



What causes business cycles to elongate, or recessions to intensify?

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ABSTRACT

In this paper we use both New Keynesian and Classical monetary models to explain why volatility transfers from high to low frequency cycles occur, causing the business cycle to elongate, and how they could reverse. Our results show that an increase in inflation aversion or a reduction in the commitment to output stabilization would create volatility transfers sufficient to give rise to a great moderation, while a reversal of those commitments would take it away again. In short, the lower frequency cycles become more volatile at the expense of traditional business cycle frequencies, even though there are no reversals in the parameters that govern the economy's underlying economic behaviour, dynamics or volatility. This implies we should expect less frequent but more severe recessions, with smoother business cycle expansion phases in between. We identify moderate expectations for output or earnings growth to be the key element that underpins these results.

“...The reporting of facts—without assuming the data are generated by some probability model—is an important scientific activity. We see no reason for economics to be an exception.” [Kydland and Prescott \(1990\)](#).

1. Introduction

Recent academic literature has drawn attention to the appearance of shifts in cyclical behaviour in the developed economies. A classic example would be the “great moderation” that appeared to smooth business cycles in the early 1980s, but then vanished again 20 years later. More generally, the composition of economic cycles may shift as longer financial cycles come to dominate (or perhaps replace) cycles at traditional business cycle frequencies. In this case, volatility shifts when power passes from short/medium cycles to longer cycles (implying sharper but more infrequent booms and busts with longer periods of calm in between). But it is one thing to show empirically that these shifts did occur in a certain period (as in [Crowley and Hughes Hallett, 2015](#)), or argue that one should expect such shifts on first principles ([Brock et al 2008, 2013](#)). It is quite another thing to show why these shifts occur, and what the driving variables and final consequences are.

The “great moderation”, as a phenomenon, has had a variety of explanations put forward for it, as the recent article ([Heer et al., 2017](#)) makes clear. One explanation is the “good luck” hypothesis proposed by [Stock and Watson \(2002\)](#) which suggests that business cycle variances have fallen. Some studies such as those by [Davis and Kahn \(2008\)](#) and [Dyanan et al. \(2006\)](#), attribute financial innovations or inventory behaviour as possible causes. But other studies suggest demographic explanations as the proximate cause, and this approach is supported by both [Jaimovich and Siu \(2009\)](#) and [Heer et al. \(2017\)](#). In this paper, our approach is different. First we take the evidence from time-frequency analysis of economic growth, and then use a New Keynesian model to identify the factors

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that might cause a shift in volatility from shorter cycles to longer cycles embedded in economic growth. The research presented here is therefore a logical sequel to our previous work (Crowley and Hughes Hallett, 2015).

Several papers which use time-frequency analysis (see Crowley, 2010; Aguiar-Conraria and Soares, 2011; Rua, 2012), have clearly shown how economic growth consists of cyclical fluctuations at different frequencies. Although much work needs to be done in terms of identifying and authenticating the source and drivers behind these different cycles, it is clear that fluctuations in these cycles appear to wax and wane over time. In particular, in relation to recent growth patterns in both the US and the UK (see Crowley and Hughes Hallett, 2015), we see that the “great moderation” appeared in higher frequency cycles and traditional business cycles, while lower frequency cycles or those at longer than the usual business cycles appear to have become as volatile as the traditional business cycle, and in many cases more volatile.

The idea of a volatility transfer between variables is quite common in policy work. It is usually a consequence of the trade-off between conflicting targets expressed in terms of the variability of those targets rather than average levels: for example between inflation and output volatility in a Phillips curve setting (Rogoff, 1985; Hughes Hallett and Petit, 1990); or in the effects of increasing monetary policy transparency (Demertzis and Hughes Hallett, 2007); or between output stability versus exchange rate volatility (Sachs, 1983); or indeed the tax regime (Posch and Wälde, 2011).

