22nd Federal Forecasters Conference

Theme: The Potential for Big Data in Forecasting
When: Thursday, April 20th, 2017
Where: Bureau of Labor Statistics, Washington, DC

www.federalforecasters.org

eventbrite.com
search ffc2017

Sponsoring agencies:

Bureau of Labor Statistics • Economic Research Service
Internal Revenue Service • National Center for Education Statistics • U.S. Census Bureau
U.S. Department of Labor • U.S. Energy Information Administration • U.S. Geological Survey

Partnering organizations:

Research Program on Forecasting, The George Washington University
Society of Government Economists • Office of Revenue Analysis, DC Office of the Chief Financial Officer

FFC2017

The 22nd

Federal Forecasters Conference (FFC)

The Potential for Big Data in Forecasting

Thursday, April 20, 2017

Conference Registration Hours: 8:00 AM - 9:00 AM

Conference Time: 9:00 AM - 4:15 PM

Bureau of Labor Statistics (BLS) Conference and Training Center
2 Massachusetts Avenue, N.E.
Washington, DC 20212

Sponsoring Agencies:

Bureau of Labor Statistics
Economic Research Service
Internal Revenue Service
National Center for Education Statistics
U.S. Census Bureau
U.S. Department of Labor
U.S. Energy Information Administration
U.S. Geological Survey

Partnering Organizations:

Research Program on Forecasting, The George Washington University
Society of Government Economists
Office of Revenue Analysis, DC Office of the Chief Financial Officer

www.federalforecasters.org

Contents

2017 Federal Forecasters Consortium Board

Jensen, Eric (Chair)
U.S. Census Bureau
U.S. Department of Commerce

Armstrong, David
U.S. Census Bureau
U.S. Department of Commerce

Busse, Jeffrey
U.S. Geological Survey
U.S. Department of the Interior

Chu, Michelle
Internal Revenue Service
U.S. Department of the Treasury

Colby, Sandra
U.S. Census Bureau
U.S. Department of Commerce

Dubina, Kevin
Bureau of Labor Statistics
U.S. Department of Labor

Hussar, William
National Center for Education Statistics
U.S. Department of Education

Joutz, Frederick
Research Program on Forecasting
The George Washington University

MacDonald, Stephen
Economic Research Service
U.S. Department of Agriculture

Madjemian, Michael
U.S. Department of Agriculture

Mallik, Arup
U.S. Energy Information Administration
U.S. Department of Energy

Niami, Farhad
Office of Revenue Analysis
DC Office of the Chief Financial Officer

Schelach, Kellie
Veterans Health Administration
Veterans Administration

Sinclair, Tara
Research Program on Forecasting
The George Washington University

Sloboda, Brian
Office of Regulatory & Programmatic Policy
U.S. Department of Labor

Wodon, Quentin
Society of Government Economists
World Bank

FFC2017 Conference at a Glance

8:00 AM — 9:00 AM	**Registration ..... Lobby**
9:00 AM — 12:00 PM	**Morning Session ..... Room 1**
9:00 AM — 9:10 AM	Opening Remarks
9:10 AM — 9:20 AM	Welcome
9:20 AM — 9:30 AM	Award Announcements
9:30 AM — 11:45 AM	Panel Discussion

There will be a 15 minute break at 10:30 am

11:45 AM — 12:00 PM	Award Presentations and Photos
12:00 PM — 1:00 PM	**Lunch (On Your Own)**
1:00 PM — 4:15 PM	**Afternoon Concurrent Sessions ..... Room 1, 2, 3, 7, or 8**
1:00 PM — 2:30 PM	Concurrent Sessions I
2:30 PM — 2:45 PM	Afternoon Break
2:45 PM — 4:15 PM	Concurrent Sessions II

Morning Session

9:00 AM – 12:00 PM..... Room 1

9:00 AM – 9:10 AM	Opening Remarks Eric Jensen Chair, Federal Forecasters Consortium U.S. Census Bureau U.S. Department of Commerce
9:10 AM – 9:20 AM	Welcome Bill Wiatrowski Deputy Commissioner Bureau of Labor Statistics U.S. Department of Labor
9:20 AM – 9:30 AM	Award Announcements 2017 Forecasting Contest Winners Brian W. Sloboda Office of Regulatory and Programmatic Policy U.S. Department of Labor FFC2015 Conference Best Paper Awards Tara Sinclair Research Program on Forecasting The George Washington University
9:30 AM – 11:45 AM	Panel Discussion (15 minute break at 10:20 am)
11:45 AM – 12:00 PM	Award Presentations and Photos Jeffrey Busse U.S. Geological Survey U.S. Department of the Interior
12:00 PM – 1:00 PM	Lunch (On Your Own)

Panel Discussion.....9:30 AM – 11:45 AM

The Potential for Big Data in Forecasting

Big data coming from all sorts of new sources represents a new frontier in the data-driven analysis of social, physical, and economic trends. Clearly, there is potential for using big data to develop forecasts; however, many analysts are still more familiar with using traditional types of data and techniques to make forecasts and projections. As forecasters explore the potential for big data, there are important questions about the generalizability, specificity, and accessibility of these data and approaches that need to be answered. Panelists will share their experience using big data in forecasting. After the panelists have shared their experience, audience members will have an opportunity to ask questions of these big data experts regarding the potential and the pitfalls of using big data in their forecasts.

