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Nowcasting

Overview of concepts, definitions and current practices

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An overview of the

. definition
. historical background
. uses and applications
. characteristics
. methodologies
. examples
. future developments

of nowcasting

now + forecasting

Assessment of the current state of a target variable based on information provided by relevant indicators

Similarities and overlap with other related concepts

- forecasting
- flash estimates
- scenario building
- early warnings systems
- imputation

Greater demand for more up-to-date information for monitoring development and guiding policy

More opportunities created by innovations and new sources of data

Nowcasting is originally a term from meteorology

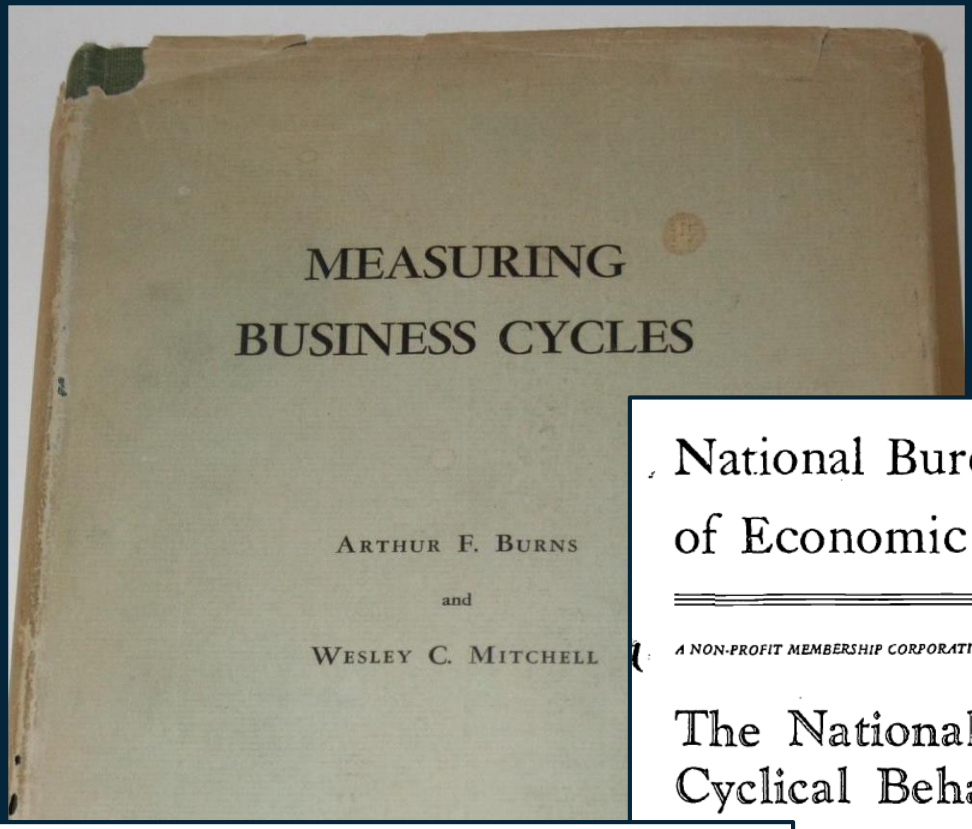
> "Nowcasting comprises the detailed description of the current weather along with forecasts obtained by extrapolation for a period of 0 to 6 hours ahead […] A forecaster using the latest radar, satellite and observational data is able to make analysis of the small-scale features present in a small area such as a city and make an accurate forecast for the following few hours."
>
> - WMO

Process undertaken, formally or informally, every time we take a decision about the present state with only partial information

Information about the current state of the economy is essential for policy makers

Since the 1930s, economists have systematically studied the co-movements of time series to predict the current state of the economy

Business cycle analysis by Mitchell and Burns (1935, 1938, 1946)



National Bureau
of Economic Research

BULLETIN 57
JULY 1, 1935

1819 BROADWAY, NEW YORK

A NON-PROFIT MEMBERSHIP CORPORATION FOR IMPARTIAL STUDIES IN ECONOMIC AND SOCIAL SCIENCE

The National Bureau's Measures of Cyclical Behavior

WESLEY C. MITCHELL
and
ARTHUR F. BURNS

ational Bureau of Economic Research, Inc.

