Uncertainty and Employment During the COVID Pandemic: Evidence from Search Behaviour in the EU

Salvador Barrios[1], **Wouter van der Wielen**[1]

[1] European Commission, Joint Research Centre

Banca d'Italia-Federal Reserve Board, 11-11-2020

Highlights

- People's economic anxiety increased substantially following the COVID-19 outbreak
- Unemployment-related uncertainty jumped beyond those during the Great Recession
- Uncertainty was substantially larger in those countries hit hardest in economic terms
- Contrary to the Great Recession, fears were not eased by short-time work schemes
- A coinciding slowdown in European labour markets and consumption is observed

Introduction

Uncertainty's impact on the economy

Forward-looking correlations: **sentiment is driver of activity**

- Reduce growth through increasing **risk premia** raising cost of financing (cf. Tobin)
- Make firms cautious about actions like investment and hiring, since their (*S*-shape) **adjustment costs** often make reversion expensive (Bloom, 2009)
- Affect **households' expectations** and, by consequence, their precautionary savings, consumption and investment (Ben-David et al., 2018; Roth and Wohlfart, 2020)
  - Unprecedented surge in EA saving rates, from 12.7% in the fourth quarter of 2019 up to 16.9% in the first quarter of 2020
- Lead to persistently high unemployment as the result of **steady-state indeterminacy**, so-called sunspots (Farmer, 2012; Benigno and Fornaro, 2017)

Challenges in measuring uncertainty

Challenges:

- distinction between self-fulfilling prophecies, animal spirits, news and noise
- Speed at which COVID-19 hit
- Lack of historic parallels for COVID-19

Traditional, backward looking measures of economic uncertainty derived from statistical models' fit to macroeconomic data are not well suited

► existing early-warning indicators in the policymakers' toolbox are being expanded

Measures of economic uncertainty

- Statistical forecast uncertainty
- Stock market volatility
- Newspaper/Twitter-based uncertainty
- Business expectation surveys
- Forecaster disagreement

Analysis

Data

Non-traditional data: Google Trends

- records the popularity of Google search queries
- across various regions and languages

Growing in popularity:

- detection of influenza epidemics (Ginsberg et al., 2009)
- nowcasting economic activity (Choi and Varian, 2012; Koop and Onorante, 2019)
- forecasting unemployment (Askitas and Zimmermann, 2009; D'Amuri and Marcucci, 2017) and private consumption (Vosen and Schmidt, 2011)

► Internet searches serve as a **measure of economic sentiment** among households and thus expectations (Fetzer et al., 2020)

Data

Our data:

- language-specific search queries w.r.t. crisis, labour markets and consumption
- measure of search intensity scaled from 0 to 100, with 100 representing the highest proportion within the selected country/region and timeframe
- normalize the series by the mean search intensity prior to the surge of the coronavirus
  - coefficient estimates interpretable as percentage changes
  - baseline captures queries not solely driven by uncertainty (cf. focus on excess searches)
- three panels:

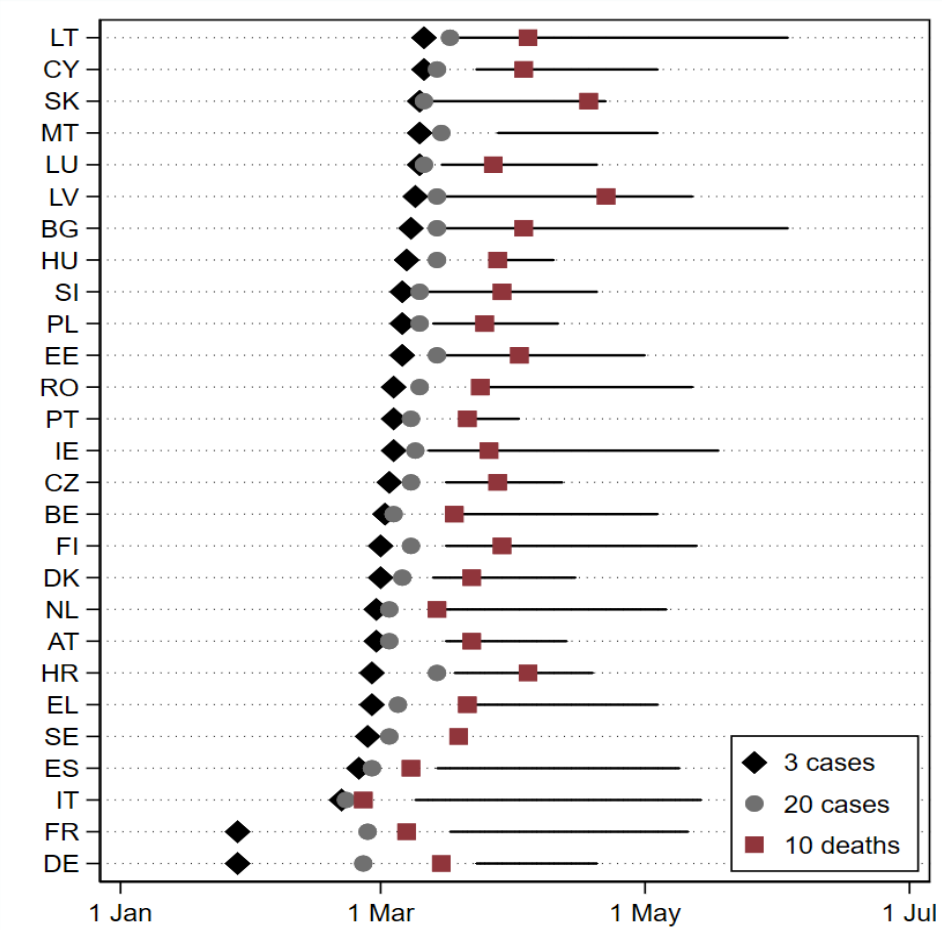
Coverage	Focus	Frequency	Time
EU27	country-level	monthly	since 2004
EU27	country-level	daily	Jan-Apr 2020
DE, ES, FR, IT	regional	daily	Jan-Apr 2020