Moderator

Eric Jensen
U.S. Census Bureau
U.S. Department of Commerce

Panelists

Dr. Michael Horrigan
Associate Commissioner for Employment and Unemployment Programs
Bureau of Labor Statistics

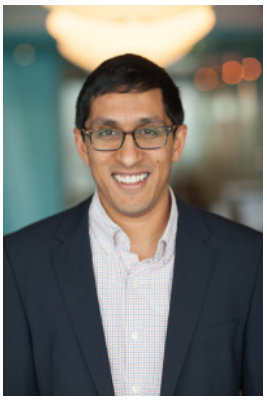
Dr. Krishna Rao
Scientific Advisory Committee Member
U.S. Census Bureau

Dr. Tara Sinclair
Associate Professor of Economics and International Affairs
The George Washington University

Question and answer discussion with audience will follow

Panelist Information

Dr. Michael Horrigan has worked at the Bureau of Labor Statistics since 1986 in a variety of positions including running the Surveys of Employer Provided Training, the National Longitudinal Surveys Program, the Occupational Employment Survey, and the BLS Occupational Projections Program. From 2004-2007, he oversaw the BLS Producer Price Index program and from 2007-2014 he served as Associate Commissioner in the Office of Prices and Living Conditions (OPLC), which publishes consumer, producer and import/export price indexes as well as estimates of consumption expenditures. In August 2015, Mike became the Associate Commissioner for Employment and Unemployment Programs at BLS, which includes the publication of the national civilian unemployment rate and the monthly payroll jobs numbers. This office produces a wide variety of labor market indicators from 11 different survey programs including local area unemployment statistics, and payroll employment for counties, states, and regions, as well as detailed information on occupational employment at the national, state and MSA level of detail.



Dr. Krishna Rao is the Director of Economic Product & Research at Zillow, where he and his team focus on building predictive models to analyze market conditions and forecast future trends and prices. Krishna is also a member of the U.S. Census Bureau's Scientific Advisory Committee. He joined Zillow in the summer of 2013, after finishing a Ph.D. in Economics at Stanford University focused on Macroeconomics and Finance. Prior to his Ph.D. he graduated from Columbia University with a B.A. in Economics and Math and worked at the Federal Reserve Bank of New York where he helped develop structural macroeconomic forecasting models to guide monetary policy.

Dr. Tara Sinclair is an associate professor of economics and international affairs at the George Washington University in Washington, DC. She also served as chief economist for global job search site Indeed from September 2014-September 2016 and continues on as a senior fellow with the Hiring Lab, Indeed's proprietary research arm focused on examining emerging employment trends. Professor Sinclair is also co-director of the George Washington University Research Program on Forecasting and serves on the governing board of the Federal Forecasters Consortium. Her research focuses on producing and evaluating measures and forecasts of labor market and macroeconomic activity.

Afternoon Concurrent Sessions

1:00 PM – 2:30 PM **Concurrent Sessions I**

Employment and Growth ..... Room 1

Forecasting Turning Points, Recessions and Interest Rates ..... Room 2

Big Data and Forecasting: The Good, The Bad, and The Ugly ..... Room 3

Machine Learning and Neural Network Forecasting ..... Room 7

Topics in Forecasting ..... Room 8

2:30 PM – 2:45 PM **Afternoon Break**

2:45 PM – 4:15 PM **Concurrent Sessions II**

Fertility, Human Capital Accumulation and Migration ..... Room 1

Forecasting Agricultural and Energy Commodities ..... Room 2

Forecasts Using Naïve Methods and Unorthodox Techniques ..... Room 3

Accident, Mortality, and Public Health Forecasting ..... Room 7

Topics in Forecasting ..... Room 8

Concurrent Sessions I

1:00 PM – 2:30 PM.....Room 1

"Employment and Growth"
Chair: Farhad Niami

$15 Minimum Wage in the District of Columbia: A General Equilibrium Analysis of the Economic Impact

Fahad Fahimullah, Yi Geng, Daniel Muhammad, Jeffrey Wilkins (Office of Revenue Analysis, District of Columbia Government) and Bradley Hardy (American University)

This study assesses the economic and fiscal impacts of increasing the District of Columbia minimum wage to $15.00 an hour. Our study utilizes a general equilibrium model. We estimate over 60,000 District residents will be impacted by this policy: many will see an average increase of about 20% in their wage income but about 3.4% of District resident workers are estimated to experience job loss. We also find that the city's affected EITC recipients will lose $16.4 million in federal and local EITC payments while gaining $56.6 million in additional wages by way of the $15 minimum wage.

Using General Retail Sales Tax Data to Analyze the District of Columbia's General Retail Sector

Matthew Crank (Office of Revenue Analysis, District of Columbia Government)

General retail commercial activity plays an important role in the economy of the District of Columbia. Being such a major source of tax revenue and a bellwether of the city's retail activity, this analysis will examine a few of the underlying dynamics of the taxable general retail sector in recent years as viewed from annual general retail sales tax data for years 2001 to 2015. This analysis finds that when the city's top 50 general retailers are categorized into two very broad sectors of consumer goods and services and business goods and services, the consumer goods and services sector has been the faster growing sector since 2010, while business goods and services sector generally has been the larger, more resilient sector since 2007.