OSE FOR WHICH THE MEASURES ARE MADE

cycles consist of interrelated fluctuations in nomic processes—the production of commodi-, miners and manufacturers; the transporting passengers by land and water; the pricing of t successive stages of their journeys to business l households; marketing merchandise at home arrying stocks of raw materials and finished loying men and disbursing wages; borrow- d paying interest; making profits or losses dividends; saving and investing capital; t expenses and maturing debts with money . That the cyclical fluctuations in these di- differ from one another in timing, amplitude

Business Cycles: The Problem and Its Setting. Since that volume appeared in 1927, a small staff has been developing a technique for measuring cyclical behavior and has been applying it to some eight hundred time series from the United States, Great Britain, France and Germany.[2] The task of rechecking this analysis and bringing it up to the close of the last completed cycles in the four countries should be finished before the end of the year.

This *Bulletin* gives a brief explanation of the leading features of the technique and a few illustrations of the results. The first three chapters of the book in preparation—*Business Cycles*, Volume II, *Analysis of Cyclical Behavior*—will be available in mimeographed form by August or September. They explain the technique in full detail, inter-

CHAPTER 6

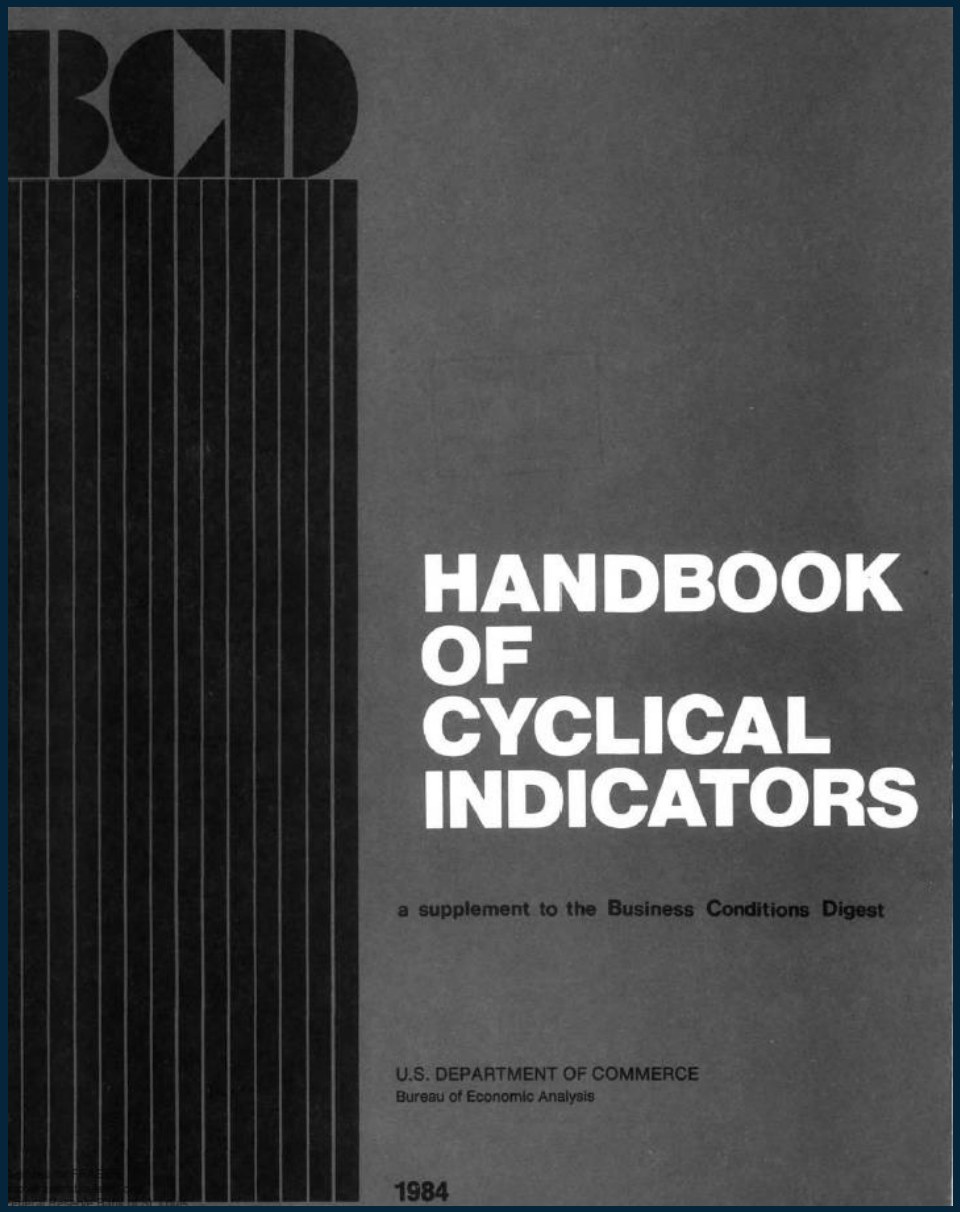
Statistical Indicators of Cyclical Revivals