Data

Merge in (John Hopkins):

- number of confirmed cases
- number of active cases
- COVID-19 related deaths

Used to determine the pre and post-COVID outbreak period



European Commission

Methodology

Estimate the following difference-in-difference (DiD) regression

$$y_{c,t} = \alpha + \sum_{\tau=-6}^{6} \beta_\tau D_{c,\tau} + \epsilon_{c,t}$$

$y_{c,t}$ measures the search intensity in country (or region) c on day t

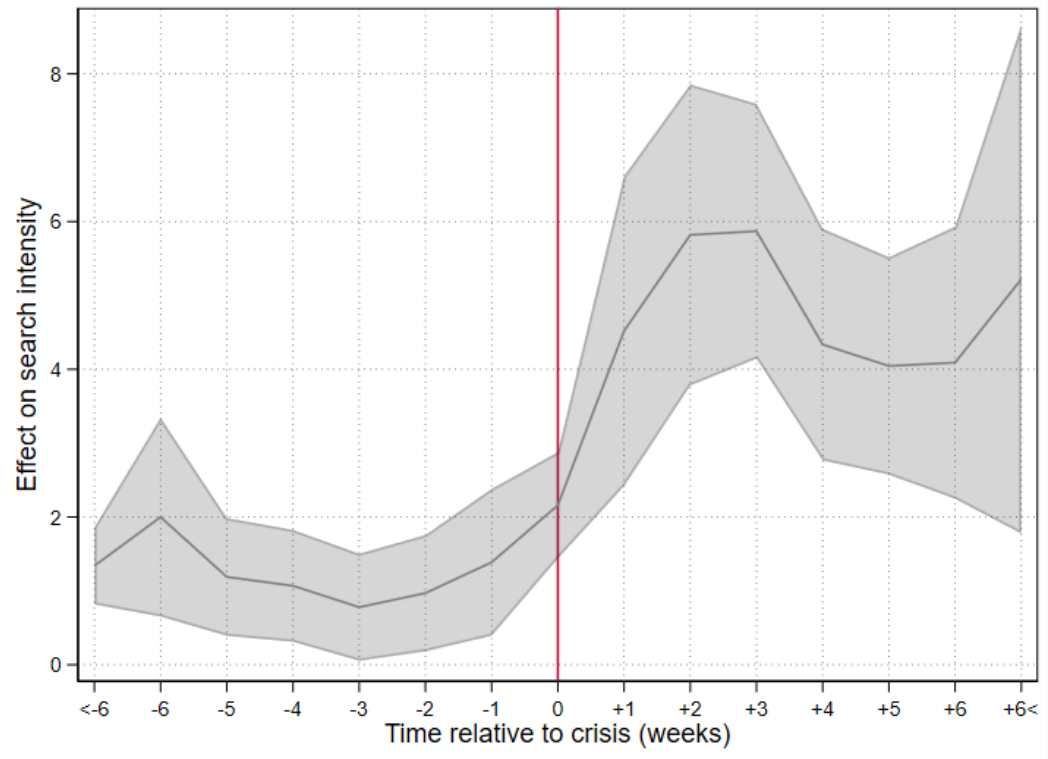
$D_{c,\tau}$ are relative week dummies centred around the arrival of the pandemic in the country

$\epsilon_{c,t}$ comprises panel fixed effects, time fixed effects and the error term

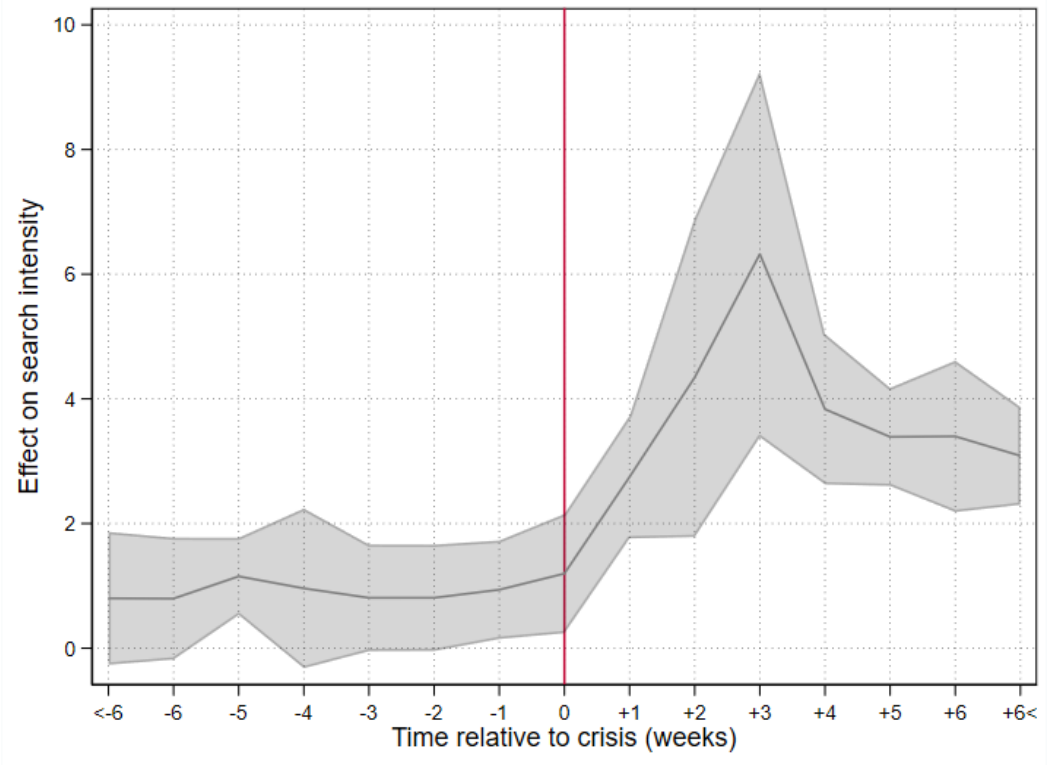
Alternatively, we performed Im-Pesaran-Shin tests for a unit root in the respective search series, confirming our conclusions.

