

An Overview of Google Trends

EE406: Contemporary Economic Issues
Semester 1/ 2021
Faculty of Economics, Thammasat University

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Hal R. Varian



Search



Hal Varian
Chief Economist at Google

Experience



Chief Economist
Google
2002 – Present · 19 yrs



Dean
UC Berkeley
1995 – 2007 · 12 yrs



Professor of Economics
University of Michigan
1977 – 1995 · 18 yrs

Education



UC Berkeley
PhD, Economics
1969 – 1973



Massachusetts Institute of Technology
SB, economics
1965 – 1969

Activities and Societies: Art Association, Crow, Science Fiction Society

Hal R. Varian



I am an emeritus professor in the [School of Information](#), the [Haas School of Business](#), and the [Department of Economics](#) at the [University of California at Berkeley](#).

- The *Journal of Public Economic Theory* has published a Special Issue: Commemorating works of James Andreoni, Theodore Bergstrom, Larry Blume, and Hal Varian ([link](#))
- The International Honor Society in Economics has published a special commemorative issue of its journal, *The American Economist*, that contains noteworthy articles from the past 50 years. My article, [How to Build an Economic Model in Your Spare Time](#) is included in this special issue.
- In April, 2015, I was named a [Distinguished Fellow](#) of the American Economics Association.
- On January 3, I delivered the [2010 Ely Lecture](#) at the American Economics Association meetings.
- I have retired from Berkeley and am now serving as Chief Economist at [Google](#).
- In 2006 I received a [Humboldt Prize](#) from the [Alexander von Humboldt Foundation](#)
- My paper "[Positions Auctions](#)" won [Paul Gerowski prize](#) for the best article published in the *International Journal of Industrial Organization* in 2006.
- Here is the [special issue](#) of the *Journal of Public Economics* that celebrates the 20th anniversary of the Bergstrom, Blume, and Varian paper on the [Private Provision of Public Goods](#).
- I recently received an honorary Ph.D. from the [University of Karlsruhe](#). I also hold an honorary Ph.D. from the [University of Oulu](#)
- Accenture says I am number 9 on their list of the [top 50 business intellectuals](#)
- [Fortune Magazine](#) says that [Information Rules](#) is one of the [75 smartest books they know](#) about strategy.
- Links to my [New York Times columns](#)
- Links to my [nonacademic articles](#)
- Link to my [academic papers](#) and [books](#)

My work

[Biography](#): of different sizes, including photos

[Courses](#): links to courses taught

[Talks](#): text and slides

[Writing](#):

- [Articles \(general\)](#): for a general audience
- [Books](#): text, trade and professional
- [Papers \(research\)](#): primarily for an academic audience

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Research papers of Hal R. Varian

These are academic papers of one sort or another. Look under [articles](#) to find material published in the popular press.

Recent papers

Non-technical papers

Intelligent Technology [[IMF Finance and Development, September 2016](#)]

This is an overview and update of some of the themes in my Ely Lecture on *Computer Mediated Transactions* available below.

Causal Inference in Social Science: an Elementary Introduction [[PNAS reprint](#)]

This is a short and very elementary introduction to causal inference in social science applications targeted to machine learners. I illustrate the techniques described with examples chosen from the economics and marketing literature. [Prepared for Sackler

Symposium on [Drawing Causal Inference from Big Data](#), National Academy of Sciences, March 2015.]

A Hands on Guide to Google Data [[Working paper](#)] [[Slides](#)]. Also need [coof.R](#)

Shows how to use Google Correlate, Google Trends, and Google Consumer Surveys for social science research.

Super Returns to Super Bowl Ads? (with Seth Stephens-Davidowitz and Michael D. Smith) [[Working paper](#)]

We use a natural experiment--the Super Bowl--to study the causal effect of advertising on demand for movies. Identification of the causal effect rests on two points: 1) Super Bowl ads are purchased before advertisers know which teams will play; 2) home cities of the teams that are playing will have proportionally more viewers than other cities. To appear in [Quantitative Marketing and Economics, 2017](#).

Beyond Big Data [[Working paper](#)]

Transcript of keynote given at NABE meeting, Sept 2014, San Francisco.

Big Data: New Tricks for Econometrics [[Working paper](#)] [[Data](#)] [[Published in JEP](#)]

A review of some tools for the manipulation and analysis of big data, along with some speculations about how they can be used in econometrics.

Predicting the Present with Bayesian Structural Time Series (co-author: Steve Scott) [[Working paper](#)] [[Slides from KDD 2013, Chicago](#)]

A Bayesian model for variable selection in a time series context. Applications use Google Trends data to improve short term forecasts of economic indicators. Now published in [Int. J. Mathematical Modeling and Numerical Optimisation](#), Vol. 5, Nos. 1/2, 2014.

