



Committee of the Chief Statisticians  
of the United Nations System



## **CCS-UN Technical Workshop on Nowcasting in International Organizations**

3-4 February 2020  
Room XXVII, Palais des Nations, Geneva, Switzerland

### **Programme**

#### **Day 1: 3 February 2020**

##### **10:00 – 10:30 Session 1. Introduction and Objectives**

Steve MacFeely (UNCTAD)  
Valentin Todorov (UNIDO)

##### **10:30 – 12:00 Session 2. Concepts, Definitions and New Approaches**

###### **1. Fernando Cantú (UNCTAD) Overview of Concepts, Definitions and Current Practices**

**Abstract:** This presentation will discuss the definition of nowcasting and the similarities and differences with other concepts, such as forecasting, scenario building, early warnings, turning point detection and flash estimates. It will also cover the relationship between nowcasting and backward-looking concepts such as imputation and backcasting. The presentation will survey the proliferation of nowcasting exercises underpinned by demand-side factors (e.g., increased demand for up-to-date estimates to monitor development) and supply-side factors (e.g., new data sources, refinements in methodologies). Finally, it will briefly present some of the most common methodologies used to date and successful examples of their application in national and international contexts.

###### **2. Stefan Andrés Sperlich (Geneva University) Evoking Ideas from Small Area Estimation for Timely Indicator Prediction on a High Level of Disaggregation**

**Abstract:** Small Area Estimation (SAE) has a long tradition in indicator prediction for high levels of disaggregation. Prediction, however, only referred to the fact that in the centre of interest was not the estimation of a deterministic but rather a random area parameter. A quite popular approach is to combine mixed effects model assisted prediction. These models may range from most simple linear to highly complex nonparametric ones. The modelling approach then allows for imputation, including the prediction of indicators for areas in which no direct information is available. Moreover, more recently, models were

proposed that account not only for spatial but also temporal correlation. It is then just a small step to think of time series model assisted prediction which almost naturally includes nowcasting and forecasting.

3. Richard Rothenberg (GlobalAI) Big Data and AI-driven Approaches for SDG Nowcasting

Abstract: We present an overview of big data, machine learning and natural language processing techniques applied to SDG nowcasting. We provide a use case which uses taxonomies associated with the UN SDGs to nowcast the SDG footprint of companies and countries using large-scale unstructured data. The analytical process involves the extraction, processing, geo-tagging and analysis of unstructured data from tens of thousands of sources in dozens of languages, including news, blogs, company and NGO reports, social media, and Google trends. We discuss the challenges and implications of this approach for SDG nowcasting, with a focus on Tier II and Tier III indicators, SDG finance, SDG inter-linkages and more timely assessments of non-financial company and country risks.

**12:00 – 13:00 Session 3. Nowcasting Economic Domains**

1. UNIDO Nowcasting Manufacturing Country Value Added: The Present and the Future

Abstract: UNIDO Statistics is responsible for implementing the international mandate of the Organization in the field of industrial statistics. It maintains a unique industrial statistics database and updates it regularly with data collected from the national statistical offices. Manufacturing Value Added (MVA) is the key indicator of a country's industrial production. In order to facilitate international comparison, it is published in UNIDO's International Yearbook of Industrial Statistics for a large set of countries. Because of a time-gap of at least one year between the latest year for which data are available and the year for which MVA data must be reported in the Yearbook, nowcasting methods are used to fill in the missing data up to the current year. We proposed a parsimonious methodology that exploits the relationship between MVA and GDP to produce reliable nowcasts of MVA. The approach is based on stationary time series variables, robust estimation on rolling samples to extract the trend in past growth rate data and contemporaneous information from related variables. Now we are investigating the possibilities for improving the model through utilization of new data sources and application of new computational algorithms.

2. UNCTAD Nowcasting Global Trade in Goods and Services

Abstract: World economic aggregates are compiled infrequently and released after considerable lags. There are, however, many relevant series released in a timely manner and at a higher frequency that could potentially provide significant information about the evolution of global aggregates. The challenge is then to extract the relevant information from this multitude of indicators and combine it to track the real-time evolution of the target variables. We develop a methodology based on dynamic factor models adapted to accommodate for variables with heterogeneous frequencies, ragged ends and missing data. We apply this nowcast methodologies to two variables of interest: global trade in goods and in services. In addition to monitoring these variables in real time, this method can also

be used to obtain short-term forecasts based on the most up-to-date values of the underlying indicators.