Result 1 – Uncertainty increased substantially

Recession



Unemployment



European Commission

Result 2 – Fear higher in countries hit hardest

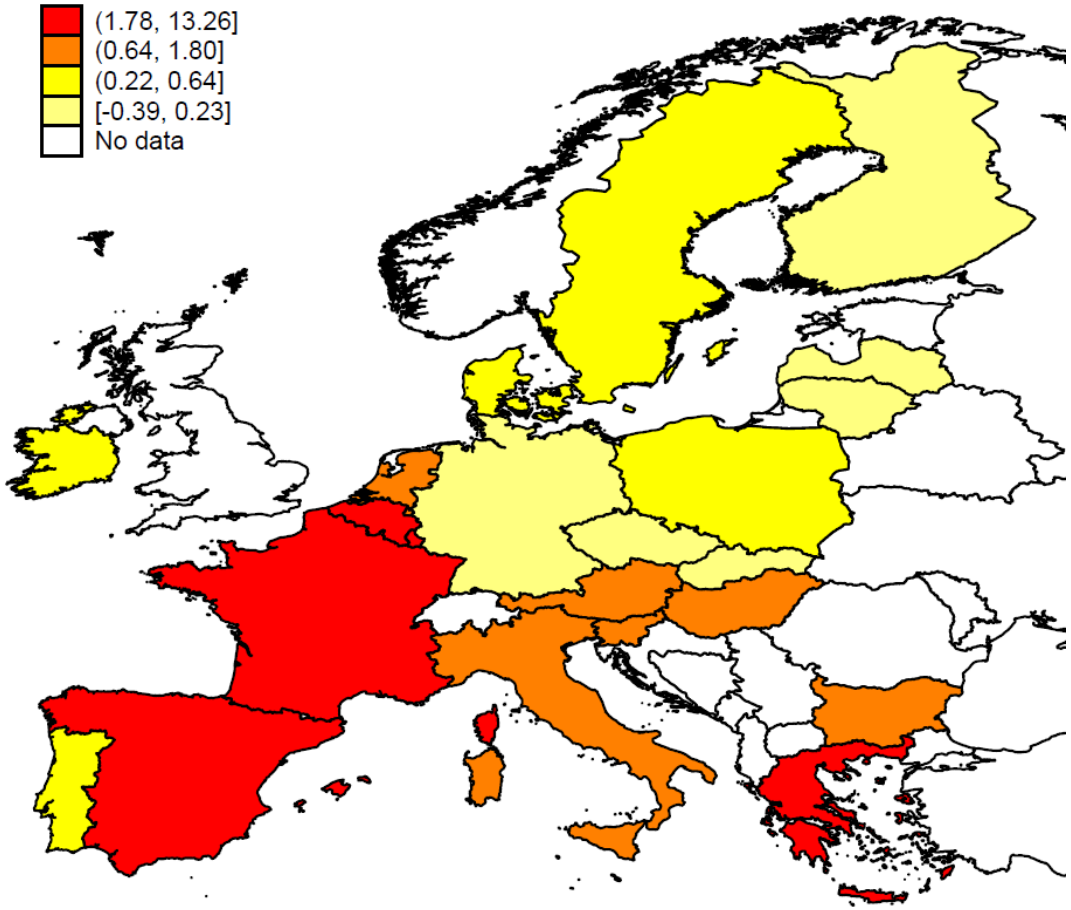
	Crisis		Recession		Unemployment		Unemp. Benefit	
	(Hard)	(Rest)	(Hard)	(Rest)	(Hard)	(Rest)	(Hard)	(Rest)
COVID dummy	2.069**	0.838***	4.124**	0.574***	2.180**	1.165***	0.690**	1.087***
	(0.649)	(0.181)	(1.726)	(0.188)	(0.904)	(0.293)	(0.218)	(0.196)
Intercept	0.867**	0.809***	0.908*	0.702***	0.812	0.944***	0.950***	0.901***
	(0.286)	(0.0733)	(0.455)	(0.0705)	(0.471)	(0.114)	(0.120)	(0.0959)
Day Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic	11.851	13.996	5.378	15.037	16.885	18.559	4333.595	7.705
p-value	0.001	0.0000	0.015	0.000	0.000	0.000	0.000	0.000
Goodness-of-fit	0.372	0.261	0.116	0.041	0.194	0.133	0.207	0.174
N^o of obs.	882	1470	882	1470	882	1666	882	1568
N^o of countries	9	15	9	15	9	17	9	16

Note: The dependent variable is the seven-day moving average search intensity for country-specific terms (crisis, recession, unemployment and unemployment benefit), normalized by the mean search intensity before the COVID-19 outbreak. The COVID cut-off dummy is that based where the number of COVID-related deaths exceeds ten. Cluster-robust standard errors are noted in parentheses: * p<0.10, ** p<0.05, *** p<0.01. The set of hard hit countries (in blue) covers those countries with GDP growth revisions larger than 5.5 pp.