Bayesian Variable Selection for Nowcasting Economic Time Series (co-author: Steve Scott) [[Working paper](#)] [[Slides](#)] Now published in NBER volume, *Economic Analysis of the Digital Economy* (2015), Avi Goldfarb, Shane M. Greenstein, and Catherine E. Tucker, editors (p. 119 - 135).

Combining Kalman filters, spike-and-slab regression and model averaging to improve short-term forecasts of time series.

Public Goods and Private Gifts [[Working paper](#)] [[Slides](#)]

Public goods can be provided by tying them to private goods. Though this is an old phenomenon, Kickstarter has given it a new life on the internet. This is a simple model of how this mechanism works.

Revealed Preference and its Applications [[Working paper](#)]

I describe some applications of revealed preference theory. Royal Economics Society session in honor of Sydney Afriat.

Predicting the Present with Google Trends (with Hyunyoung Choi) [[Working paper](#)] [[Zip file with data](#)] [[Economic Record 2012](#)]

Keynote address at the Australian Conference of Economists, July 2011.

Computer Mediated Transactions [[Paper](#)] [[Slides](#)] [[Video from AEA meetings](#)] [[Video from previous presentation](#)]

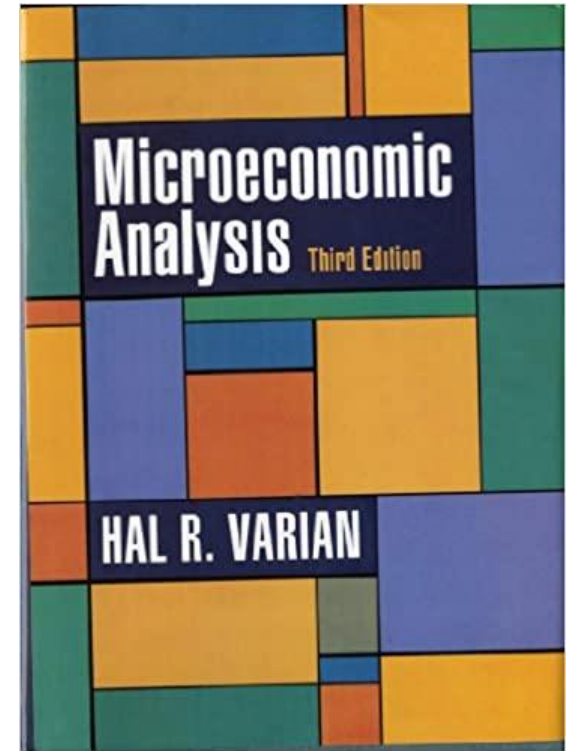
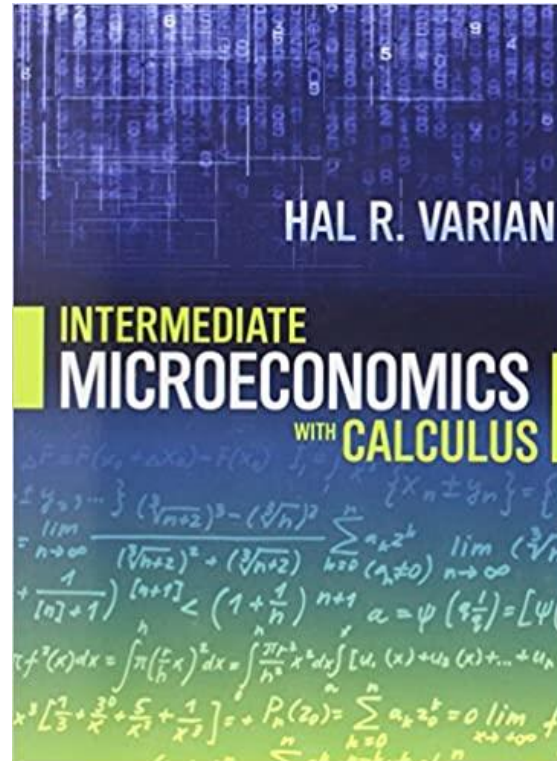
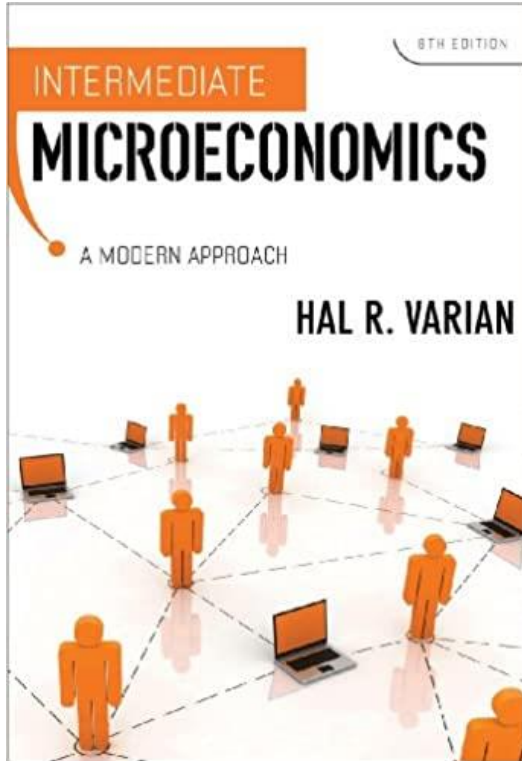
The 2010 Ely Lecture at the American Economics Association meeting, Atlanta Georgia.

