There has been in a long running debate in the empirical macroeconomic literature on the issue of the symmetric versus asymmetric business cycles. In this chapter, I develop the implications of nonlinear time series models for asymmetries in the business cycle and contrast the nonlinear time series approach to those previously used to answer the question. I use as my main example quarterly observations on seasonally adjusted real U.S. GNP since the Second World War. I contend that the notion of an asymmetric business cycle is best understood as a statement about the response of the economy to shocks over different stages of the business cycle. Thus, in order to evaluate business cycle asymmetry it is necessary to estimate a propagation mechanism that is nonlinear and, therefore, allows for the dynamics of the economy to be different between contractions and expansions. Most previous work on asymmetries has not separated the business cycle into its propagation and impulse components and has examined the observed time series directly for asymmetry. Thus, it is not possible to distinguish whether the source of the asymmetry is the propagation mechanism or a certain type of asymmetric impulse.

The plan of this chapter is as follows. I start with a brief review of the origin and history of the debate on business cycle asymmetry. This is
followed by some technical definitions of what type of time series behavior might constitute asymmetry. Next I review some of the empirical results on the presence of asymmetry. Then I evaluate the economic importance and statistical significance of the asymmetric propagation mechanism found for U.S. GNP.

1. Origin and History of the Business Cycle Asymmetry Debate

Both Keynes (1935) and Burns and Mitchell (1946) clearly stated the issue of asymmetric business cycles just before the ascendancy of linear time series methods in empirical economics. Burns and Mitchell noted (p. 134) "that contraction is a more violent change than expansion is a common finding," that is, the rate of decrease in a contraction was greater than the rate of increase in an expansion. Alternatively, the switch into contraction from expansion can be initiated by a smaller shock that it is propagated very strongly. This view is reiterated by the following quote from the General Theory (p. 314):

There is, however, another characteristic of what we call the trade cycle . . . the phenomenon of the crisis—the fact that the substitution of a downward for an upward tendency often takes place suddenly and violently, whereas there is, as a rule, no such sharp turning-point when an upward is substituted for a downward tendency.

Both quotes concern the sample path behavior of economic time series and both concentrate on the potential for different dynamics over the stages of the business cycle. However, the direction taken by empirical business cycle theory after 1945 was away from the atheoretical and descriptive techniques of Burns and Mitchell at the National Bureau of Economic Research and towards the structural estimation of linear Keynesian economics advocated by the Cowles Commission. This switch had two main impulses: first, the realization following the work of Frisch, Slutsky, and Yule that linear difference equations propagating (Gaussian) random impulses could produce many of the standard features of the business cycle; second, the comparative ease with which the new Keynesian theory in its IS–LM form could be cast into the propagation plus impulse formulation. Thus, the empirical analysis of business cycles was cast in terms of linear difference equations that have strong symmetry properties when propagated by Gaussian impulses as we shall discuss below. Since this period rather than being viewed as a standard feature of the business