Result 2 – Fear higher in countries hit hardest

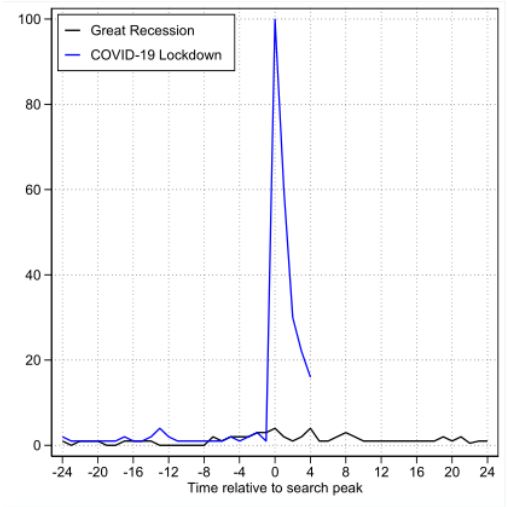
Reflects to some extent the pre-crisis performance of country-specific labour markets:

- perceived risk of unemployment is especially high in countries with high pre-crisis level of unemployment
  - red: 10.3% aver. unempl. rate
  - orange: 7.5%
  - dark yellow: 4.7%
  - light yellow: 3.4%

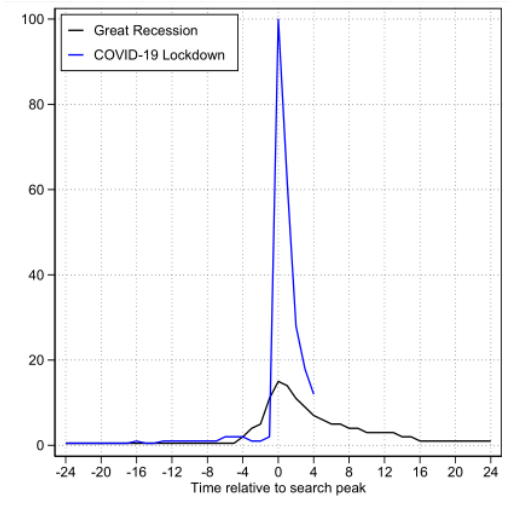


European Commission

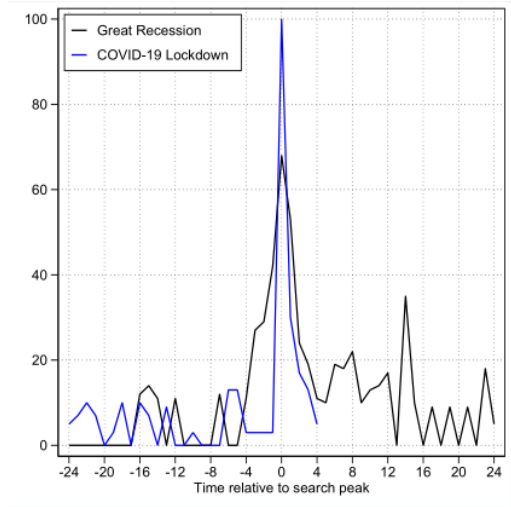
Result 3 – Renewed attention for STWs ...



