. A new approach to the analysis of time series and the business cycle. *Econometrica* 57, 357–384] and extended to the case of variable transition parameters by Filardo [Filardo, A.J., 1994. Business cycle phases and their transitional dynamics. *Journal of Business and Economic Statistics* 12, 299–308]. In Durland and McCurdy's model duration alone was used as an explanatory variable of the transition probabilities. They found that recessions were duration dependent whilst expansions were not. In this paper, we explicitly incorporate the widely-accepted US business cycle phase change dates as determined by the NBER, and use a state-dependent multinomial Logit modelling framework. The model incorporates both duration and movements in two leading indexes – one designed to have a short lead (SLI) and the other designed to have a longer lead (LLI) – as potential explanatory variables. We find that doing so suggests that current duration is not only a significant determinant of transition out of recessions, but that there is some evidence that it is also weakly significant in the case of expansions. Furthermore, we find that SLI has more informational content for the termination of recessions whilst LLI does so for expansions.

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1. Introduction

The question of whether business cycle phases are duration dependent has been of interest for many decades. One widely held view is that the older an expansion is, the more likely it is to end. There was much discussion along these lines in the US in the late 1990s as that expansion approached – and eventually passed – the longest previous US expansion ever recorded (since the 1850s). On the other hand, many economists have questioned whether there is any strong underlying rationale for this belief or whether it is simply the business cycle analogue of the view that ‘nothing lasts forever’.

Whilst it is obvious that no business cycle phase has ever lasted forever – and is never likely to – the issue surrounding duration dependence is whether there exists statistical evidence that the probability of a phase change systematically increases with the length of the current phase. Furthermore, even if current phase duration does seem to be a determinant of the probability of phase termination, there may well be some underlying economic processes taking place systematically over time which increase the likelihood of the phase ending. Thus, if other factors are indeed important in determining phase shifts, then apparent duration dependence may simply reflect the influence of other more fundamental variables. In the same way therefore that a trend variable may or may not remain statistically significant after incorporating other explanatory variables, the same may well be true of duration once other explanatory variables are incorporated into the analysis. We believe this to be an important question which we address in this paper.

In our empirical analysis we use the business cycle phase chronology for the US determined by the National Bureau of Economic Research (NBER) dating panel. As we discuss below, this chronology represents a set of reference dates which is agreed upon by a group of recognized experts at the NBER, is widely used, and has been used to examine duration dependence in the business cycle using a range of different methodologies. However the business cycle is essentially a conceptual construct – and at that an ultimately unobservable construct. The best that can be done is to carefully conceptually define it and then use a range of datasets to triangulate on the most appropriate dates of the phase changes. There may well be alternative methodologies and resulting chronologies for the US to that of the NBER. However, we argue that the NBER methodology has the longest pedigree and the NBER chronology is the most widely accepted, cited and used set of phase change dates for the US business cycle. Given this, we elect to study duration dependence explicitly using the NBER chronology.

Our approach can be contrasted with the duration-dependent regime switching extensions of [Hamilton \(1989\)](#) which explicitly assume that the latent regime state is unobservable and must be inferred. In fact every Markov-switching model of US GDP we are aware of benchmarks the regime probabilities against the NBER chronology. Hamilton-type models are most useful in situations where there is no clear a priori knowledge of

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