Discussion of “Structural Change in Macroeconomic Time Series: A Complex Systems Perspective,” by M.J. Hinich, J. Foster, and P. Wild, for Special Issue of *Journal of Macroeconomics*

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1 Introduction

Hinich, Foster, and Wild (HFW) offer many comments on current econometric time series practice and argue that standard analysis is unlikely to capture important forms of structural change. Below I point out what I believe are the key points they make, and I also indicate how these issues can perhaps be better communicated to time series econometricians and macroeconomists.

2 HFW’S Key Points

First, the authors provide a very useful set of relatively early references for important work on structural change in the form of intercept and slope shifts in the parameters of a linear statistical model, e.g., Page (1955). These papers are rarely (if ever) cited in the post-Hamilton (1989) literature, and it would seem only appropriate for them to receive the recognition they arguably deserve. As HFW emphasize, analysis of structural change “is not a new problem in mathematical statistics.”

Second, HFW argue that real-world discrete-time economic time series are obtained by filtering an associated underlying continuous-time data flow. In this view any particular discrete-time observation at point \( t \) is not the “true value” at this point in time; rather, it reflects an average of the continuous-time process in a neighborhood around \( t \). Within this framework HFW show that such continuous-to-discrete filtering can make it considerably more difficult to detect structural changes. In particular, standard filtering is likely to reduce the evidence of structural change by emphasizing more so low-frequency relative to high-frequency movements.

Third, HFW point out conditions under which discrete-time sampling produces a filtered output series which is time irreversible, and consider use of such a time irreversible series in an econometric modeling exercise. If the series is used as a regressor, output from the exercise will itself be time irreversible (since functions of time irreversible variables are generally time
irreversible). If the series is used as a dependent variable, failure to account for the time irreversibility of the data will result in a misspecified model.

3 Some Suggestions

I am very sympathetic to the points made by HWF; this is so not just because I am a co-author with one of them on a paper which addresses a major theme of theirs (see Hinich and Rothman [1998]). However, I feel there are a couple of important hurdles for them to clear before their presumed target audience will give them the attention that is their due.

My first concern is HWF’s use of concepts and tools from spectral analysis. Put simply, since graduates of PhD programs in economics generally are not well exposed to frequency domain techniques (this is true even for people who specialize in time series econometrics), it is easy to imagine that they will have considerable difficulty following much of the paper’s technical arguments. For example, the representative time series PhD economist is unlikely to know what the “Nyquist rate” and “aliasing” are. Accordingly, I suggest that in future work of this type, the authors take care to tailor their spectral-analysis-based discussion a bit better to the non-specialist.

My second concern is more substantive: I am not sure HWF have passed the “Why Should I Care?” test for macroeconomists. While their examples and arguments are compelling, I feel they should go further by demonstrating exactly how and to what extent more standard analysis is flawed, all else equal, because it ignores the issues they raise. One possibility is a study of how the “stylized facts” of business cycles may be biased. Another would be an examination of the extent to which a conventional “Taylor Rule” analysis is affected if GDP, inflation, and/or the Fed Funds rate are/is time irreversible. The list of questions with which macroeconomists are concerned is large, and I think the authors would do well to cast their arguments within the context of such questions.
References