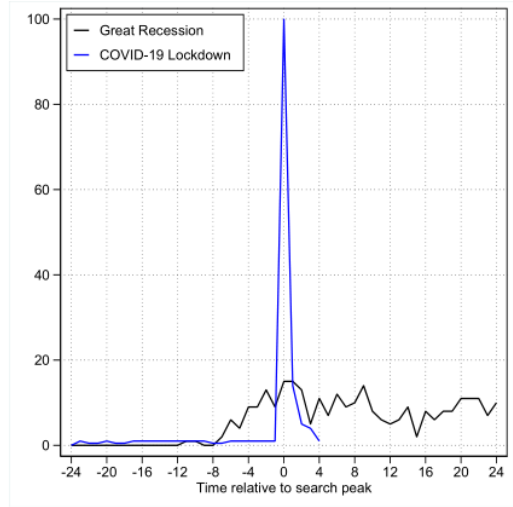
(a) BE - Tijdelijke werkloosheid



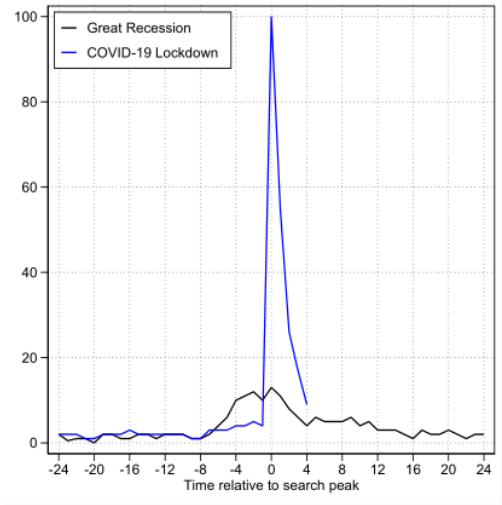
(b) DE - Kurzarbeit



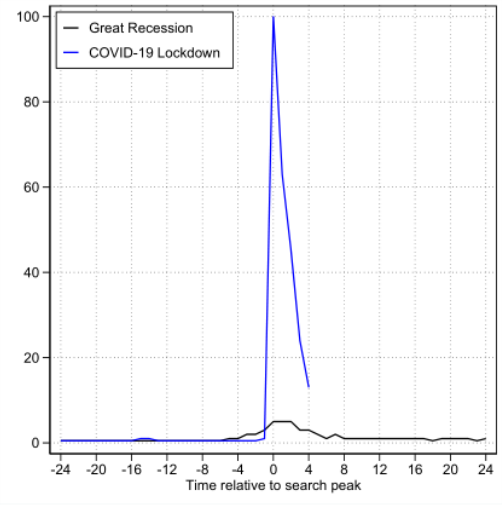
(c) DK - Arbejdsfordeling



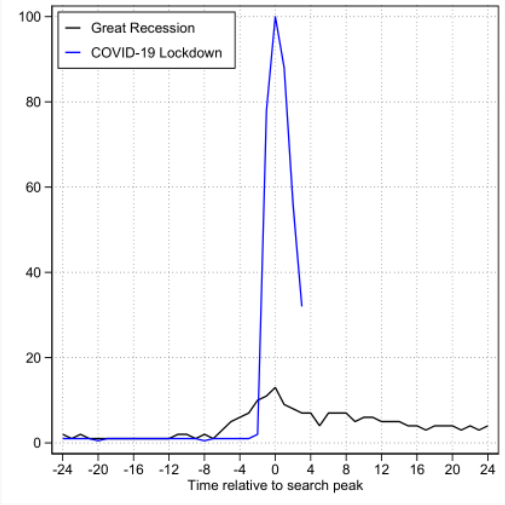
(d) ES - ERTE



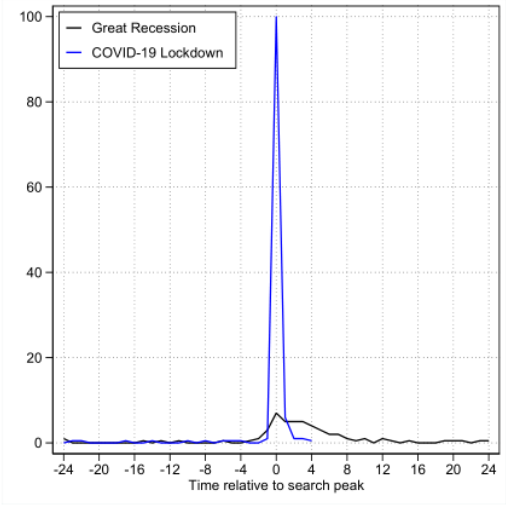