A regularization approach to the dynamic panel data model estimation with application to economic growth

Marine Carrasco (University of Montreal, CIREQ) and Ada Nayihouba (World Bank)

In a dynamic panel data model, the number of moment conditions may be very large even if the time dimension is moderately large. Even though the use of many moment conditions improves the asymptotic efficiency, the inclusion of an excessive number of moment conditions increases the bias in finite samples. This paper proposes a regularization approach to the estimation of such models using three regularization schemes based on three different ways of inverting the

covariance matrix of the instruments. Under double asymptotic, we show that our regularized estimators are consistent and asymptotically normal. These regularization schemes involve a regularization or smoothing parameter so that we derive a data driven selection of this regularization parameter based on an approximation of the Mean Square Error and show its optimality. The simulations confirm that regularization improves the properties of the usual GMM estimator. As empirical application, we investigate the effect of financial development on economic growth. Regularization corrects the bias of the usual GMM estimator which seems to underestimate the financial development - economic growth effect.

Analysis of Effectiveness of DC Qualified High Technology Companies (QHTC) Credit

Yi Geng (Office of Revenue Analysis, District of Columbia Government)

This paper focused on the effectiveness of the District of Columbia's Qualified High Technology Company (QHTC) credit. The QHTC Credit is the District's primary tax credit programs for economic development, and is one of the most attractive incentive packages for high-tech businesses in the country. The District spent more than $150 million in terms of foregone corporate franchise tax revenue from 2001 to 2014 for QHTC credits. It is only natural to ask if such expenditures were well spent. Our findings are both discouraging and encouraging: 1) The District's tax law regarding the QHTC credit does not stipulate that a company must continue to do business in the District after the credit has been allowed. A significant number of companies certified as QHTC in one year ceased doing business in the District in the following years in our tracking period; 2) On the other hand, for those certified QHTC companies that stayed in DC and continued to do business in the District, their DC payrolls grew much faster than their nationwide payrolls, while payroll growth for comparable non-QHTC companies was slower than the nationwide payroll growth. Our regression analysis using panel data showed that the QHTC credit has a significant impact on payroll growth for these QHTC companies staying in DC.

1:00 PM – 2:30 PM.....Room 2

"Forecasting Turning Points, Recessions and Interest Rates."
Chair: Arup Malik

Predicting U.S. Business Cycle Turning Points Using Real-Time Diffusion Indexes Based on a Large Data Set

Yongchen Zhao (Towson University) and Herman Stekler (George Washington University)

This paper considers the issue of predicting cyclical turning points using real-time diffusion indexes constructed using a large data set from March 2005 to September 2014. We construct diffusion indexes at the monthly frequency, compare several smoothing and signal extraction methods, and evaluate predictions based on the indexes. Our finding suggests that diffusion indexes are still effective tools in predicting turning points. Using diffusion indexes, along with good judgment, one would have successfully predicted or at least identified the 2008 recession in real time.

How Did Forecasters Respond to the American Growth Slowdown Since the Mid-2000s?

Gabriel Mathy and Daniel Kirwin (American University)

Byrne et al. (2016) found that worldwide growth slowed down in the mid-2000s. This paper both confirms this result for the United States and looks at how forecasters responded to this slowdown in GDP growth. GDP is unambiguously and consistently below its forecasted level and so forecasts errors are persistently positive, consistent with a growth slowdown that is not forecasted in advance. In response to this slowdown, IMF and CBO forecasters adjusted their forecasts downwards while the Survey of Professional Forecasters made overoptimistic forecasts. We discuss the recent recession and its potential contribution to the current secular stagnation.

Did Treasury debt markets anticipate the secular decline in long-term interest rates?

Edward Gamber (Congressional Budget Office)

Professional forecasters consistently missed the decline in global long-term real and nominal interest rates over the past three decades, producing sizable over-predictions. This paper looks at whether bond-market participants did a better job (compared to professional forecasters) anticipating the decline in long-term rates. I compare the accuracy of forecasts produced by models based on the yield curve with forecasts from the Blue Chip consensus, and the Survey of Professional Forecasters. My preliminary results indicate that the yield curve models do provide information that would have improved the accuracy of private sector forecasts of long-term interest rates.

1:00 PM – 2:30 PM.....Room 3

Big Data and Forecasting: The Good, The Bad, and The Ugly
Chair: Christopher Dick

Big Data and Forecasting: The Good, The Bad, and The Ugly

Neil Ericsson (Federal Reserve Board)

Big data pervades our day-to-day lives, from Google searches and Amazon recommendations to car-loan approvals and Twitter feeds. Big data opens far-reaching opportunities but also presents serious pitfalls. This presentation examines some current and potential uses and misuses of big data in forecasting, focusing on a wide range of analyses that span economics, finance, health, the natural sciences, social media, and climate change.

Predictive Power Metrics of Predictors in Forecast Models

Ken Su (Internal Revenue Service)

The forecasting process can sometimes begin with hundreds to thousands of variables, and requires removing variables that have small or no contribution to the model while keeping a few with the most predictive power and information content. Predictive power metrics evaluate the level of association between dependent variable and the predictors. The Pearson Chi-square statistic, the information value, GINI variance, the odds ratio, likelihood ratio statistic, entropy variance, and others are all used to measure the predictive power in forecasting analysis. This paper will summarize various predictive power metrics and discuss how to use them when building forecast models.