Wesley C. Mitchell and Arthur F. Burns

The Aims of This Bulletin

THIS bulletin rests upon an analysis of the timing of cyclical revivals in the United States of 487 statistical series in monthly or quarterly form, of which many cover the postwar period alone, while a few run back to the 1880's or earlier. What we have to offer is a digest of past experience, which we take to be on the whole the best teacher of what to expect in the near future.

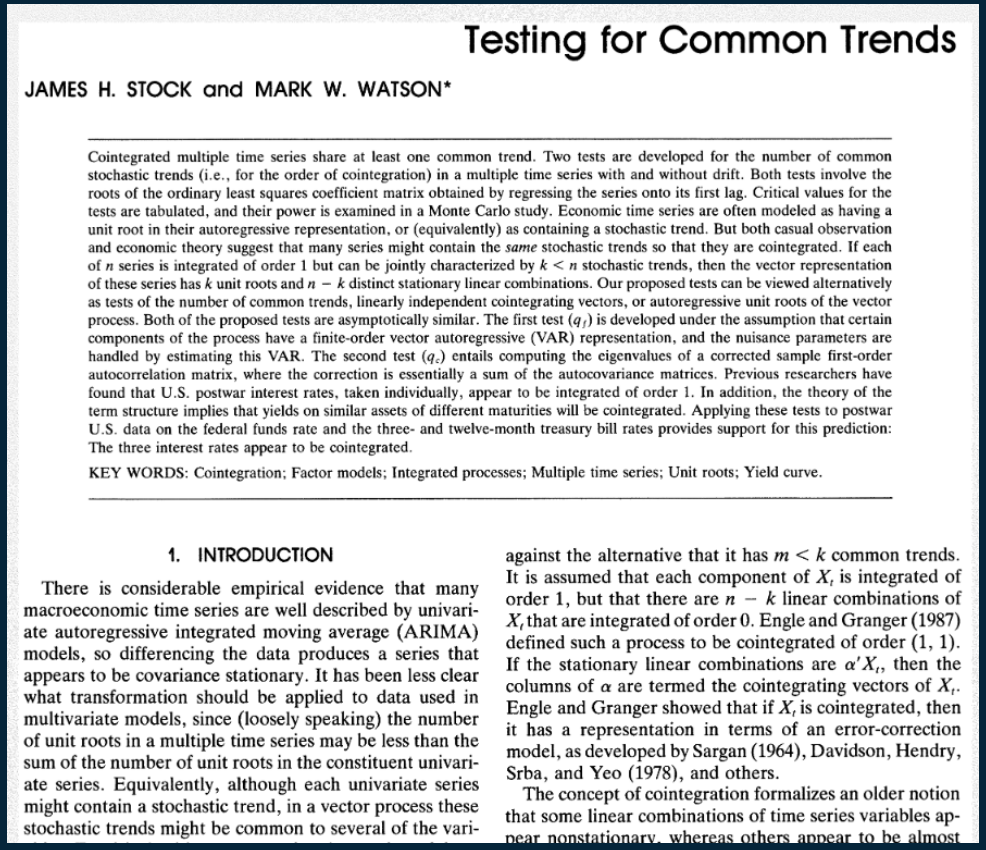
But one of the clearest teachings of experience is that every business cycle has features that are peculiar to it. Accordingly, no one who knows the past expects that what happened during any earlier business revival will repeat itself exactly during the next revival. Even average experience over several revivals establishes no more than a presumption concerning



