



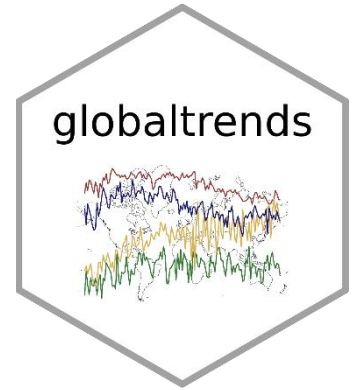
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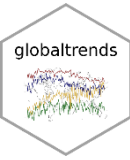
Let Me Google That for You

Measuring global trends using Google Trends

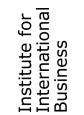
Harald Pühr & Jakob Müllner

useR! – 2021-07-06

Agenda



- What does globaltrends do?
- What can you do with globaltrends?
- Why should you care?



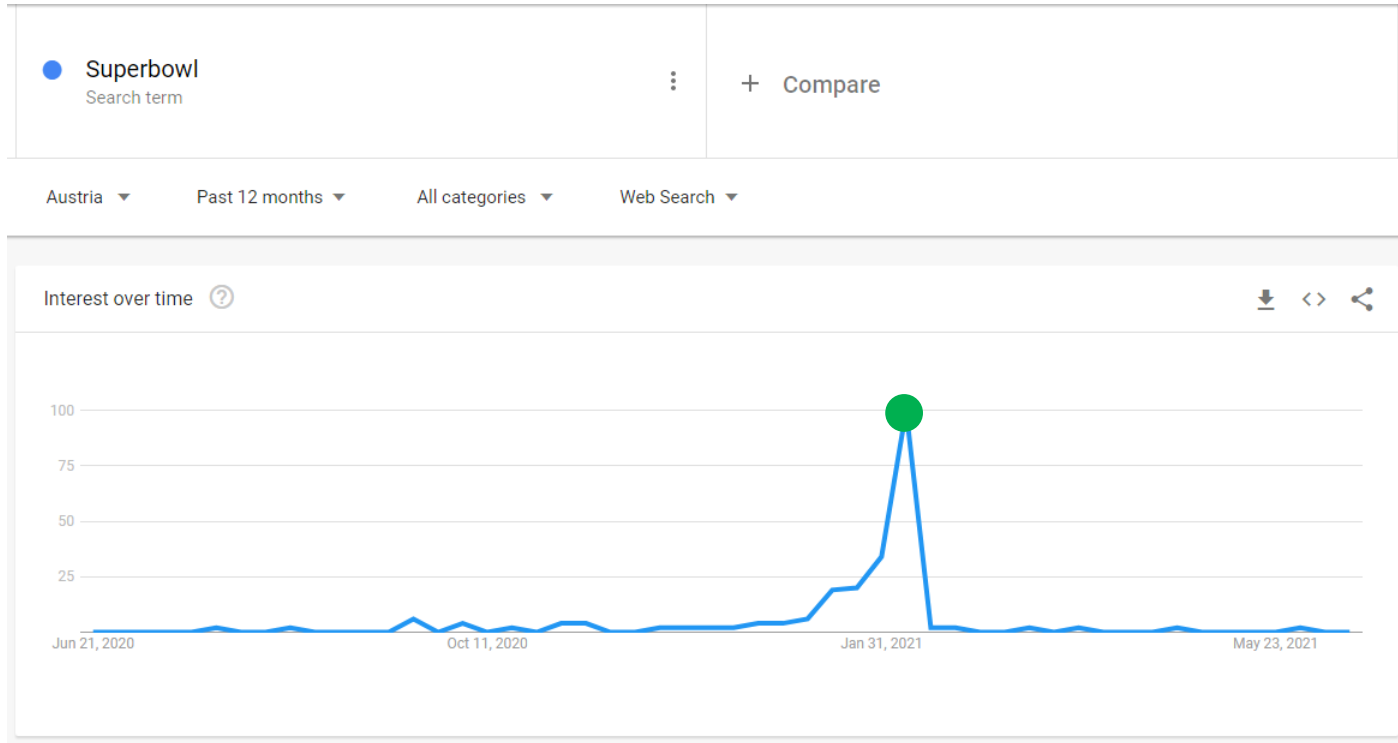
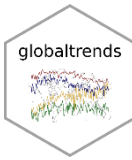
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WHAT DOES GLOBALTRENDS DO?