Robust Forecasting by Regularization

Dobrislav Dobrev (Federal Reserve Board of Governors) and Ernst Schaumburg (Federal Reserve Bank of New York)

The prediction of multivariate outcomes in a linear regression setting with a large number of potential regressors is a common problem in macroeconomic and financial forecasting. We exploit that the frequently encountered problem of nearly collinear regressors can be addressed using standard shrinkage type estimation. Furthermore, when the outcomes are high-dimensional correlated random variables, univariate forecasting is often sub-optimal and can be improved upon by shrinkage based on a canonical correlation analysis. In this paper, we consider a family of models for multivariate prediction that employ both types of shrinkage to identify a parsimonious set of common forecasting factors with the ability to enforce factor interpretability via variable grouping constraints implied by economic theory. As an important special case, our approach generalizes principal component regression by applying reduced rank rather than linear regression to the principal components of the regressors, thereby disentangling the forecasting factors driving the outcomes from the factor structure in the predictors. We illustrate its promising performance in applications to several standard forecasting problems in macroeconomics and finance relative to existing approaches. In particular, we show that a single factor model can almost double the predictability of one-month bond excess returns across a wide maturity range by using a set of predictors combining the yield slopes of Cochrane and Piazzesi (2005) and the maturity related cycles of Cieslak and Povala (2011).

The Good, the Bad, and the Ugly… signals of currency crises: Does signal approach work in ex-ante forecasting of currency crises?

Olga Bespalova (George Washington University)

This paper contributes to the literature on the design and evaluation of the Early Warning System (EWS) of currency crisis episodes. It uses monthly data from 40 countries over a span of 45 years (1970-1945). First, I suggest a novel way to evaluate the predictive value of the existing EWSs in terms of their classifying ability and probability of detection of the crisis episodes. This new method is based on the analysis of the Receiver Operating Characteristic (ROC) curves. I use a training sample (1970-1995) to construct and assess properties of the ROC curves for each early warning indicator. At this stage I determine a list of indicators which take on significantly different values in two regimes (crisis vs. tranquility), and therefore are able to classify between the two regimes. At the second stage, I apply indicators identified earlier to a test sample (1996-2014) to conduct an ex-post forecasting of currency crisis episodes as events. The rare event nature of a crisis episode calls for a modified ROC curve. It allows to analyze the relationship between the probability of the correctly predicted crisis given the signal was issued and the probabilities that the good signal or a false alarm was sent given the crisis occurred at the alternative thresholds used in the forecasting rules. Finally, I explore the ways to improve forecasting accuracy combining information from different indicators.

1:00 PM – 2:30 PM.....Room 7

Machine Learning and Neural Network Forecasting
Chair: Tara Sinclair

Big Data Machine Learning versus Statistical Modeling: An Application to U.S. Passenger Route Choice Forecast

Chia-Mei Liu (Federal Aviation Administration) and Peng Wei (Iowa State University)

Airline passenger route choice forecast modeling has not been a widely explored area in the airline forecasting community even though it is studied quite often in the airline empirical papers. This paper takes the initiative to build a model to forecast passenger choice between direct and connecting flights. Individual itineraries from 2000 to 2015 are aggregated to the airport-pair level to form our target variable, the percent of passengers flying direct. We compare forecast performance between statistical modeling and machine learning. Our preliminary findings show great promise with machine leaning techniques.

Semiparametric panel data models using neural networks

Andrew Crane-Droesch (U.S. Department of Agriculture)

This paper presents an estimator for semiparametric models that uses a feed-forward neural network to fit the nonparametric component. Unlike many methodologies from the machine learning literature, this approach is suitable for longitudinal/panel data. Parametric estimates are unbiased, while associated confidence intervals have near-nominal coverage rates. Simulations demonstrate efficiency, unbiasedness, and coverage rates. An application section predicts county-level corn yield using daily weather data from the period 1981-2015, along with parametric time trends representing technological change. The method is shown to out-perform linear methods such as OLS/ridge/lasso, as well as random forest.

Predicting Industry Output with Statistical Learning Methods

Peter Meyer and Wendy Martinez (Bureau of Labor Statistics)

The Bureau of Labor Statistics uses predicted levels of industry output to release preliminary industry productivity for most manufacturing industries. In this work we estimate the nominal dollar value of annual industry production for 86 manufacturing industries using data on industry prices, imports, exports, employment, wages, and preliminary output measures available within three months of the end of the reference year. One challenge is that the predictors are colinear. We apply prediction methodologies, including ridge regression, LASSO, and ElasticNet. We test the performance of these methods by year-wise cross-validation of predictions from 2007-2015.

Forecasting Government Collections of Delinquent Debt

Mark Hutson (Summit Consulting on behalf of the Bureau of the Fiscal Service)

Seriously delinquent government debt encompasses a diverse portfolio of loans, fees, fines, and overpayments, and the government employs several unique and centralized tools to collect. We find that, despite coming from heterogeneous backgrounds and having numerous idiosyncratic factors, we can forecast successfully both the monthly collections and the expected delinquency rate for outstanding debts. Using a combination of data dynamics, machine-learning algorithms, and convergent recursive estimation, we identify several relevant macroeconomic factors to predictive collections of seriously delinquent government debts despite the presence of seasonal unit roots, structural breaks, and the great recession.