Copyright Term and Orphan Works [[Working paper](#)] [[Reprint of published article](#)]

I discuss copyright term extension and its impact on the orphan works and mass digitization problems.

The Google Library Project [[PDF](#)]

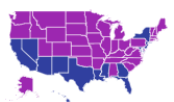


A discussion of some of the economic aspects of the Google Library Project.



Explore what the world is searching

Enter a search term or a topic

Or start with an example HIDE

<p>● Taylor Swift ● Kim Kardashian</p>  <p>Interest by subregion, Past 7 days, United States</p>	<p>● World Cup</p>  <p>Interest by region, Past 7 days, Worldwide</p>	<p>● Football ● American football</p>  <p>Interest by subregion, 2004 - present, United States</p>
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< Showing 1-3 of 6 examples >

● พัทยา
Search term

● หัวหิน
Search term

● เขาใหญ่
Search term

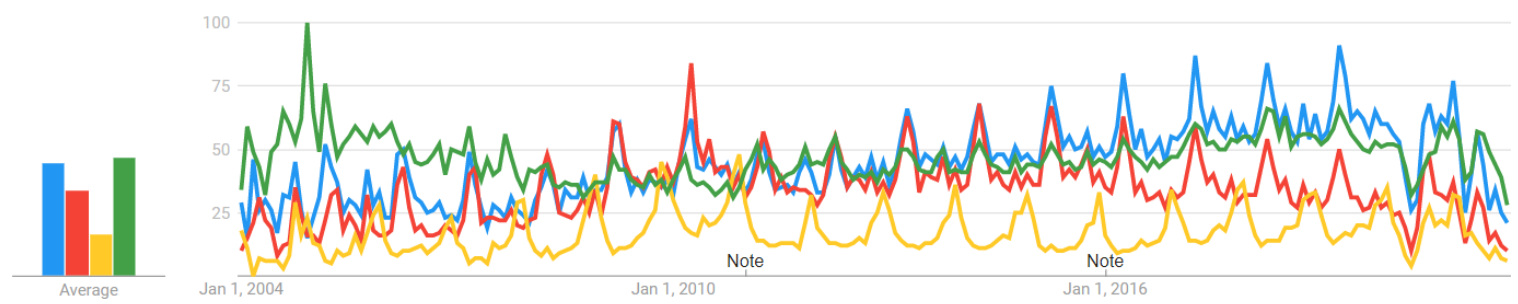
● ภูเก็ต
Search term

+

Thailand 2004 - present All categories Web Search

Interest over time

Download, Full Screen, Share icons



● **ประกันสังคม**
Search term

● **มาตรา 40**
Search term

+ Add comparison

Thailand Past 5 years All categories Web Search

Interest over time ?

