

Macroeconomic policy analyses with big data

- using new data sources to understand current issues

Danmarks Nationalbank workshop, Copenhagen, 10 October 2019



Attendance is by invitation only.

PROGRAMME

9.00 – 9.15: Registration and coffee

9.15 – 9.30: Opening Remarks: Signe Krogstrup, Danmarks Nationalbank

Morning session 1: Business cycles

Chair: Martin Nygaard Jørgensen, Danmarks Nationalbank

9.30 – 9.50: **Using job vacancies to understand the effects of labour market mismatch on UK output and productivity**

Arthur Turrell (Bank of England), Bradley Speigner (Bank of England), Jyldyz Djumalieva (Nesta), David Copple (Bank of England) and James Thurgood (Bank of England)

9.50 – 10.10: **Business cycle narratives**

Vegard H. Larsen (BI Norwegian Business School, and Norges Bank) and Leif Anders Thorsrud (BI Norwegian Business School, and Norges Bank)

10.10 – 10.40: **Discussion**

10 minutes introduction by **Fane Naja Groes** (Copenhagen Business School) followed by a general discussion.

10.40 – 11.10: Coffee break

Morning session 2: Financial stability

Chair: Kim Abildgren, Danmarks Nationalbank

11.10 – 11.30: **Predicting Distresses using Deep Learning of Text Segments in Annual Reports**

Casper Hansen (University of Copenhagen), **Rastin Matin** (Danmarks Nationalbank), Christian Hansen (University of Copenhagen) and Pia Mølgaard (Danmarks Nationalbank)

11.30 – 11.50: **Making text count: economic forecasting using newspapers**

Eleni Kalamara (King's College London), **Arthur Turrell** (Bank of England), George Kapetanios (Kings College London), Sujit Kapadia (European Central Bank) and Chris Redl (Bank of England)

11.50 – 12.20: **Discussion**

10 minutes introduction by **Andreas Bjerre-Nielsen** (University of Copenhagen) followed by a general discussion

12.20 – 13.30: Lunch

Afternoon session: Taxes and housing

Chair: Troels Kromand Danielsen, Danmarks Nationalbank

13.30 – 13.50: **The effects of tax changes on economic activity: a narrative approach to frequent anticipations**

Sandra García-Urbe (Bank of Spain)

13.50 – 14.10: **The potential of big housing data: an application to the Italian real-estate market**
Michele Loberto (Bank of Italy), Andrea Luciani (Bank of Italy) and **Marco Pangallo** (University of Oxford)

14.10 – 14.40: **Discussion**
10 minutes introduction by **Asger Lau Andersen** (University of Copenhagen) followed by a general discussion

14.40 – 15.10: Coffee break

15.10 – 16.30 **Panel discussion: Opportunities and challenges of using big data for policy analysis**

Chair: Thais Lærkholm Jensen, Danmarks Nationalbank

Big data usually refers to large-scale unstructured data and/or large structured datasets where the size alone gives rise to computational challenges. The panel discussion will address the opportunities and challenges of using big data in policy-oriented analyses and research within the areas of macroeconomics and financial stability. Topics that could be discussed might be: Where is the largest potential for the use of big data within macroeconomic analysis (nowcasting, forecasting, structural analysis, etc.) and financial stability (early warning, risk assessment, stress tests)? What do we know about the quality and reliability of big data? What skills and tools do we need to properly use the potential of big data? Are there any legal or political issues restricting the use of big data for policy analyses? What should be the role of national statistical institutes in relation to big data? What is the scope for linking big data to traditional microdata from surveys and administrative registers?

10 minutes introduction from each of the following panelists:

Niels Ploug (Statistics Denmark)

Markus Tibblin (Sveriges Riksbank)

Per Nymand-Andersen (European Central Bank)

Tomasa Rodrigo (BBVA Research)

Followed by panel discussion and a general discussion.

16.30: End of workshop

ABSTRACTS OF PAPERS

Using job vacancies to understand the effects of labour market mismatch on UK output and productivity

Arthur Turrell (Bank of England), Bradley Speigner (Bank of England), Jyldyz Djumalieva (Nesta), David Copple (Bank of England) and James Thurgood (Bank of England)

Mismatch in the labour market has been implicated as a driver of the UK's productivity 'puzzle', the phenomenon describing how the growth rate and level of UK productivity have fallen behind their respective pre-Great Financial Crisis trends. Using a new dataset of around 15 million job adverts originally posted online, we examine the extent to which eliminating occupational or regional mismatch would have boosted productivity and output growth in the UK in the post-crisis period. To show how aggregate labour market data hide important heterogeneity, we map the naturally occurring vacancy data into official occupational classifications using a novel application of text analysis. The effects of mismatch on aggregate UK productivity and output are driven by dispersion in regional or occupational productivity, tightness, and matching efficiency. We find, contrary to previous work, that unwinding occupational mismatch would have had a weak effect on growth in the post-crisis period. However, unwinding regional mismatch would have substantially boosted output and productivity relative to their realised paths, bringing them in line with their pre-crisis trends.