1:00 PM – 2:30 PM.....Room 8

Topics in Forecasting
Chair: Eric Jensen

Federal Payment Levy Program: Forecasting Payments Collected to Manage the Budget Necessary for Receipts

John Iuranich (Internal Revenue Service)

The Federal Payment Levy Program is an automated program developed, in part, as an efficient systemic means for the IRS to collect delinquent taxes from those who receive payments from the Federal government. Each year, the IRS Automated Programs Group estimates their budget based on the forecast number of federal levy payments. Historically, payments have been forecast by manually reviewing patterns and estimating changes. To improve the forecasts, we developed equations using historical data and autoregressive modeling to control for policy changes and known variations. An Excel workbook uses these equations to update forecasts as new data are added.

Harnessing Archived Data and Tableau to Create a Farm Income and Wealth Statistics Forecast Evaluation Tool

Kevin Patrick (U.S. Department of Agriculture)

For decades, The Economic Research Service, USDA has released forecasts of the U.S. farm sector performance and position in a data product called Farm Income and Wealth Statistics. In this presentation, I will give an overview of the new data archive system currently in place for this data product. I will also walk-through a new visualization tool to evaluate forecast accuracy using the archived data and Tableau business analytics software. Understanding past forecasts and forecast accuracy may give enhanced perspective on current forecasts and also guide the focus of research to improve future forecasts.

Valuing Unpaid Tax Assessments – Estimating Long Run Collectability Using an Econometric Approach

Alex Turk, Dan Howar, and Maryamm Muzikir (Internal Revenue Service)

Like many organizations, the IRS reports on its financial statements the dollar amount it is likely to collect from the inventory of unpaid tax assessments. In this paper we develop an econometric approach to forecast collectability. A two-step modeling approach is used in order to statistically control for cases where all potential payments are not observed. These controls allow us to back out the impact of only partially observing payment streams on some assets, allowing a “full statute” payment/recovery estimate. This model-based approach provides forecasts of collection potential over the life of the statute and allows for continuous or “real time” scoring of the entire inventory of unpaid tax assessments.

Cloud Based Time Series Analysis and Forecasting

Tammy Jackson, Michael Leonard, Ed Blair, and Alex Chien, (SAS Institute Inc.)

Many organizations need to process large numbers of time series for analysis, decomposition, forecasting, monitoring, and data mining. The TSMODEL procedure provides a resilient, distributed, optimized generic time series analysis scripting environment for cloud computing. It provides automatic forecast model generation, automatic variable and event selection, and automatic model selection. It provides advanced support for time series analysis (time domain and frequency domain), time series decomposition, time series modeling, signal analysis and anomaly detection (for IoT), and temporal data mining. This paper describes the scripting language that supports cloud based time series analysis. Examples show flexibility in time series analysis, the ability to process large time series, the ability to process large numbers of time series, and the usage of parallel processing to improve computational speed.

Concurrent Sessions II

2:45 PM – 4:15 PM.....Room 1

Fertility, Human Capital Accumulation and Migration
Chair: Quentin Wodon

Impact of Child Marriage on Total Fertility: A Study for 15 Countries

Adenike Onagoruwa and Quentin Wodon (World Bank)

Child marriage has significant negative impacts, not only for girls, but also for a range of development outcomes. This study aimed to assess, in a more detailed way than done so far, the magnitude of the relationship between child marriage and total fertility in multiple countries representing diverse settings. We used data from the most recent Demographic and Health Surveys in the fifteen countries of interest. Analysis was restricted to a subsample of women aged 35-49 years in order to capture completed fertility. Poisson regression was conducted to estimate the impact of each additional year of early marriage on the total number of births women have, controlling for selected sociodemographic characteristics. Counterfactual analyses were carried out to estimate the reduction in the number of children that women will have over their lifetime in the absence of child marriage. Controlling for socio-economic and other characteristics, girls who marry as children have more children over their lifetime than women marrying after the age of 18. Nationally, across 15 countries, the impact of child marriage on total fertility ranges from 0.25 to 1.1 children per women depending on the country. The simulated change in total fertility that would result from ending child marriage tends to be higher in countries that have a higher incidence of child marriage.

What is the Contribution of Parental Transfers, Grants, Scholarships and Loans on Student's Employment and Hours Studied?

Ali Yedan (World Bank)

This paper investigates whether financial supports, in particular parental transfers, grants, scholarships and loans, really affect the hours studied and worked during the academic year for college students. Using panel data from the U.S National Longitudinal Survey of Youth (NLSY97), we estimate a dynamic model of the hours worked and the hours studied. We find that the financial supports have different effects on hours spent at work and study. The parental transfers led to a decrease in the hours spent working among 4-year college students. Grants and scholarships had no significant effect on the hours spent studying, and only really affect working among the 4-year college male students. Loans led to an increase in working participation in all sub-groups except in the 4-year college male students group. The parental transfers and loans also led to an increase in the hours studied among the 4-year college female students.