(e) FI - Lomautus



(f) FR - Chomage partiel

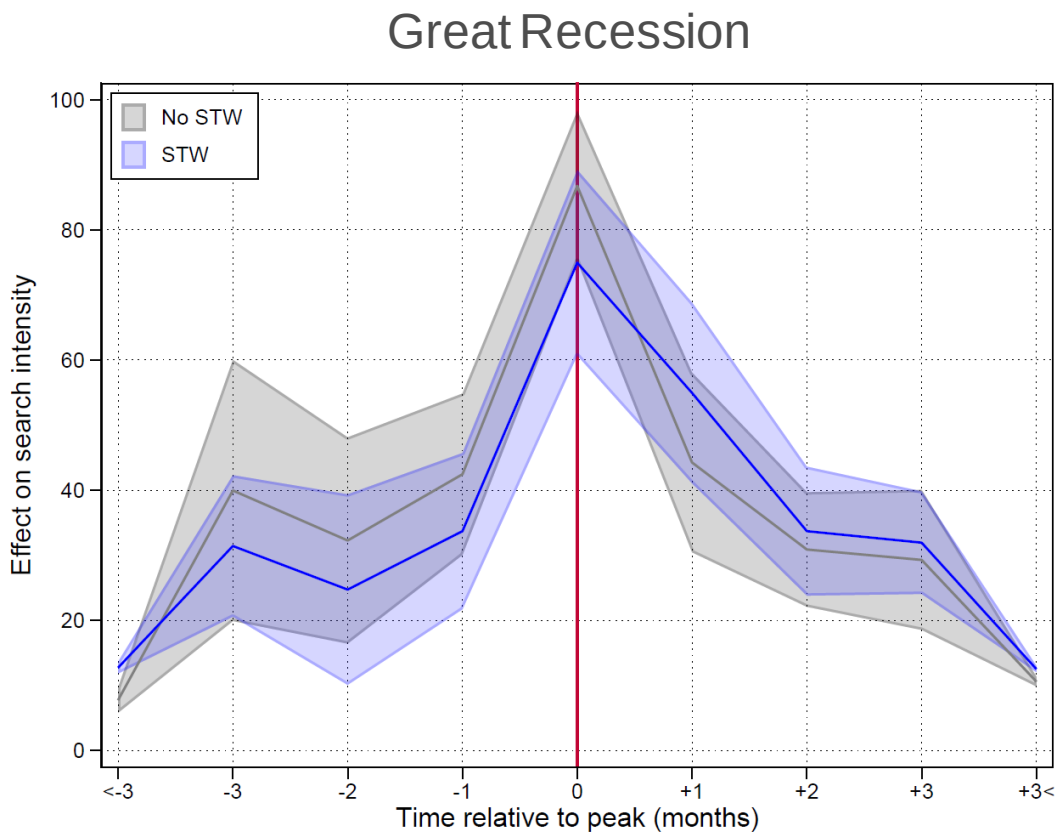


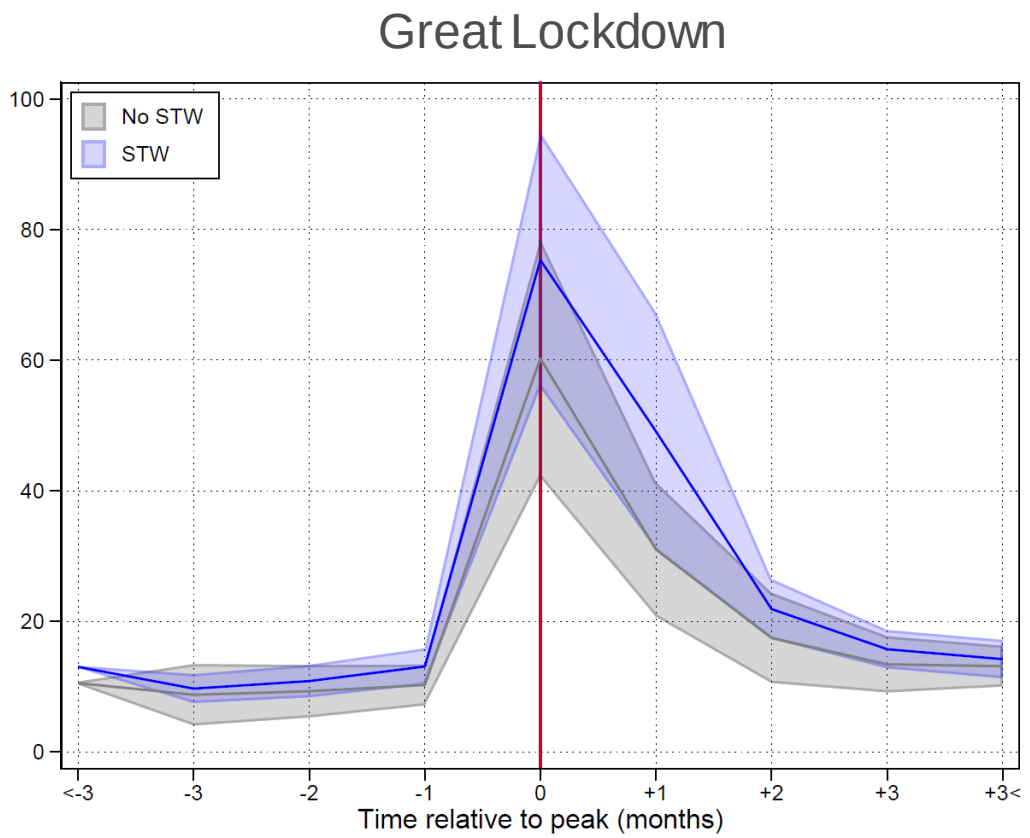
(g) IT - Cassa integrazione



(h) NL - Werktijdverkorting

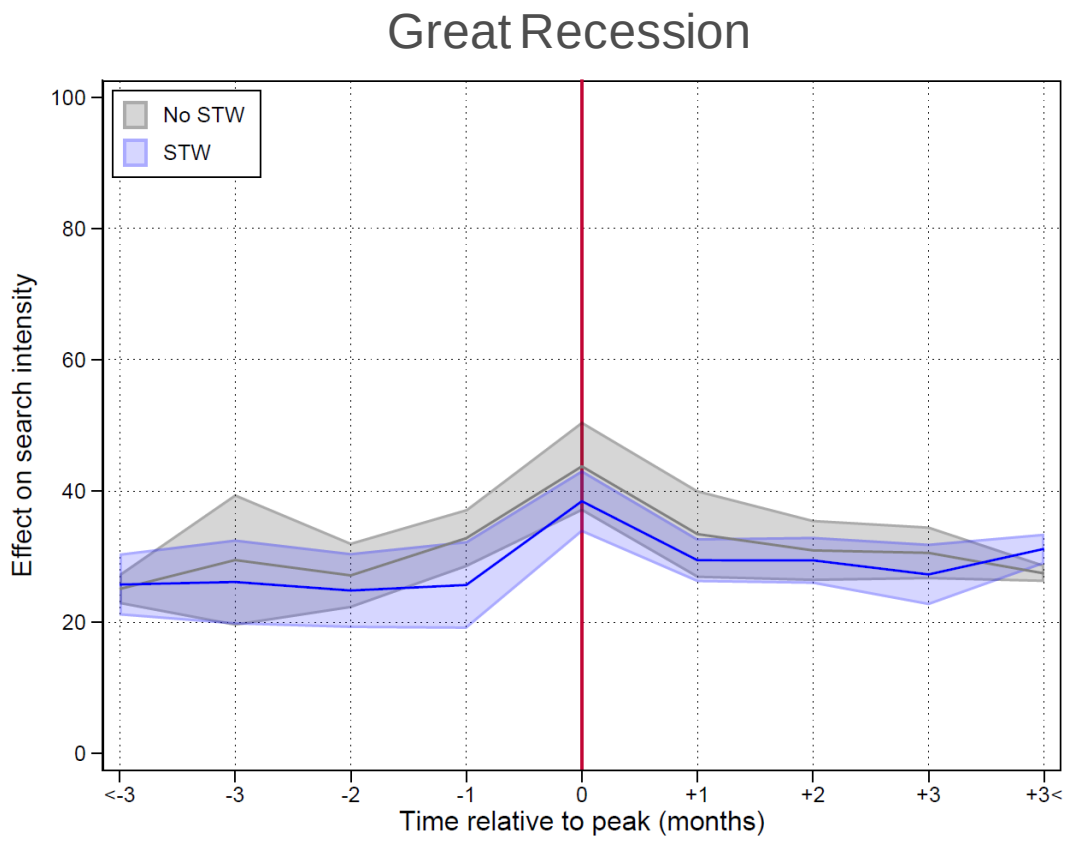
Result 3 – … did not ease recession fears