Download, Full Screen, Share icons



● **หางาน**
Search term

● **เศรษฐกิจ**
Search term

+ Add comparison

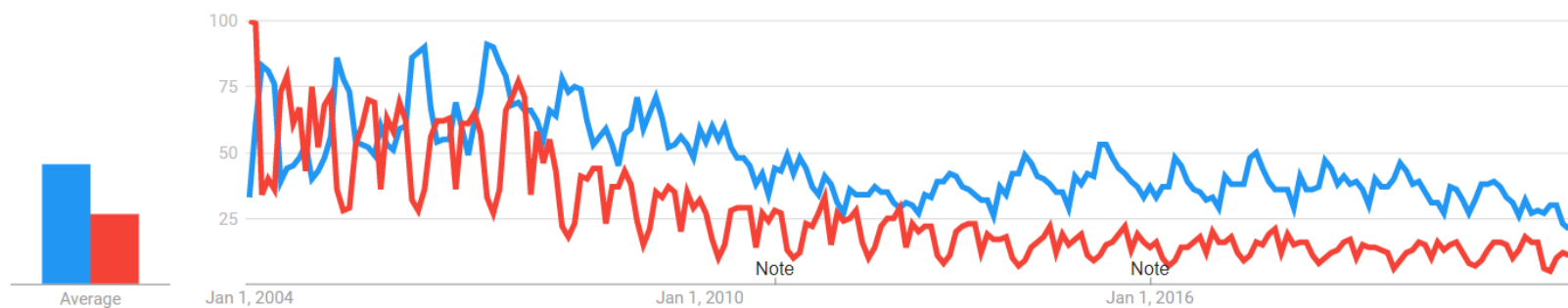
Thailand ▾

2004 - present ▾

All categories ▾

Web Search ▾

Interest over time



● เศรษฐกิจ
Search term

● ภาษี
Search term

+ Add comparison

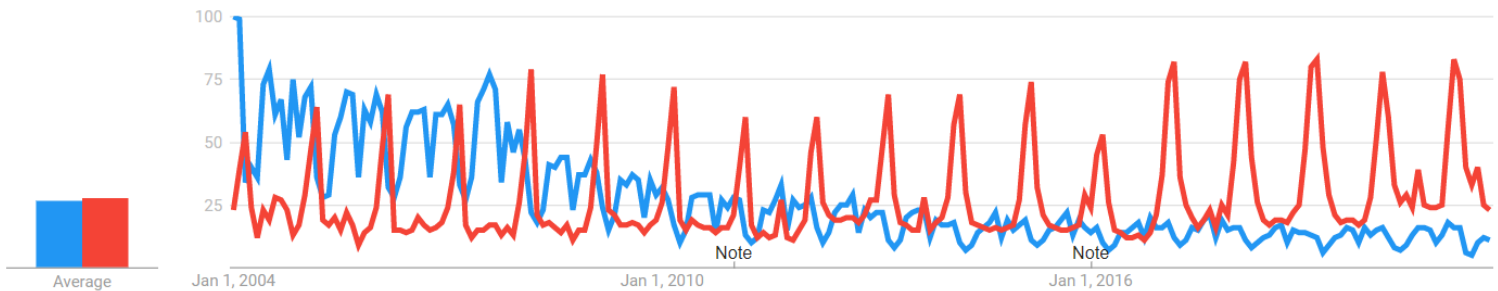
Thailand

2004 - present

All categories

Web Search

Interest over time



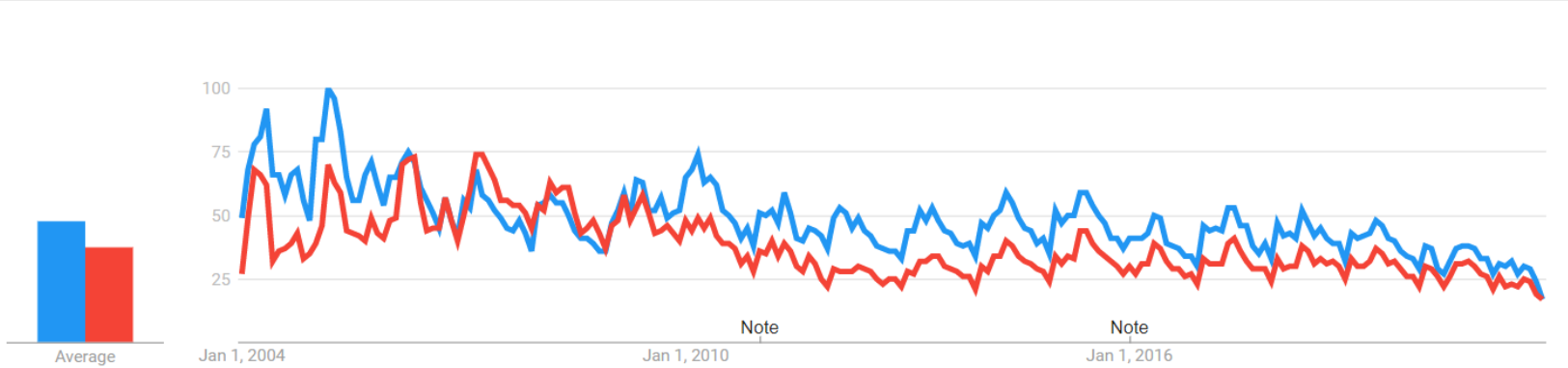
● **สมัครงาน**
Search term

● **หางาน**
Search term

+ Add comparison

Thailand 2004 - present All categories Web Search

Interest over time



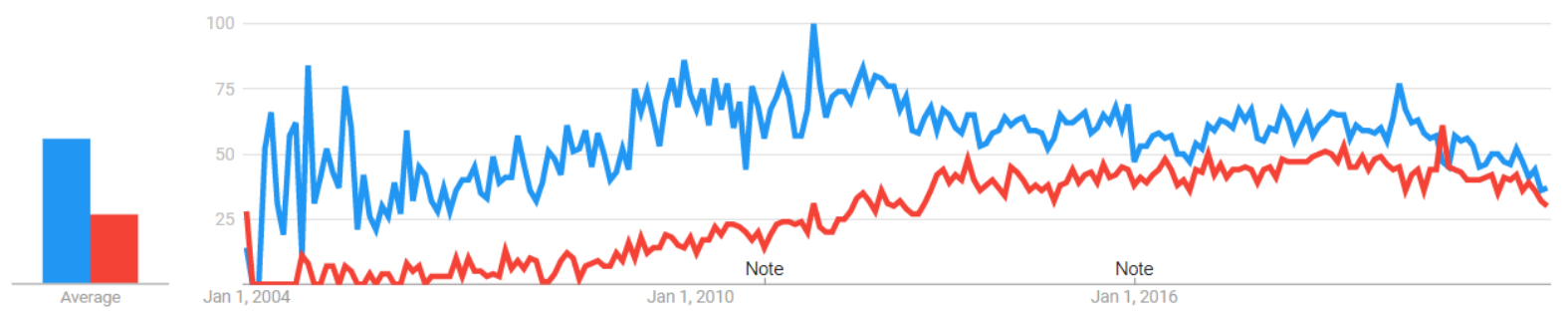
● **ซีอีอาร์**
Search term

● **ผ่อนรถ**
Search term

+ Add comparison

Thailand ▼ 2004 - present ▼ All categories ▼ Web Search ▼

Interest over time ?



● **ซื้อรถ**
Search term

● **ผ่อนรถ**
Search term

+ Add comparison

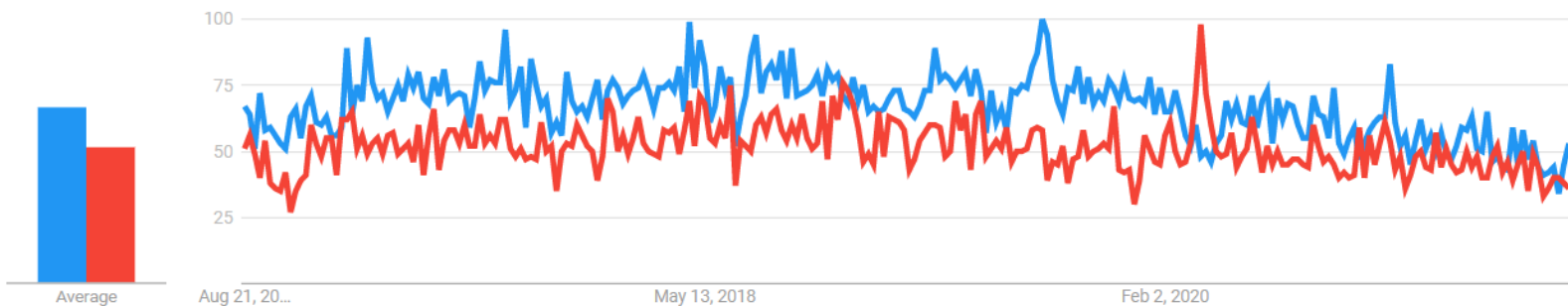
Thailand ▾

Past 5 years ▾

All categories ▾

Web Search ▾

Interest over time ?



Seth Stephens-Davidowitz



- **Seth Stephens-Davidowitz** has used data from the internet -- particularly **Google searches** -- to get **new insights** into the **human psyche**.
- Seth has worked as a **data scientist** at **Google** and a visiting lecturer at the **Wharton School** of the University of Pennsylvania.