Neighborhood Migration within the District of Columbia

Charlotte Otabor (Office of Revenue Analysis, District of Columbia Government)

Migration is a rational decision made by householders for economic or non-economic reasons either for job opportunities, to increase income or for amenities. While most research on migration have focused on households moving in and out of the District, limited research is available on within District migration at the neighborhood level. Using the gravity model, this paper investigates the role of local amenities on the migration flows within Washington D.C between 2005 and 2011. The analysis uses data drawn from three main sources—the District of Columbia individual income and real property tax rolls, NeighborhoodInfoDC, and the American Community Survey (ACS). The dataset was divided demographically and into 6 sub- groups to analyze year by year movements within the District of Columbia. The sub-groups by years are 2005-2006, 2006-2007, 2007-2008, 2008-2009, 2009-2010, and 2010-2011. This study found that people generally move to neighborhoods with less population, less rent prices, less violent crime rates, less federal adjusted gross income, more grocery stores and public schools.

Evaluation of an Argumentative Writing Program for High School Students in the District of Columbia

Quentin Wodon (World Bank) and Edward Comstock (American University)

During the 2015-16 school year, One World Education, a nonprofit based in the District of Columbia (DC), worked with DC Public Schools (DCPS) as a partner for the Cornerstone initiative. Cornerstones are high-quality, in-depth core curricular experiences that students engage in through DCPS units of study. Cornerstones aim to provide rigorous content to students, improved professional development for teachers, and continuity and consistency across grades and subjects. Some 5,200 students in 15 DC Public Schools in grades 10 and 12 participated in the One World Education argumentative writing program, which is referred to in DCPS as One World Cornerstone. This paper provides results from an independent evaluation of the One World Cornerstone. The evaluation suggests that the program led to a positive and statistically significant improvement in the ability of students to write argumentative essays. The gains were larger for students who had weaker writing skills before the start of the program. The value of the program appears to be confirmed by perceptions data from teachers and students who participated in the program.

2:45 PM – 4:15 PM.....Room 2

Forecasting Agricultural and Energy Commodities
Chair: Neil Ericsson

Some Alternative Estimates of Oil Elasticities

Melissa Lynes (U.S. Energy Information Administration)

Studies on elasticities of oil demand vary greatly by regional focus and aggregation level and time horizon. Due to varying scopes of previous research, it can be difficult to know if changes in oil demand are different across countries. This study examines the short- and long-run price and income elasticities of oil demand. A Bayesian Vector Error Correction Model (BVECM) is used to determine the elasticities for three levels of aggregation – world-wide, OECD and non-OECD, and regional. The varying degrees of aggregation will help determine if countries react similarly in the long run to changes in oil price and income.

Projecting Long-Term World Oil Prices using a Structural Price Model

Terry Yen (U.S. Energy Information Administration)

Long-term projections of oil prices enable federal and state governments, industry decision makers, and other planners in government, the private sector, and the general public to make long-term assessments of energy market dynamics. The world oil price (WOP) model is a structural model used by the U.S. Energy Information Administration (EIA) to help prepare its 30-40 year assessments of international energy markets. The WOP takes analyst assumptions for both supply and demand by country/region and projects the real oil prices. The model was developed in EViews and solved as a system of nonlinear equations.

Changing Dynamics of Volatility Spillovers in Agricultural and Energy Commodities

Irene Xiarchos and Wesley Burnett (U.S. Department of Agriculture)

This study uses a spillover index to examine the changing interrelations among corn and energy prices from 1997 to 2014. This index is based on the forecast error variance decomposition of a vector autoregressive model, allowing for endogenous volatility determinants like fundamentals and speculation. Structural break tests are performed and the sample split into two periods for comparing spillovers before and after 2006. Volatility spillovers between corn, crude oil, and ethanol prices increased substantially, yet each commodity's past behavior explained the largest portion of its own variability. As sensitivity analysis the rolling-sample spillover index corresponds to historical market events.

Optimally Reconciling Hierarchical Agricultural Forecasts

Ryan Kuhns (Farmer Mac), Annemarie Kuhns and David Levin (U.S. Department of Agriculture)

Hierarchical time series are prevalent in agriculture and many of the time-series forecast by the USDA Economic Research Service including food price inflation, farm income, farm sector debt, and farmland values. This research considers the impact of different aggregation methods, including optimal hierarchical reconciliation, on several agricultural time-series. To our

knowledge, no research has considered the potential benefits of both forecast averaging and hierarchical reconciliation. To bridge this gap, we compare forecasts accuracy of averaging forecasts for each series in a hierarchy with several hierarchical aggregation methods. The results will provide guidance to forecast practitioners on how to best allocate their model development efforts.

2:45 PM – 4:15 PM.....Room 3

Forecasts Using Naïve Methods and Unorthodox Techniques
Chair: Jeffrey Busse

What Do We Lose When We Average Expectations?

Constantin Burgi (George Washington University)

I use the Bloomberg Survey of forecasts to assess if evaluating the distribution of expectations will lead to important additional insights over the evaluation of the simple average. I first introduce new approaches that allow me to assess the forecast accuracy and the information rigidity at the individual level despite a large share of missing data. Applying these new approaches, I find that taking into account the distribution can significantly improve the predictive power of the survey. My findings suggest that we should look at individual expectations whenever possible as important insights are lost by just looking at aggregate expectations.

