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 policymakers.

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

The National Bureau’s Measures of Cyclical Behavior

WESLEY C. MITCHELL

and

ARTHUR F. BURNS

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. 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-
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


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**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 ($q_1$) 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 ($q_2$) entails comparing the eigenvalues of a corrected simple 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 differentiating 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 vari-

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 $\alpha$ 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, Sbati, 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.
Nowcasting: The real-time informational content of macroeconomic data

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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.

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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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Overview of concepts, definitions and current practices

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