[Link to paper](#)

Business cycle narratives

Vegard H. Larsen (BI Norwegian Business School, and Norges Bank) and Leif Anders Thorsrud (BI Norwegian Business School, and Norges Bank)

This article quantifies the epidemiology of media narratives relevant to business cycles in the US, Japan, and Europe (euro area). We do so by first constructing daily business cycle indexes computed on the basis of the news topics the media writes about. At a broad level, the most influential news narratives are shown to be associated with general macroeconomic developments, finance, and (geo-)politics. However, a large set of narratives contributes to our index estimates across time, especially in times of expansion. In times of trouble, narratives associated with economic fluctuations become more sparse. Likewise, we show that narratives do go viral, but mostly so when growth is low. While narratives interact in complicated ways, we document that some are clearly associated with economic fundamentals. Other narratives, on the other hand, show no such relationship, and are likely better explained by classical work capturing the market's animal spirits.

[Link to paper](#)

Predicting Distresses using Deep Learning of Text Segments in Annual Reports

Casper Hansen (University of Copenhagen), Rastin Matin (Danmarks Nationalbank), Christian Hansen (University of Copenhagen) and Pia Mølgaard (Danmarks Nationalbank)

Corporate distress models typically only employ the numerical financial variables in the firms' annual reports. We develop a model that employs the unstructured textual data in the reports as well, namely the auditors' reports and managements' statements. Our model consists of a convolutional recurrent neural network which, when concatenated with the numerical financial variables, learns a descriptive representation of the text that is suited for corporate distress prediction. We find that the unstructured data provides a statistically significant enhancement of the distress prediction performance, in particular for large firms where accurate predictions are of the utmost importance. Furthermore, we find that auditors' reports are more informative than managements' statements and that a joint model including both managements' statements and auditors' reports displays no enhancement relative to a model including only auditors' reports. Our model demonstrates a direct improvement over existing state-of-the-art models.

[Link to paper](#)

Making text count: economic forecasting using newspapers

Eleni Kalamara (King's College London), Arthur Turrell (Bank of England), George Kapetani-os (Kings College London), Sujit Kapadia (European Central Bank) and Chris Redl (Bank of England)

Every second, journalists create information in the form of text. We show how best to extract the timely signal from this text and use it to forecast the future of the economy using three popular UK newspapers that span the political spectrum. We assess text both as an economic indicator and as an input into forecasts. We introduce a powerful new method of making text count in forecasts that combines counts of terms with sophisticated supervised machine learning techniques. This method improves forecasts of a range of macroeconomic variables including GDP, CPI, and unemployment, and does so more than existing methods. Across all methods, the contribution of text to forecasts is particularly strong during stressed times. While we find that simple metrics go a long way in extracting signal, supervised machine learning methods go further and are also more transferable to uses beyond those we present in this paper.

The effects of tax changes on economic activity: a narrative approach to frequent anticipations

Sandra García-Uribe (Bank of Spain)

This paper studies the effects of anticipations of tax changes in the USA through the release of tax news in the media. I construct a new measure that captures the anticipation of tax bill approvals by exploiting the content of news in the US television. Since this information typically flows faster than standard measures of GDP, I propose a mixed frequency dynamic factor model to estimate both the economic activity latent factor and the effects of anticipated tax shocks on it. I find that onemonth-ahead media anticipations of tax approvals significantly stimulate current economic activity. This stimulation comes from anticipations of tax cuts.

[Link to paper](#)

The potential of big housing data: an application to the Italian real-estate market

Michele Loberto (Bank of Italy), Andrea Luciani (Bank of Italy) and Marco Pangallo (University of Oxford)

We present a new dataset of housing sales advertisements (ads) taken from Immobiliare.it, a popular online portal for real estate services in Italy. This dataset fills a big gap in Italian housing market statistics, namely the absence of detailed physical characteristics for houses sold. The granularity of online data also makes possible timely analyses at a very detailed geographical level. We first address the main problem of the dataset, i.e. the mismatch between ads and actual housing units - agencies have incentives for posting multiple ads for the same unit. We correct this distortion by using machine learning tools and provide evidence about its quantitative relevance. We then show that the information from this dataset is consistent with existing official statistical sources. Finally, we present some unique applications for these data. For example, we provide first evidence at the Italian level that online interest in a particular area is a leading indicator of prices. Our work is a concrete example of the potential of large user-generated online databases for institutional applications.