- He is currently a contributing **op-ed writer** for the **New York Times**.
- He received his **BA in philosophy**, Phi Beta Kappa, from **Stanford**, and his **PhD in economics** from **Harvard**.

Essays Using Google Data

A dissertation presented

by

Seth Stephens-Davidowitz

to

The Department of Economics

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

in the subject of

Economics

Harvard University

Cambridge, Massachusetts

April 2013

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NEW YORK TIMES BESTSELLER

EVERYBODY LIES

BIG DATA, NEW DATA,
AND WHAT THE INTERNET
CAN TELL US ABOUT WHO
WE REALLY ARE



SETH STEPHENS-DAVIDOWITZ

FOREWORD BY STEVEN PINKER

"A whirlwind tour of the modern human psyche." —*THE ECONOMIST*

- NEW YORK TIMES BESTSELLER
- WALL STREET JOURNAL BESTSELLER
- ECONOMIST BEST BOOK OF THE YEAR
- PBS NEWSHOUR BEST BOOK OF THE YEAR
- AMAZON BEST BUSINESS BOOK OF THE YEAR
- BUSINESS INSIDER BUSINESS BOOK OF THE YEAR

- How many Americans are actually racist?
- What should you say on a first date if you want a second?
- Is America experiencing a hidden back-alley abortion crisis?
- Where is the best place to raise kids?
- Can you game the stock market?
- Do parents treat sons differently from daughters?
- Do violent movies increase violent crime?
- How many people actually read the books they buy?