Much less common is the idea of volatility transfers between different cycles in economic behaviour. In fact, as far as we are aware, there are no formal analyses of how such transfers might arise, although recognition that such transfers might take place is implicit in Alesina and Gatti (1995)’s depiction of the trade-off between an economy’s political and business cycles, and in Granger (1966)’s typical spectral shape before and after an exchange rate is stabilized. Likewise, discussions that volatility transfers could appear between cycles as a result of policy interventions has also been present in the literature for a long time, starting with Wicksell’s distinction between financial cycles and business cycles (Wicksell (1936); Laidler (1972)). In fact that distinction has a much older tradition, having been first developed by Thornton (1802) and then presented in complete form by Joplin (1832). The idea here is that if the rate of interest is held too low, a boom period driven by expanding credit and asset prices will follow. Then, if credit and money are endogenous (or endogenised by policy), a bust will appear when the financial expansion is no longer sustainable or the economy suffers an adverse shock. At that point, a balance sheet recession will set in as firms, households and banks are obliged to de-leverage – triggering a sharp downturn, followed by a period of feeble growth and stubborn unemployment. Typically this type of financial cycle is thought to last about 10–20 years, as opposed to the 4–8 years of a business cycle.

This is a theme taken up by Ruestler (2016). He underscores the importance of distinguishing between financial cycles and business cycles, but demonstrates how hard it is to do so econometrically. Our paper shows that one reason this cannot be done in practice is because power can shift rapidly between cycles. If that happens, there is little chance of being able to distinguish between the cycles on limited sets of data - especially if we want to avoid the implication that the economy will remain stuck with the new cyclical behaviour until some other change in shocks or structure appears. This is an important, if rather disappointing, insight to add to the literature. It suggests that a time-specific as well as frequency-specific analysis will be necessary to get a proper handle on the possibility of cyclical volatility transfers. In this paper we demonstrate how that can be done. Empirical studies reinforce this finding; they reveal time varying cycles without obvious structural or policy changes (Crowley and Hughes Hallett, 2015).

A theoretical analysis of why volatility transfers happen between cycles is a different matter. We need a theoretical explanation of how and why volatility transfers between cycles arise, what the driving variables might be, and whether standard macro-economic models predict such transfers. Brock et al. (2008, 2013) provide formal proof that, in the macro-economic models we typically use, a policy rule designed to moderate a particular cycle – the business cycle, say – will always exaggerate or destabilize one or more of the other cycles in the economy¹ This, following the control theory literature, is known as the economy’s “design limit” - although it might be more appropriate to refer to it as an inevitable trade-off between dominance by short versus long-run cycles. The theory is then extended to show what can be done to get the pattern/balance of spectral densities required for the target variables; and that the extent that this can be done expands if rational expectations are operating in the economy. But what it does not do is explain what makes these transfers happen; nor does it say which variables or structural parameters are the source of the phenomenon, and what would then need to be done to moderate the transferred volatilities.² Hence, what is missing from the existing literature is a theoretical examination of how volatility transfers between cycles arise, and what the role of expectations might be. Given that the financial crash and 2008-9 recession proceeded as just described, it is important to provide some sound explanations for these events.

The “great moderation” period is an interesting episode, in that it occurred at a time when aversion to inflation among central bankers appears to have been at its most ardent (for example, inflation targeting), and when central bank independence appears to have focused monetary policy more in the direction of price stability than output stabilization. This left fiscal policy as the only way to achieve output stabilization at a time when fiscal interventions were constrained or made inoperative by excess debt. As a result, it is an interesting exercise to consider whether, in a wider cyclical context, the “great moderation” was more ephemeral than real.

Section 2 presents some of the empirical evidence for volatility transfers during the great moderation, and then Section 3 presents a simple theoretical framework for generating volatility and the tendency to longer, deeper and less frequent recessions. Section 4 then parameterizes our theoretical models, and derives the result that volatility transfers will always appear if the policy rules

¹ Time-frequency analysis, with possible evidence of volatility transfers, has been applied in other areas of macroeconomics; for example in identifying different cyclical responses of wages and prices in the US and hence in the Phillips Curve (Gallegati et al., 2011) – which leads in turn to an illustration of diminishing flexibility in the labor market, or structural reform fatigue (Hughes Hallett and Richter, 2008).

² The current paper is best seen as a necessary theoretical complement to our earlier empirical work (Crowley and Hughes Hallett, 2015); and as confirmation of the practical importance of design limits.

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