### **14:30 – 17:30 Session 3. Nowcasting Economic Domains (continued)**

#### **3. GCC-Stat Nowcasting Quarterly GCC Economy with VAR and Dynamic Factor Models**

**Abstract:** Timely and accurate assessment of current macroeconomic activity is crucial for policymakers and other economic agents. The official statistics, however, are often published with considerable delays and may be subject to significant revisions even long after their initial release. Nowcasting aims to forecast the current economic situation ahead of official data releases. We evaluate local preconditions related to nowcasting of latest quarterly GCC GDP estimates and follow similar methodology as many official national and regional organizations' flash GPP estimates follow. The objective is to estimate a current/recent quarter's GDP based on narrower information set than is available for the official final quarterly estimate. We first discuss the specific regional issues in availability and breadth of official macroeconomic data we face. We then develop and compare various mixed frequency VAR / dynamic factor model specifications to nowcast the aggregate GCC quarterly GDP growth rate and propose a final quarterly flash GDP estimate methodology. We then briefly examine the final estimate's one period out-of-sample performance based on specific assumptions and propose a work program for fine-tuning and implementing the forecast methodology to GCC-Stat production environment.

#### **4. ADB Nowcasting GDP Growth for Indonesia**

**Abstract:** We produce predictions of the current state of the Indonesian economy by estimating a dynamic factor model on a dataset of 11 indicators. Besides the standard difficulties associated with constructing timely indicators of current economic conditions, Indonesia presents additional challenges typical to emerging market economies where data are often scant and unreliable. By means of a pseudo real-time forecasting exercise, we show that our model outperforms univariate benchmarks, and it does comparably well with predictions of market operators. We show that when quality of data is low, a careful selection of indicators is crucial for better forecast performance. Finally, we also show how our framework can be used to regularly update the nowcast reading for Indonesia and act as a useful device to help in explaining movements in the growth momentum.

#### **5. OECD Real Time Detection of Turning Points: The OECD Experience**

**Abstract:** Timely and accurate identification of turning points in economic activity is crucial for fiscal, monetary and economic policy making. The OECD system of Composite Leading Indicators (CLIs) designed to provide early signals of turning points and to monitor the position of economies in the business cycles, is an important part of the statistical tool kit in this regard. This presentation aims to provide an overview of the methodology used by the OECD to derive CLIs, with a particular focus on the approach and concepts used to detect turning points in real time that could be applied to other nowcasting efforts. To help motivate the discussion, and to demonstrate its utility, the presentation will also describe the performance of CLIs before and after the recent crisis and will discuss possible ways to incorporate business cycle estimates in nowcasting macroeconomic variables.

## 6. WTO      Forecasting and Nowcasting in WTO Statistics

Abstract: The WTO produces a number of statistical outputs that can be characterized as nowcasts, if we define nowcasts to be very short-term economic forecasts for the current period or for the very near future. The WTO's bi-annual trade forecasts include projections for the current year, with mid-year updates based on partial data for the latest period. Meanwhile, the organization's trade barometers for goods and services are composite leading indicators for world trade that signal trade developments in the current month and in coming months. Although none of these products is referred to explicitly as a nowcast, each includes significant elements of nowcasting. This presentation will review the relationship between forecasts, composite leading indicators and nowcasts, including the political constraints associated with these activities. It will then summarize the methodology used in the WTO's trade forecasts and trade barometers, identifying their relative strengths and weaknesses. Finally, it will evaluate the past performance of these products with an eye to improving them in the future.

## 7. Eurostat      Eurostat's Business Cycle Clock: Methodology and Results

Abstract: Using scoreboards of indicators to monitor the different aspects of a phenomenon is becoming more and more common, in particular in relation to policy decision making. The Principle European Economic Indicators (PEEIs) is an example of a scoreboard aiming to describe the economic and labour market situation as well as price developments, which are of particularly high importance for economic and monetary policy. In order to give a clear and concise message to the user, information from multiple indicators can be summarised to capture and highlight key signals behind a scoreboard of statistical indicators. Eurostat will present the Business Cycle Clock (BCC) a tool developed with this aim. The BCC depicts in a visually appealing and intuitively understandable manner cyclical developments in the euro area. It is based on the outcome of a predefined set of composite indicators which are not directly displayed but used as inputs: Business Cycle Coincident Indicator (BCCI), Growth Cycle Coincident Indicator (GCCCI) and Acceleration Cycle Coincident Indicator (ACCI). The clock is structured according to the so-called  $\alpha AB\beta CD$  approach with six types of "turning points": maximum of the GDP growth rate ( $\alpha$ ), the growth rate slips below the trend (A), the growth rate becomes negative (B), minimum of the growth rate ( $\beta$ ), the growth rate becomes positive (C) and the growth rate surpasses the trend (D). The BCC shows the cyclical developments as a chronology of turning points together with the GDP growth cycle as a percentage of deviation from the trend. In its presentation, Eurostat will provide more details on the methodology of the BCC and composite indicators, as well as some latest results.