In this groundbreaking work, Seth Stephens-Davidowitz, a Harvard-trained economist, former Google data scientist, and New York Times writer, argues that much of what we thought about people has been dead wrong. The reason? People lie, to friends, lovers, doctors, surveys—and themselves.

Seth Stephens- Davidowitz

NYT Bestselling Author; NYT
Opinion Writer

About Seth

About Everybody Lies

Research/Data

Bio/Picture

Book Seth to Speak

Buy Everybody Lies

Email Seth

Seth has used Google searches, and other Big Data sources, to learn more about human behavior. He has presented his ideas both in scientific manuscripts and as data journalism. His c.v. can be downloaded [here](#).

RESEARCH

- **The Cost of Racial Animus on a Black Candidate: Evidence Using Google Data** ([paper](#); [New York Times op-ed](#))
 - I introduce a new measure of racism in different parts of the United States based on Google searches. I argue that racism cost Obama far more votes than previously realized.
- **The Demographics of an Online Hate Site** ([New York Times op-ed](#))
 - I study age, gender, location, and other information from profiles of Stormfront, the most popular American hate site. There was no increase in membership due to exposure to the Great Recession.
- **Self-Induced Abortion** ([New York Times op-ed](#))
 - Interest in self-induced abortion has tracked abortion restrictions.
- **Islamophobic Google Searches and Anti-Muslim Hate Crimes** (*w/ Evan Soltas*) ([New York Times op-ed](#)) ([Notes](#)) (Paper forthcoming)
 - We find, using 2004-2013, weekly data, Google Islamophobic searches can predict anti-Muslim crime.
- **Sex** ([New York Times op-ed](#))
 - Maybe if we worried less about sex, we'd have more of it.
- **Treatment for Depression in Different States** ([New York Times op-ed](#))
 - Red states use therapy less; red and blue states take anti-depressants at similar rates.
- **How Many Gay Americans Are There?** ([slides](#), [notes](#), [New York Times op-ed](#))
 - I study 6 datasets, including Facebook profiles and Google searches. I find consistent evidence that roughly 5 percent of American men are gay, with intolerance driving more than half into the closet.
- **Parental Concerns of Sons vs. Daughters** ([New York Times op-ed](#))
 - Google searches suggest parents have different concerns for male and female children. They are more excited by the intellectual potential of their sons. They are more concerned about the weight and appearance of their daughters.
- **Racism and Health** (*Many co-authors; Lead Author: David H. Chae*) ([paper](#))
 - We find a correlation between an area's racism -- as measured by Google searches -- and the black-white mortality gap.
- **Unreported Victims of an Economic Downturn** ([paper](#), [New York Times op-ed](#))
 - Official data says that the Great Recession reduced child abuse. I argue, using Google searches and other evidence, that actual child abuse rates rose, while reporting rates plummeted.

Tracking GDP using Google Trends and machine learning: A new OECD model

Tracking GDP using Google Trends and machine learning: A new OECD model

Nicolas Woloszko 19 December 2020

A pre-requisite for good macroeconomic policymaking is timely information on the current state of the economy, particularly when economic activity is changing rapidly. Given that GDP figures are usually only available on a quarterly basis, the current crisis has prompted a search for alternative high-frequency indicators of economic activity. This column presents evidence from a new tracker developed by OECD which uses Google Trends and machine learning to provide real-time estimates of GDP growth in countries all over the world.

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A A

A pre-requisite for good macroeconomic policymaking is timely information on the current state of the economy, particularly when economic activity is changing rapidly. Given that GDP figures are usually only available on a quarterly basis, and that monthly survey-based indicators (such as the Purchasing Managers' Indices) can become unreliable when changes in economic activity are abrupt and massive, the current crisis has prompted a search for alternative high frequency indicators of economic activity. The OECD Economic Outlook (OECD 2020), and a recent OECD paper (Woloszko 2020), discuss one such indicator based on Google Trends, which are used to construct a 'Weekly Tracker' that provides real-time estimates of GDP growth in 46 economies covering G20, OECD, and OECD partner countries. The OECD Weekly Tracker data are updated on a regular basis and made available on this [webpage](#).