Forecasting the Term Structure of Interest Rates Using Macroeconomic Factors

Weiqi Xiong (Rutgers University)

In this paper, an extensive set of forecast experiments is conducted to provide further evidence on the effect of adding macro-variables on improving out-of-sample forecast performance of interest rate models in multiple sub-samples and in periods of economic recessions. In particular, we assess the forecast accuracy of a number of models commonly used for monthly prediction of the term structure of interest rates. These models include: (i) diffusion index type models developed and discussed in Stock and Watson (2002b); Bai and Ng (2006); Ayi Armah and Swanson (2010); (ii) DNS type models of the variety recently examined by Diebold and Li (2006), and various benchmark models, including VAR and AR models. Common macroeconomic factors are extracted from 103 U.S macro-variables (McCracken and Ng, 2016). It is found that, adding macro factors extracted from a large macroeconomic data set could improve the out-of-sample forecast accuracy in 1992-2008 for the whole yield curve, regardless of the sample period in recession or in normal time. However, in the post crisis sample from 2007:Dec - 2009:Jun, no \data-rich" prediction models can beat an AR(1) benchmark.

Predicting Recessions Using Sales at Restaurants

Timothy Park, Howard Elitzak, and Abigail Okrent (U.S. Department of Agriculture)

Food industry analysts have highlighted the emergence of a restaurant recession, pointing to weak growth in same-store restaurant sales over the past three years. Restaurants are also mentioned as a leading indicator for recessions, since sales are linked to consumer spending. This is most apparent with sales at full-service restaurants declining at least a year before the most recent economic downturn. Our research will assess the link between recessions (both in timing and severity) and limited- and full-service restaurant sales in the Food Expenditure Series data gathered by the Economic Research Service. The annual series provides estimates of sales of food eaten away from home and food eaten at home from 1929 through 2014. The

model will also examine the role of changes in food prices, consumer sentiments, and macroeconomic factors on limited- and full-service restaurant sales.

Public Non Tax Revenue in the District of Columbia (D.C.): Classification, Trends and what they tell us about the regional economic outlook.

Seble Tibebu (Office of Revenue Analysis, District of Columbia Government)

This report will discuss the revenue trends of the top five non-tax revenue sources in the D.C., the challenges of forecasting these revenue, Key demographic and gentrification aspects contributing to increasing/decreasing revenue trends, and a regional comparison and data about non-tax revenues in the District of Columbia and the neighboring jurisdictions. During fiscal year (FY) 2016, non-tax revenue contributed 13.5% of the District government's general fund revenue ($1.1 billion of the $8.1 billion general fund revenue). Non-tax revenue have continued to support the city's operating budget allowing city leaders the flexibility to allocate these funds to address emerging priorities in addition to helping close budget gaps. Non-tax revenue refers to the income of a government which comes from fines, fees, and other charges imposed by its administration. State and city governments classify these revenues in different ways. The D.C. government classifies this revenue group as general-purpose non-tax revenue, which flows into the general fund without restrictions on its use, and Special-Purpose non-tax revenue, which reflects "funds used to account for proceeds from specific revenue sources that are legally restricted to expenditures for specified purposes. Traffic fine related revenues represented 60% of the top five non-tax revenue sources in the District of Columbia during the past five fiscal years, i.e. FY2012-FY2016. The District is also a leader in the region in the use of Automated Traffic Enforcement (ATE) camera units as part of the city's traffic management program. Amongst DC's non-tax revenue sources contributing less than 5% of the total revenue generated in this category, the trend of revenues from pet licenses, driver's license and new building permits shows the changes in city's demographics. For this study, we will be utilizing a mix of quantitative (trend and econometric forecasting) and qualitative forecasting methods. The study will also discuss how some of the individual forecasts for these non-tax revenue sources are impacted by the laws, policies, mandates and implementation practices of government agencies.

2:45 PM – 4:15 PM.....Room 7

Accident, Mortality, and Public Health Forecasting
Chair: Sand Colby

Modeling Pathways of Psychosocial Depression, Anxiety, and Post-Traumatic Stress Following the Chornobyl Nuclear Accident of 1986

Robert Yaffee (New York University)

Background: In the 25 year review of the effects of the Chornobyl nuclear disaster, the mental health impact was found to be the largest public health consequence of the accident for Ukraine.

Objectives: Our objective was to examine the psychosocial impact of the Chornobyl nuclear accident on the general population. We focus on psychosocial anxiety, depression, and post-traumatic stress reported by respondents over three decades using techniques designed to facilitate recall of events.

Methods: We conducted a survey of 702 residents of Kiev and Zhitomyr oblasts. By attaching computer-generated random numbers to telephone area codes, we obtained a representative telephone sample of the Ukrainian residents of those oblasts. Interviews were conducted with willing respondents. Time series of salient psychosocial symptoms were constructed for analysis.

Analysis: We examine pathways of psychosocial depression, anxiety, and PTSD among Ukrainian males and females, using GETS-AutoMetrics variable selection and dynamic simultaneous equation models to analyze symptoms, their relation to perceived radiation exposure, pain and discomfort, addictive habits, medical utilization, and impacts on the lives of respondents.

Conclusion: In modeling nuclear disaster impact with dynamic simultaneous equation models, we demonstrate circumvention of confounding crises, generated by Russian gas cut-offs to Ukraine in 2006 and 2009, by early estimation termination and scenario forecasting for medical emergency analysis. We thank the National Science Foundation for funding HSD Grant 082 6983.