The globaltrends package

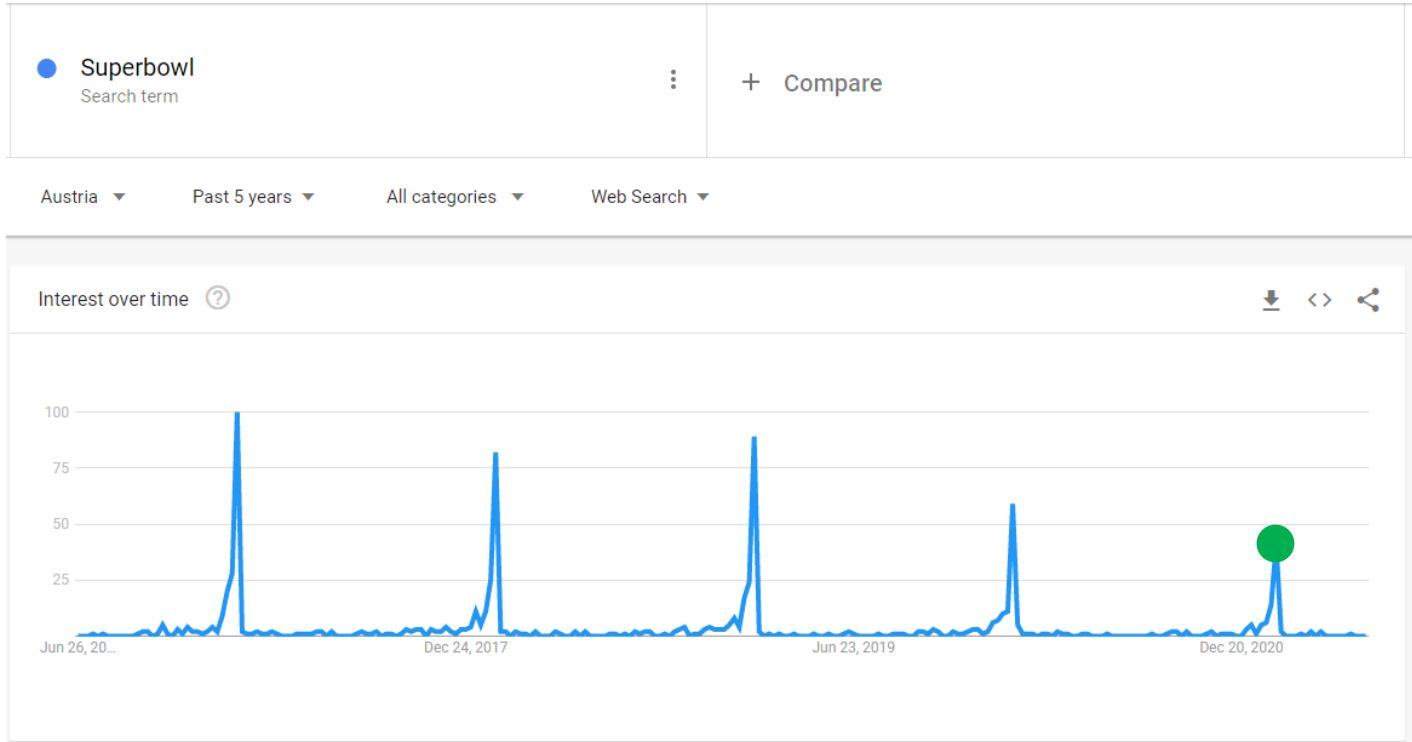
- The `globaltrends` package allows users to download and analyze the dispersion and development of global trends with data from Google Trends
 - Functions to download and compute data
 - Functions to export data
 - Functions to visualize data
 - Data storage in SQLite file
- “One stop solution” to work with data from Google Trends
- Available on GitHub: <https://github.com/ha-pu/globaltrends>
- Presentation and code example available on GitHub

Google Trends...