Composite indices of leading, coincident and lagging indicators by the U. S. Department of Commerce (1977, 1984) and the Conference Board

Treatment of the nowcasting problem in a formal statistical framework

1. Stock and Watson (1988)



Testing for Common Trends

JAMES H. STOCK and MARK W. WATSON*

Cointegrated multiple time series share at least one common trend. Two tests are developed for the number of common stochastic trends (i.e., for the order of cointegration) in a multiple time series with and without drift. Both tests involve the roots of the ordinary least squares coefficient matrix obtained by regressing the series onto its first lag. Critical values for the tests are tabulated, and their power is examined in a Monte Carlo study. Economic time series are often modeled as having a unit root in their autoregressive representation, or (equivalently) as containing a stochastic trend. But both casual observation and economic theory suggest that many series might contain the *same* stochastic trends so that they are cointegrated. If each of n series is integrated of order 1 but can be jointly characterized by $k < n$ stochastic trends, then the vector representation of these series has k unit roots and $n - k$ distinct stationary linear combinations. Our proposed tests can be viewed alternatively as tests of the number of common trends, linearly independent cointegrating vectors, or autoregressive unit roots of the vector process. Both of the proposed tests are asymptotically similar. The first test (q_f) is developed under the assumption that certain components of the process have a finite-order vector autoregressive (VAR) representation, and the nuisance parameters are handled by estimating this VAR. The second test (q_c) entails computing the eigenvalues of a corrected sample first-order autocorrelation matrix, where the correction is essentially a sum of the autocovariance matrices. Previous researchers have found that U.S. postwar interest rates, taken individually, appear to be integrated of order 1. In addition, the theory of the term structure implies that yields on similar assets of different maturities will be cointegrated. Applying these tests to postwar U.S. data on the federal funds rate and the three- and twelve-month treasury bill rates provides support for this prediction: The three interest rates appear to be cointegrated.

KEY WORDS: Cointegration; Factor models; Integrated processes; Multiple time series; Unit roots; Yield curve.

1. INTRODUCTION

There is considerable empirical evidence that many macroeconomic time series are well described by univariate autoregressive integrated moving average (ARIMA) models, so differencing the data produces a series that appears to be covariance stationary. It has been less clear what transformation should be applied to data used in multivariate models, since (loosely speaking) the number of unit roots in a multiple time series may be less than the sum of the number of unit roots in the constituent univariate series. Equivalently, although each univariate series might contain a stochastic trend, in a vector process these stochastic trends might be common to several of the variates against the alternative that it has $m < k$ common trends. It is assumed that each component of X_t is integrated of order 1, but that there are $n - k$ linear combinations of X_t that are integrated of order 0. Engle and Granger (1987) defined such a process to be cointegrated of order (1, 1). If the stationary linear combinations are $\alpha' X_t$, then the columns of α are termed the cointegrating vectors of X_t. Engle and Granger showed that if X_t is cointegrated, then it has a representation in terms of an error-correction model, as developed by Sargan (1964), Davidson, Hendry, Srba, and Yeo (1978), and others.