Forecasting for Public Health: The Ebola Epidemic in West Africa

Keith Ord (Georgetown University) and Arthur Getis (San Diego State University)

An epidemic puts pressure on medical personnel and supplies, and on hospital space. The situation is particularly acute when the virus was previously unknown, as with Ebola. The process of spatial spread is examined to suggest a modeling framework. Two models for forecasting the progress of this epidemic are then developed using real-time data from Sierra Leone, Guinea and Liberia. The ultimate objective is to provide timely inputs into the resource deployment process.

Innovations in the Census Bureau's National Population Projections Methodology with a Focus on Mortality Research

Lauren Medina and David Armstrong (U.S. Census Bureau)

In 2017, the U.S. Census Bureau will release a new series of National Population Projections. This series will include projections of the U.S. population from 2017 to 2060 by age, sex, race, Hispanic origin, and nativity. In this paper, we outline the Census Bureau's National Population Projections methodology, discuss new features for the upcoming set of projections, and provide results from our initial research on mortality. After discussing the methodology of the National Population Projections, including past improvements, we provide an overview of our research on the inclusion of nativity in the development of our mortality assumptions. Finally, we show results from our initial analysis on producing mortality projections by nativity.

Accident Rate Projections: A Comparison of Traditional Statistics and Machine Learning

Gregory Won and Dr. Firdu Bati (Federal Aviation Administration)

Statistical accident models are useful in several aviation safety contexts; including, identification of hazards, assessment and forecasting of risks, and evaluation of hazard controls. In this paper we compare two board modeling approaches. In general, the traditional approach posits a super population model that characterizes the relationships among covariates, emphasizes the interpretability of model parameters, and favors parsimony over complex models. In contrast, the machine learning approach uses algorithmic techniques, does not require knowledge of the underlying mechanism or process that generates the data, and emphasizes performance and robustness. In supervised machine learning techniques, in particular, the emphasis is on function estimation from observations with little assumptions on the form of the estimated function (learned model). We apply each approach to the problem of predicting accident rates at non-towered airports and airports in Class D airspace. Specifically, the traditional model is a panel data count model; the data mining approach uses an ensemble learning technique (collection of base-learners). We describe the differences in the underlying theory and assumptions of each method, contrast the results, and discuss the implications for analyzing safety risk problems.

2:45 PM – 4:15 PM.....Room 8

Topics in Forecasting
Chair: William Hussar

Do All Forecast Revisions Reflect Model Updates?

Xudong Guo and Constantin Burgi (George Washington University)

This paper addresses the phenomenon that the changes of forecasters' quarterly and annual predictions do not reconcile 100% when facing new information. Quite often, forecasters update their annual prediction but not their quarterly ones or vice versa. We define this as mechanical change. We show that these mechanical changes make up around 14% of forecast revisions for the output growth rate in the Survey of Professional Forecasters. Nearly 75% of forecasters have made at least one mechanical revisions. We also evaluate the effect of mechanical changes on the evaluation of the forecasts. We find that mechanical changes can have significant effects on the evaluation of individual forecasts but no significant effects on mean forecasts.

Using Simulations with Disaggregate Data to Provide Confidence Intervals for National Forecasts: The USDA Domestic Baseline

David Boussios, Ralph Seeley and Flavius Badau (U.S. Department of Agriculture)

USDA baseline projections provide long-run country and commodity forecasts for the agricultural industry. Beyond the relevancy for market participants, the projections are used within the Federal Government to help project fiscal expenditures that are linked to world prices and local production. The linkage of macro- and micro-level outcomes presents challenges for forecasting, because it requires data on numerous scales (including large quantities of data at local levels). We developed new ways to simulate large numbers of correlated micro-level outcomes using a copula approach, which is aggregated up to forecast domestic production and government expenditures, as well as their confidence intervals.

On the Performance of US Fiscal Forecasts: Government vs. Private Information

Zidong An (American University), Joao Jalles and Prakash Loungani (International Monetary Fund)

This paper assesses the quality and performance of US forecasts of the budget balance-to-GDP ratio. Batchelor (2000) finds that the official fiscal forecasts have generally been less accurate and less informative than the private sector predictions. We extend his work and compare the fiscal forecast performance of the leading US agency—the Congressional Budget Office (CBO)—with the contemporaneous Consensus Forecasts between 1989 and 2016. When testing for the significance of differences in mean errors between official and private sector fiscal forecasts, we confirm that the two sets of forecasts are statistically different from one another. That said, one cannot say that CBO encompasses Consensus or that Consensus encompasses CBO; the informational advantages CBO might have do not appear to be sufficient to outweigh the reduction in error variance that can be achieved by pooling many individual private forecasts.

Consensus Forecasts seems to contain some information which is not contained in the CBO, but CBO forecasts contain no information which is not already present in Consensus, so adds no value to the combined forecast. All in all, Consensus fiscal forecasts seem to show a small but consistent superiority over CBO forecasts. One can argue that Consensus fiscal forecasts can be regarded as the "best-practice", particularly since private sector forecasters publish predictions more frequently than government agencies (often in response to important pieces of news) while the agencies are constrained to publish infrequently on a fixed timetable. Even in cases where their accuracy is similar to that of the CBO, the Consensus forecasts tend to be more timely. Nevertheless, we should point to the fact that most forecasts are joint products, and alongside its forecasts the CBO provides commentary and analysis that may add value to the work of private sector economists.

Notes

Notes

Notes