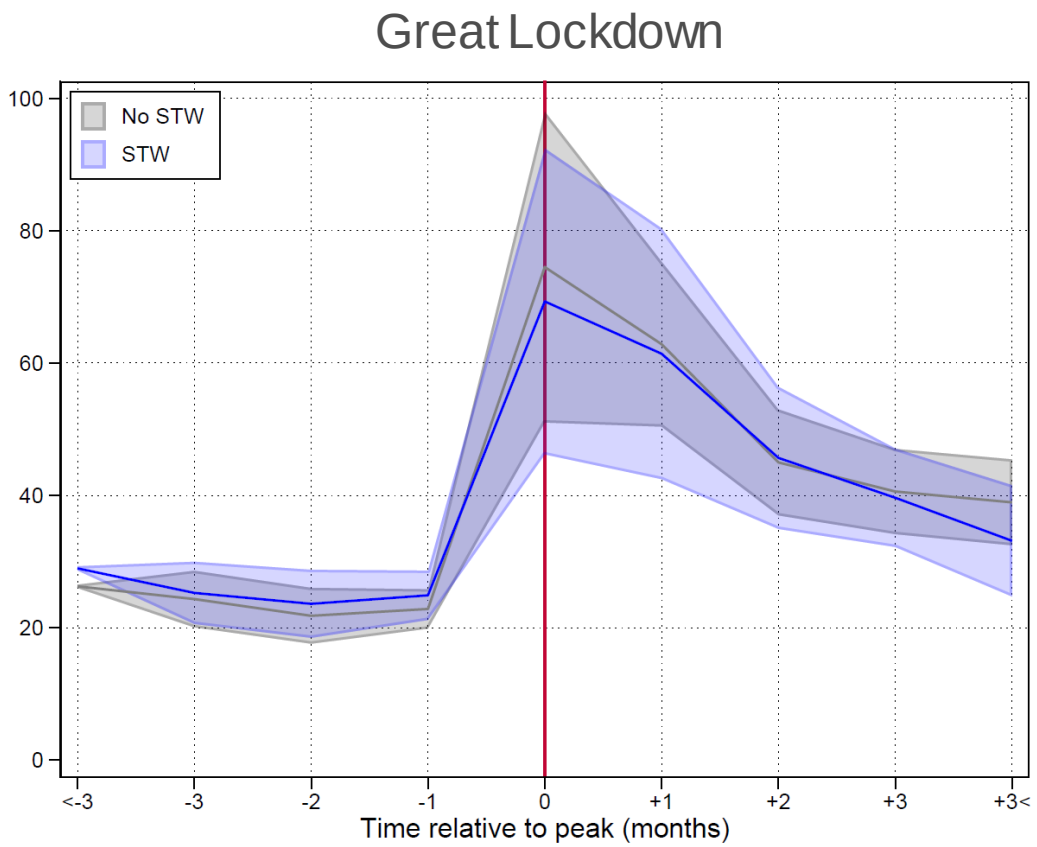




European Commission

Result 3 – … did not ease unemployment fears





European Commission

Conclusions

Main findings

- Document a substantial increase in people's economic anxiety in the months following the coronavirus outbreak
- Coinciding slowdown in labour markets and (durable) consumption
  - complementing findings for the UK and US, both in scope and data used
- Fear was more outspoken in those EU countries hit hardest
  - risk of a widening gap between EU member states and hysteresis
- Unemployment-related fears, which have recently jumped far beyond those observed during the Great Recession
- Fears were not eased by renewed attention for short-time work schemes, despite evidence for such an effect during the Great Recession

References

Askitas, N. and Zimmermann, K. F. (2009). Google Econometrics and Unemployment Forecasting, *Applied Economics Quarterly*, 55(2): 107-120.

Ben-David, I., Fermand, E., Kuhnen, C. M. and Li, G. (2018). Expectations Uncertainty and Household Economic Behavior, NBER Working Papers 25336, National Bureau of Economic Research, Cambridge (US).

Benigno, G. and Fornaro, L. (2018). Stagnation Traps, *Review of Economic Studies*, 85(3): 1425-1470.

Bloom, N. (2009). The Impact of Uncertainty Shocks, *Econometrica*, 77(3): 623-685.

Choi, H. and Varian, H. R. (2012). Predicting the present with Google Trends, *Economic Record*, 88(S1): 2–9.

D'Amuri, F. and Marcucci, J. (2017). The predictive power of Google searches in forecasting US unemployment, *International Journal of Forecasting*, 33(4): 801-816.

Farmer, R. E. (2012). Animal Spirits, Persistent Unemployment and the Belief Function. In R. Frydman and E. S. Phelps (eds), *Rethinking Expectations: The Way Forward for Macroeconomics* (pp. 251-276). Princeton, NJ: Princeton University Press.

Fetzer, T., Hensel, L., Hermle, J. and Roth, C. (2020). Coronavirus Perceptions and Economic Anxiety. *Review of Economics and Statistics*, forthcoming.

References

Ginsberg, J., Mohebbi, M. H., Patel, R. S., Brammer, L., Smolinski, M. S. and Brilliant L. (2009). Detecting Influenza Epidemics Using Search Engine Query Data, *Nature*, 457(7232): 1012–1014.

Koop, G. and Onorante, L. (2019). Macroeconomic Nowcasting Using Google Probabilities. In I. Jeliazkov and J. L. Tobias (eds), *Advances in Econometrics - Topics in Identification, Limited Dependent Variables, Partial Observability, Experimentation, and Flexible Modeling* (pp. 17-40). Emerald Insight.

Nowzohour, L. and Stracca, L. (2020). More Than A Feeling: Confidence, Uncertainty, And Macroeconomic Fluctuations, *Journal of Economic Surveys,* 34(4): 691-726.

Roth, C. and Wohlfart, J. (2020). How do expectations about the macroeconomy affect personal expectations and behavior?, *Review of Economics and Statistics*, forthcoming.

van der Wielen, W. and Barrios, S. (2020). Fear and Employment During the COVID Pandemic: Evidence from Search Behaviour in the EU, JRC Working Papers on Taxation and Structural Reforms No 08/2020, European Commission.

Vosen, S. and Schmidt, T. (2011). Forecasting Private Consumption: Survey-Based Indicators vs. Google Trends, *Journal of Forecasting*, 30(6): 565–578.