Source: <https://voxeu.org/article/tracking-gdp-using-google-trends-and-machine-learning>



Nicolas Woloszko
Economist, OECD

Don't Miss

The economics of deep trade agreements: A new eBook

Fernandes, Rocha, Ruta

A triumph of economics... but a lot of challenges ahead

Garicano

The ghost of Smoot-Hawley tells why America isn't too big to avoid retaliation

Mitchener, O'Rourke, Wandschneider

Events

CALL FOR PAPERS - Vienna Symposium on Foreign Exchange Markets 2021

23 - 24 August 2021 / Palais Coburg, Vienna, Austria / WU Vienna - Research Institute for Capital Markets

China Economics Summer Institute (CESI)

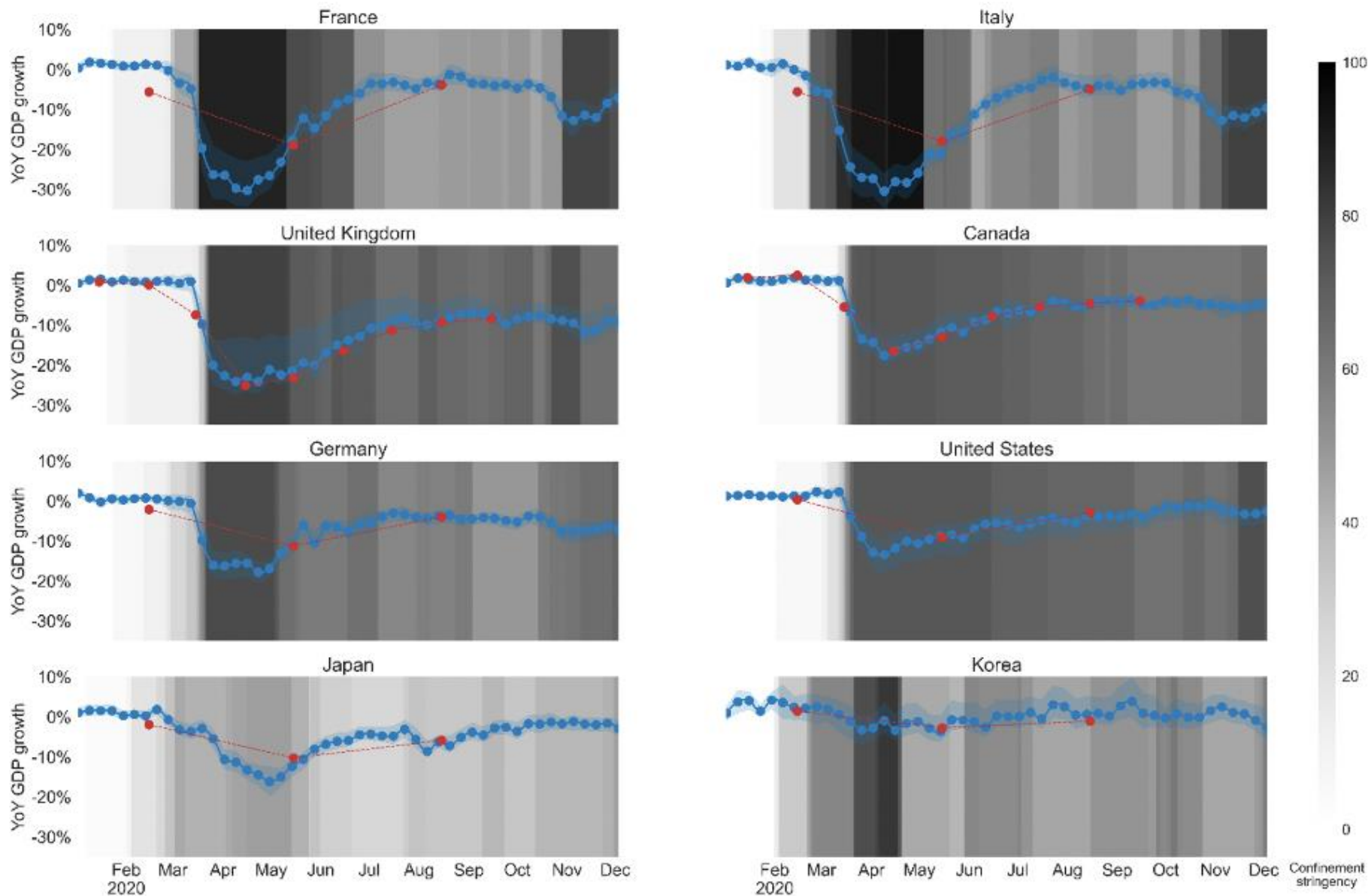
25 - 27 August 2021 / Online /

Salento Macro Meetings 2021

26 - 27 August 2021 / Lecce, Italy /

- **High-frequency** and **big data** have **limitations** as scientific analysis is usually **not the original purpose** of their collection.
- These caveats call for specific attention and statistical pre processing.
- Among the many available **Google Trends variables**, **215 categories** and topics are judged as being **relevant for economic analysis** and selected to feature in the model.
- Selected variables are transformed to **year on year growth rates**.
- Finally, as the Google Search user base has increased dramatically since 2004, the relative search intensities of most search categories decrease over time.
- This long term trend is filtered out using a methodology described in Woloszko (2020).
- The quarterly model of year-on-year GDP growth based on Google Trends **performs well** in **out-of-sample nowcast simulations**.
- On average across **46 countries**, it has a **'Root Mean Squared Error' (RMSE)** that is **17% lower than** an **'autoregressive model'** that just uses lags of year-on-year GDP growth.