[Link to paper](#)

BRIEF BIOS

Signe Krogstrup

Head of Economics and Monetary Policy, Danmarks Nationalbank.

Martin Nygaard Jørgensen

Head of Macroeconomic Analysis, Danmarks Nationalbank.

Arthur Turrell

Research Economist, Bank of England.

Vegard H. Larsen

Researcher/senior adviser, Norges Bank. Researcher, BI Norwegian Business School.

Fane Naja Groes

Associate Professor, Copenhagen Business School.

Kim Abildgren

Chief Advisor, Economics and Monetary Policy, Danmarks Nationalbank.

Rastin Matin

Quantitative Risk Analyst, Danmarks Nationalbank.

Andreas Bjerre-Nielsen

Assistant professor, University of Copenhagen.

Troels Kromand Danielsen

Principal Economist, Danmarks Nationalbank.

Sandra García-Urbe

Research Economist, Bank of Spain.

Marco Pangallo

Ph.D. Fellow, University of Oxford. MSc in Physics of Complex Systems, University of Turin.

Asger Lau Andersen

Associate Professor, University of Copenhagen.

Thais Lærkholm Jensen

Head of Data Analytics and Science, Danmarks Nationalbank.

Niels Ploug

Director, Statistics Denmark. Co-chair of United Nations Global Working Group on Big Data for Official Statistics.

Markus Tibblin

Chief Data Officer, Sveriges Riksbank.

Per Nymand-Andersen

Adviser to senior management, European Central Bank.

Tomasa Rodrigo

Principal Economist. Head of Big Data at BBVA Research.

LOGISTICAL INFORMATION

Venue

The workshop will take place on the fourth floor (Adam Oehlenschläger, Ludvig Holberg and Holger Drachmann) of the premises of Danmarks Nationalbank, Havnegade 5, DK-1093 Copenhagen K.

Lunch will be served in Børsen/Governors' Dining Room.

Registration for the workshop

Participation to the conference is by invitation only.

Registration and security on location

You will receive a name badge at the registration desk. Please note that you will need to provide a valid photographic I.D. (passport or national identity card) at the registration desk and ensure that the badge is visible at all time during the workshop.

Workshop participants will be picked up from the registration desk by a bank employee and escorted to the workshop area.

Please note that moving around within the bank outside the workshop area is only allowed if escorted by staff from Danmarks Nationalbank.

Chatham House Rules

The workshop is held under the Chatham House Rule. Participants are free to use the information received during the workshop, but with no identification of the individual speaker or participant without consent.

Photos

You are not allowed to take photos within the premises of Danmarks Nationalbank. A booklet with some nice photos is available at this [link](#).

One of Danmarks Nationalbank's photographers will be present at the event and will take situation photos and photos of the atmosphere at the event. If you don't want to appear on these photos, please contact the photographer during the event.

Smoking

Smoking is not allowed within the premises of Danmarks Nationalbank.

Language

English.

Dress code

Business attire.

Workshop dinner (by invitation only)

In the evening on 10 October 2019, there will be a dinner for speakers, discussants and panelists. The dinner is scheduled to begin at 18.30 and will take place at a restaurant close to Danmarks Nationalbank ([Den Lille Fede](#), Store Kongensgade 17, DK-1264 Copenhagen K).

Organiser

Kim Abildgren
Chief Advisor
Economics and Monetary Policy
Danmarks Nationalbank
kpa@nationalbanken.dk

Please note that the programme might change without notice.

GENERAL INFORMATION

Business hours

Most stores are open from 10:00 to 18:00/20:00 seven days a week. Others close later around 22:00~23:00.

Currency

1 EUR ≈ 7.46 DKK. Visa and MasterCard are commonly accepted.

Dialling codes

International country code for Denmark is +45.

Emergency calls

112 Fire, police and ambulance.

114 Police (non-emergency).

1813 Medical emergency.

Local time

Standard Time Zone: GMT +1.

Local transport

The Metro operates at 4-6 minute intervals during the day and evening hours. The Metro also runs from the airport (Terminal 3) to Copenhagen city. [Link to metro map.](#)

Taxi fares in Copenhagen include VAT and tips, and you can normally pay by credit card.

Power supply

The standard voltage in Denmark is 220 volts. Standard European two-pin plug.

Tipping

Tipping is generally not practised in Denmark and most places do not expect their customers to tip for services.

Tourist information

<https://www.visitcopenhagen.com/copenhagen-tourist>.

Visa

Please be aware that you might need a visa for staying in Denmark. Please contact your local Danish embassy or the Danish Ministry of Foreign Affairs: <http://um.dk/en/travel-and-residence/short-stay-visas/>