## 8. IMF      A Monthly Indicator of Economic Growth for Low Income Countries

Abstract: Monthly economic indicators support policy analysis of current economic developments and forecasting. Lacking these indicators imply that policy making has to rely on alternative information. The IMF promotes the use of timely comprehensive measures of economic growth, sometimes referred to as monthly indicators of economic growth (MIEG) and supports countries in assessing the data and statistical requirements. Several countries already produce and disseminate comprehensive measures of economic activity, although methodologies, objectives, and quality vary. MIEGs are a very specific type of high frequency indicator that aims at providing a timely signal of economic growth on a monthly basis, are almost exclusively derived from quantitative source data, largely

comply with international methodological standards, and are targeted to concurrent measures of activity – as opposed to anticipating changes in the business cycle exclusively.

#### 9. UN-DESA Nowcasting Economic Growth: Opportunities and Challenges of Using High-Frequency Data for Economic Forecasting

Abstract: Nowcasting has tremendous potential to complement and enrich existing economic forecasting tools, but it also faces some serious limitations. The presentation will showcase the use of nowcasting tools by UN/DESA's Global Economic Monitoring Branch (GEMB) as an input into forecasts for the *World Economic Situation Prospects* and other publications. Nowcasting has recently been introduced in GEMB's modelling toolbox, primarily to strengthen the rigor and consistency of UN short-term forecasting for key macroeconomic indicators. It is also useful for monitoring countries with limited data. The methodology developed for macro indicators can readily be adapted to monitoring other SDG indicators. With high-frequency data becoming more and more available, nowcasting could indeed become a powerful analytical tool for all sorts of purposes. However, successful application of any nowcasting methodology relies on careful research to identify high-quality indicators that are correlated with the targeted variable. The modeler must have an understanding of the degree of accuracy of the tools, which varies wildly depending on the volatility of the target variable and quality of the higher frequency indicators, in order to gauge the degree of confidence that can be attributed to estimates.

### Day 2: 4 February 2020

#### 9:30 – 13:00 Session 4. Nowcasting Social, Humanitarian and Environmental Domains

##### 1. Jonathan Moyer (Denver University/UNDP) Forecasting and Nowcasting Human Development Related SDGs in an Integrated Assessment Framework

Abstract: Estimating and projecting levels of human development across indicators is important for planning and assessing the effectiveness of global developmental frameworks such as the sustainable development goals. But real-world data measuring developmental outcomes often is released with long temporal lags and lacks full coverage across countries. The International Futures (IFs) integrated assessment modelling platform produces estimates and forecasts for a range of indicators and variables associated with the sustainable development goals for 186 countries. This presentation will introduce the IFs tool and highlight how an integrated assessment model framework can be useful for estimating current levels of human development at a country, regional, or global level. The presentation concludes by discussing future research potential in this area including applying these methodologies at increasingly smaller units of analysis within countries to identify acute developmental needs and further guide policy planning.

##### 2. OECD Nowcasting the Income Distribution

This paper aims at predicting the income distribution using Machine Learning Methods using a large data set of macroeconomic and financial indicators, mostly aggregated on country level. Models are tested with Lasso, Neural Network, Support Vector Machine, Random Forest and Gradient Boosting. Their differing methodologies are presented and

their respective advantages are discussed. We find that the Lasso model outperforms other techniques, while out-of-sample prediction performance remains somehow medium.

### 3. UNHCR Monthly Refugee Estimates

Abstract: Validated official statistics on the size of the refugee population are in great demand by UNCHR and its partners. Good quality and timely population statistics provide the foundation for evidence informed policies, programmes and decisions, more effective measurement and evaluation and increased accountability. Currently these statistics are released bi-annually, usually with a lag of about six months. This lag is currently inevitable because there are often delays in reporting by Governments and the data need to be checked and validated. However, this delay reduces the utility of the data, especially in fast-evolving situation. The project seeks to provide updates on population size on a monthly basis thereby significantly reducing the time lag. This is done by combining existing actual data and information with econometric and statistical modelling techniques to estimate the population size for those country operations where timely information on the population is limited. Methods include the use of a reduced-form Vector Autoregression multivariate time series model (VAR) for projecting asylum decisions available monthly with a lag, and a Panel Data gravity model for yearly projections apportioned to months through least squares distribution.