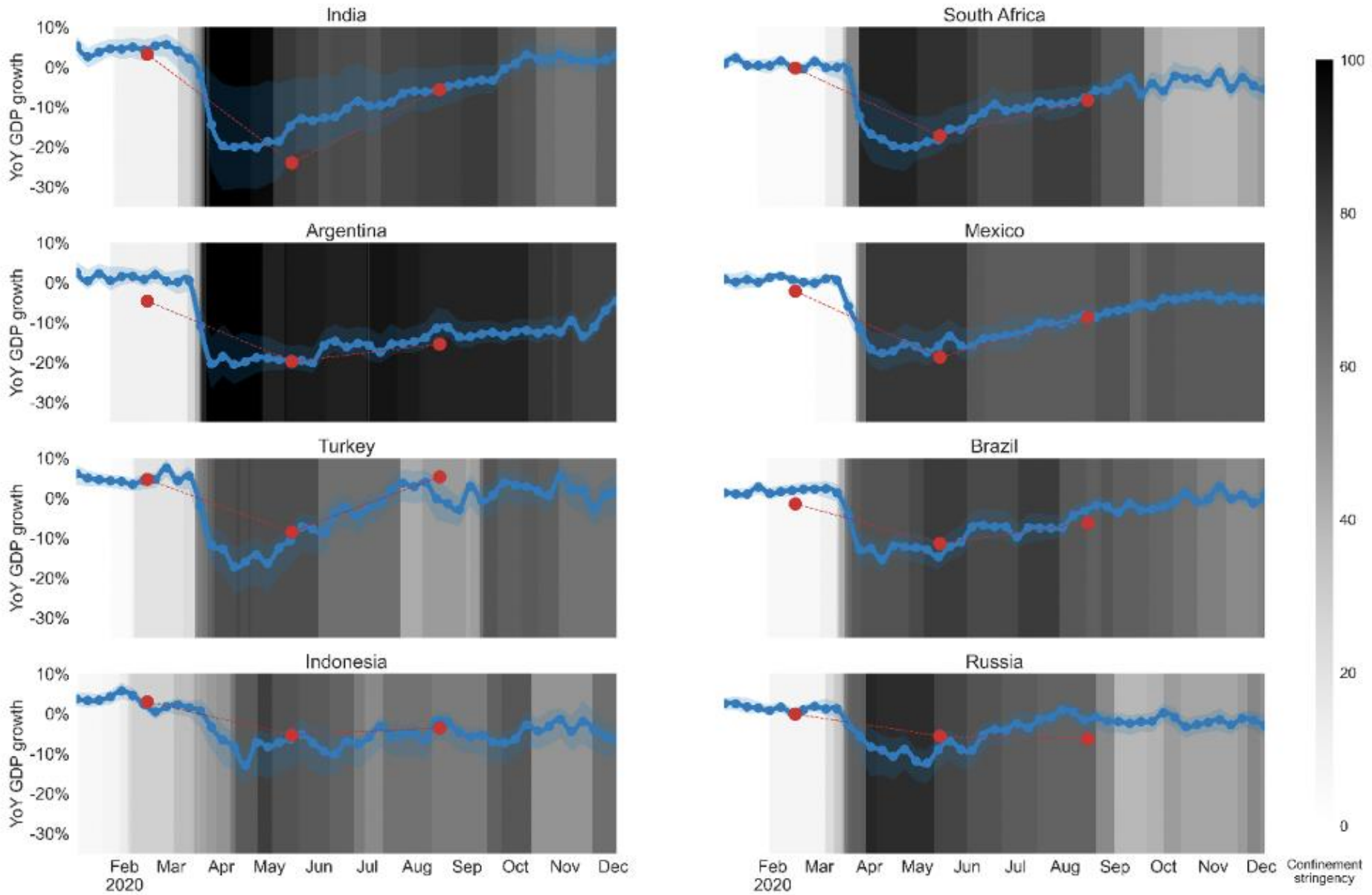
Weekly Tracker of GDP growth based on Google Trends



Source: <https://voxeu.org/article/tracking-gdp-using-google-trends-and-machine-learning>

—●— Weekly Tracker ● GDP growth

Weekly Tracker of GDP growth based on Google Trends



Source: <https://voxeu.org/article/tracking-gdp-using-google-trends-and-machine-learning>

Weekly Tracker GDP growth