Thank you

European Commission

Supplementary materials

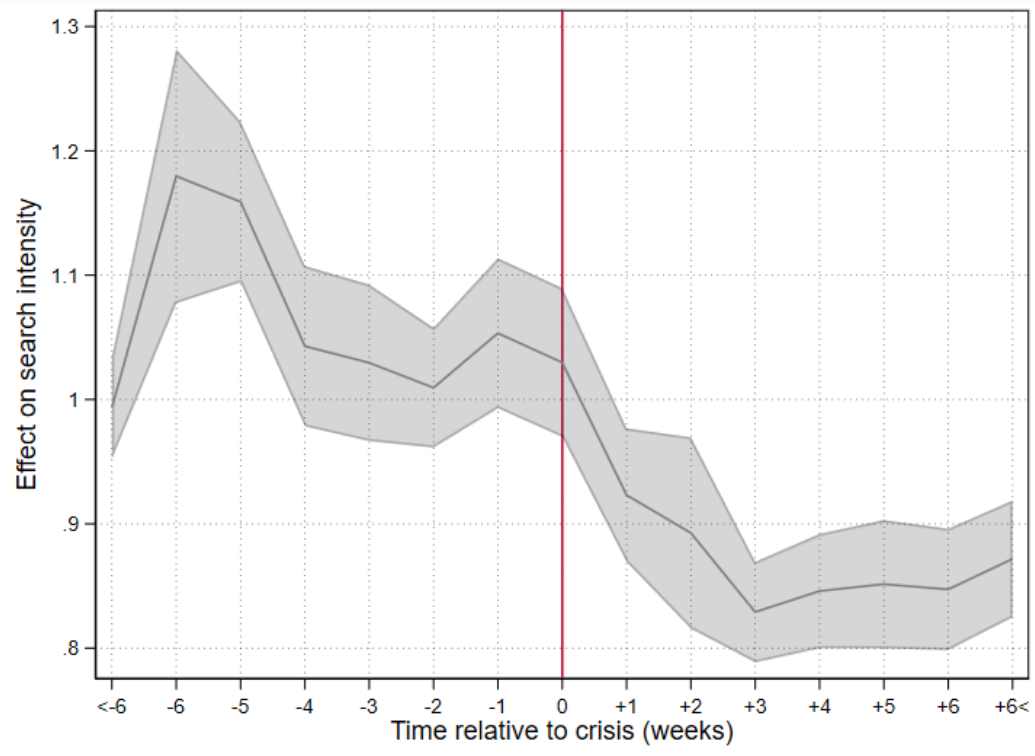
Result 4 – Coinciding slow-down in job search

	Job Board	Manpower	Randstad	Adecco	Indeed	LinkedIn	Curriculum	Resume
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	0.996***	0.934***	0.986***	0.979***	1.003***	1.005***	0.996***	1.013***
	(0.0117)	(0.0385)	(0.0357)	(0.0364)	(0.0203)	(0.0104)	(0.0388)	(0.0212)
Cut-off dummy I	-0.364***	-0.228***	-0.311***	-0.366***	-0.314***	-0.179***	-0.156	-0.123***
(# cases > 3)	(0.0202)	(0.0600)	(0.0558)	(0.0473)	(0.0322)	(0.0168)	(0.106)	(0.0339)
Day Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic	70.354	10.924	17.981	39.167	35.955	22.518	11.405	4.279
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Goodness-of-fit	0.395	0.020	0.030	0.049	0.104	0.235	0.010	0.016
N° of observations	2352	2646	2156	2548	2646	2646	2646	2646
N° of countries	24	27	22	26	27	27	27	27

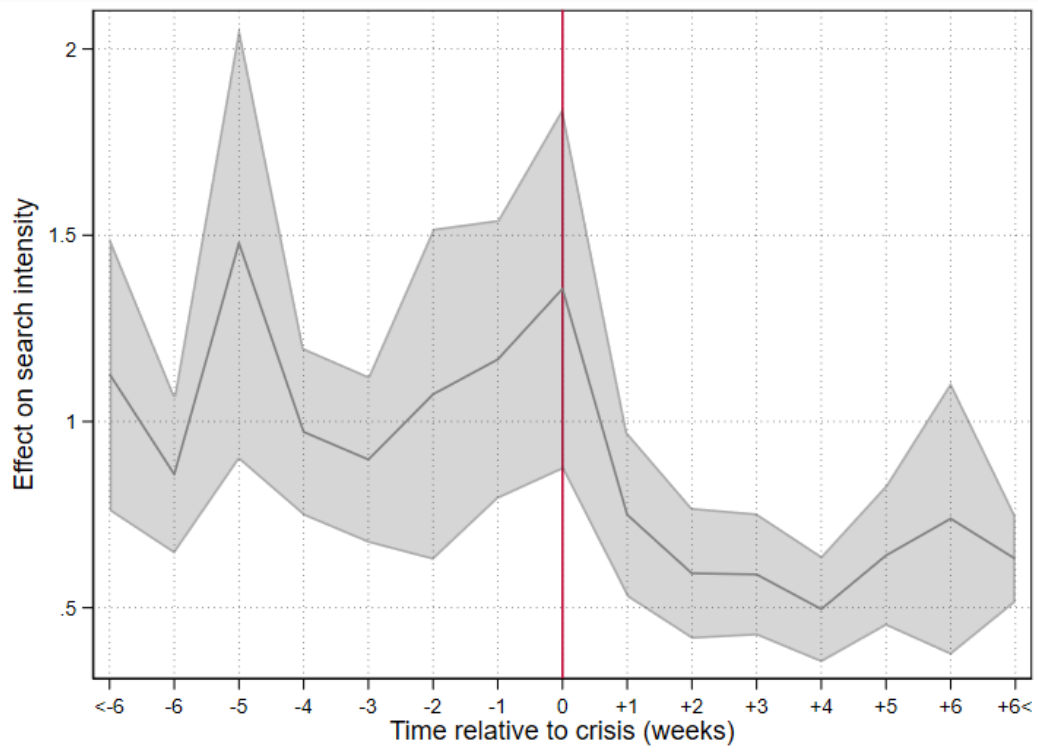
Notes: The dependent variable is the seven-day moving average search intensity for country-specific job boards, internationally active agencies and general queries, normalized by the mean search intensity before the COVID-19 outbreak. Cluster-robust standard errors are noted in parentheses: * p<0.10, ** p<0.05, *** p<0.01.

Result 4 – Coinciding slow-down in consumption

Second-hand platforms



Second-hand car platforms



European Commission