### 4. UNODC Nowcasting Homicides

Abstract: At UNODC, the current data collection/production cycle is based on a 2-year gap between reference and publication year. The complexity of data collection process makes it difficult to reduce this gap and we are exploring ways to produce nowcasts. Among the data series managed by the Office, those on intentional homicides are those with the highest quality and we are considering possible approaches to produce homicide nowcasts. In 2019, for the first time, a method based on the Exponentially Weighted Moving Average (EWMA) was used to create full time series (1990-2017) at national level that have been eventually used to produce regional aggregates. For each country, estimates of homicide data have been produced for those years where data were missing. Specifically, for each country, the rates of homicides of years without data were replaced by a moving average of the homicide rates of all other years in that same country's time series. As a first step to produce nowcasts, we will assess 2108 estimated values against actual data collected during 2019. Possible options to produce nowcasts include the use of data collected through web-scraping and/or monthly/quarterly data collected from selected countries.

### 5. OCHA Use of Predictive Analytics in Humanitarian Response

Abstract: As of November 2019, the number of datasets available on the Humanitarian Data Exchange (HDX) reached 15,000, and it keeps growing every day. Data from a variety of sources and humanitarian topics is becoming increasingly available to humanitarian responders. At the same time, algorithms are now part of daily life, following stunning advancements in data science and machine learning. Using data science to anticipate humanitarian crises represents a great opportunity for organizations to respond earlier, saving and protecting more lives than ever before. But despite some isolated applications, predictive analytics is still an exploratory space for the sector, especially when it comes to developing models that trigger financing. Given the Centre's role and expertise with data, it has been exploring how best to advance the application of predictive analytics in

humanitarian response. The Centre's 2018 and 2019 Data Fellows piloted models (for Somalia and South Sudan) and developed frameworks for model governance. The Centre's predictive analytics work will focus in three areas: Modelling, Quality assurance and Community engagement. (1) Modelling: We will develop new models, from design to application, and support existing partner models for use in humanitarian operations. (2) Quality Assurance: We will support the creation of standards for the development, validation, and use of predictive analytics. (3) Community: The Centre exists to create partnerships and our work on predictive analytics will only reinforce this.

## 6. FAO Forecasting and Nowcasting at FAO

Abstract: FAO statistical production is focused on food and agriculture data. The statistics disseminated mainly rely on data collected from member countries and for this reason are normally published with a time-lag of 2-3 years with regard to the reference period. Currently, forecasting techniques are not commonly used across FAO. The only database that publishes crop forecasts is the Agricultural Market Information System (AMIS), which however focus on 4 crops and on the 20 key producers worldwide. Nowcasting techniques are also used to project the trends for the last 2-3 years of the Prevalence of Undernourishment, one of the official SDG indicators that monitors target 2.1. FAO is planning to significantly expand use of forecasting techniques in two main areas:

- a. The estimation of missing values (country nonresponses to FAO questionnaires) and real-time data in some key data domains (e.g. agriculture production, prices, trade and investment data) with the use of auxiliary variables derived from Earth Observation images and other related methods.
- b. A more extensive will be done in the area of SDGs indicators, to assess the achievement of SDGs target in 2030, in particular for a subset of those under FAO custodianship. In this regard, the main challenges to face relate to the nature of data (mainly proportions), the shortness of the time series, the heterogeneity between countries' situation. Some preliminary findings will be illustrated during the workshop.

## 7. World Bank Nowcasting and Forecasting Global Poverty

Abstract: Timely and comparable poverty estimates are vital to assess countries' development progress and track the first SDG, to end extreme poverty by 2030. Yet timely and comparable estimates of poverty are lacking. For these reasons, initiatives that reliably nowcast what the poverty rate is today and project how poverty rates might develop in the future are crucial for informed high-level decision-making. In this presentation, we discuss how the World Bank currently nowcasts and forecasts poverty, which is by assuming that – between the last observed distribution and the time of the nowcast/forecast – all households' consumption/income grow with the rate observed in national accounts. We then discuss two ways of improving these projections: (1) by assuming that growth can be pro-poor or pro-rich, and thus change inequality, (2) by leveraging large-scale datasets, such as the World Development Indicators, and statistical learning techniques to improve the accuracy of how much household consumption/income has grown since the last observed distribution. We show that any realistic projection yields global poverty rates by 2030 well above the target of the first SDG.

## **14:30 – 15:30 Session 5. Dissemination and Communication**

Plenary discussion:

- How can we ensure users distinguish between official data and nowcasts?
- How do we communicate updates in a clear and meaningful manner?
- How do we evaluate accuracy and communicate it?

## **15:30 – 16:30 Session 6. Next Steps**

Plenary discussion:

- How do we apply nowcasting to SDG indicators?
- Is there a value in establishing an ‘informal’ methodological group to assist agencies?