The concept of cointegration formalizes an older notion that some linear combinations of time series variables appear nonstationary, whereas others appear to be almost

Treatment of the nowcasting problem in a formal statistical framework

2. Evans (2005)

Where Are We Now?

Real-Time Estimates of the Macro Economy

Martin D. D. Evans
Georgetown University
and the NBER

March 2005

Forthcoming in
The International Journal of Central Banking

Abstract

This paper describes a method for calculating daily real-time estimates of the current state of the U.S. economy. The estimates are computed from data on scheduled U.S. macroeconomic announcements using an econometric model that allows for variable reporting lags, temporal aggregation, and other complications in the data. The model can be applied to find real-time estimates of GDP, inflation, unemployment or any other macroeconomic variable of interest. In this paper I focus on the problem of estimating the current level of and growth rate in GDP. I construct daily real-time estimates of GDP that incorporate public information known on the day in question. The real-time estimates produced by the model are uniquely-suited to studying how perceived developments the macro economy are linked to asset prices over a wide range of frequencies. The estimates also provide, for the first time, daily time series that can be used in practical policy decisions.

Treatment of the nowcasting problem in a formal statistical framework

3. Giannone, Reichlin and Small (2008)

Nowcasting: The real-time informational content of macroeconomic data ☆

Domenico Giannone [a,*], Lucrezia Reichlin [b], David Small [c]

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[b] European Central Bank and CEPR, Germany
[c] Board of Governors of the Federal Reserve System, Germany

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ABSTRACT

A formal method is developed for evaluating the marginal impact that intra-monthly data releases have on current-quarter forecasts (nowcasts) of real gross domestic product (GDP) growth. The method can track the real-time flow of the type of information monitored by central banks because it can handle large data sets with staggered data-release dates. Each time new data are released, the nowcasts are updated on the basis of progressively larger data sets that, reflecting the unsynchronized data-release dates, have a "jagged edge" across the most recent months.

Recent explosion of nowcasting applications in economics

- GDP
- value added by sector
- trade
- labour market
- inflation

Applications in other areas, including social variables and other aspects of development

. poverty and inequality
. mortality
. transport
. GHG emissions

Nowcasts are useful to give real-time information on a target variable

. published after a long delay
. available at low frequency
. subject to revisions

Other applications

. inputs to forecasting frameworks
. imputation
. backcasting
. series with structural changes

Nowcasts exploit all information provided by a set of indicators

. relevant
. timely available
. different frequencies
. non-synchronised publication
. varying publication lags
. many sources
. possibly a large set

Indicators are not selected because of their causal or theoretical/structural relationship to the target variable, but because of their

- correlation with the target variable
- timeliness

Nowcasts rely on statistical models that link the flow of data releases in real-time

More than a one-off projection, what's interesting is the evolution of estimates as new data arrive

Challenges in developing a nowcasting application

. identifying relevant data sources
. working in a data-rich environment
. separating signal from noise
. summarise the information into a meaningful estimate

Common methodologies

. cycle analysis
. blocked linear systems
. bridge equations
. dynamic factor models
. mixed frequency (Bayesian) VARs
. mixed-data sampling (MIDAS)

Examples of nowcasting applications in economics

. €-coin, CEPR
. business conditions index, Fed Phil.
. GDP nowcasting, Fed NY
. inflation nowcasting, Fed Cleveland
. now-casting.com

Potential future developments of nowcasting

- proliferation of data sources
- modelling high frequency data
- links with structural models
- parameter instability and other time-varying features
- theoretical development in statistics
- AI methods

Potential future developments of nowcasting

- extensions to other target variables with limited data sources and larger publication gaps
- linking various approaches and methodologies

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Nowcasting

Overview of concepts, definitions and current practices

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