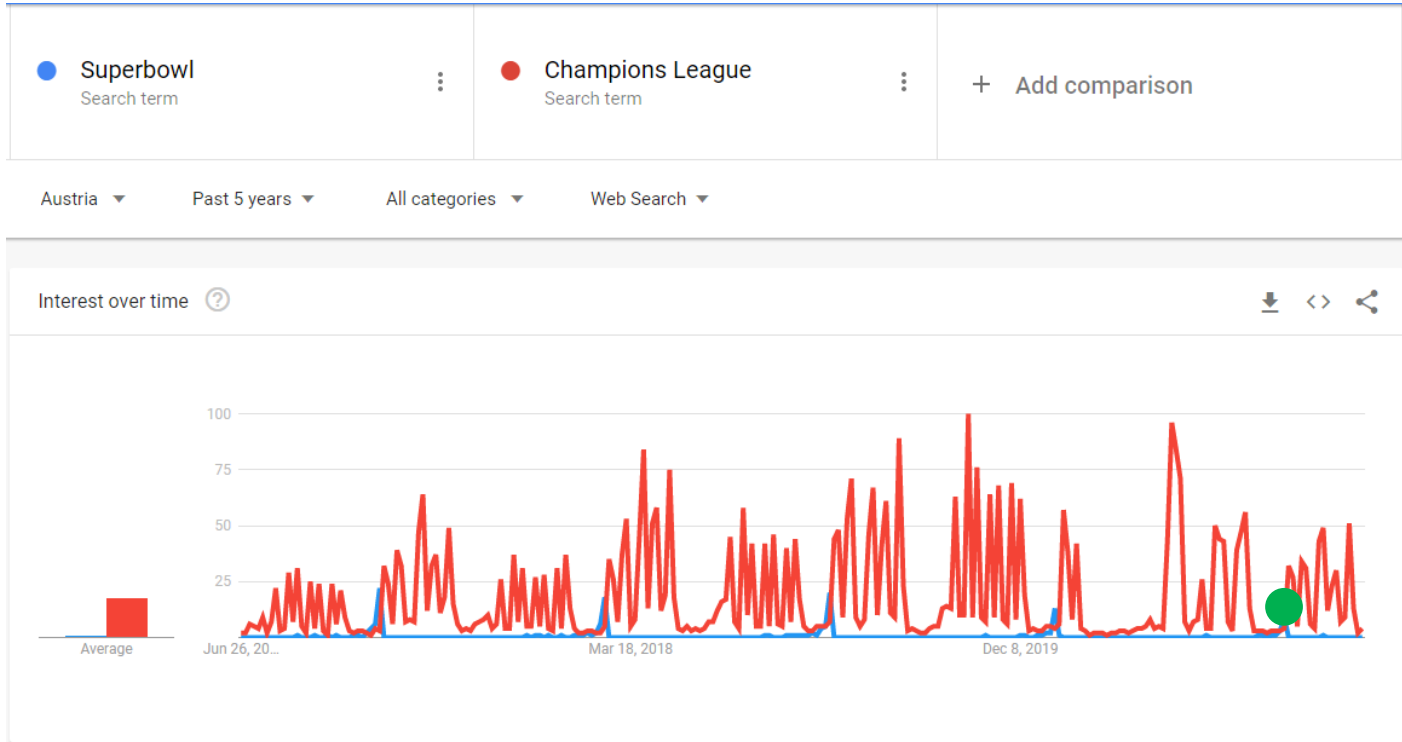
<https://trends.google.com/trends/explore?geo=AT&q=Superbowl>

...normalizes data based on time...



<https://trends.google.com/trends/explore?date=today%205-y&geo=AT&q=Superbowl>

...and keyword combination



Solution: re-normalization

- `globaltrends` re-normalizes data from Google Trends
 - „Object“ keyword and „control“ keywords
 - Data not relative to search query but control keywords
 - Up to five keywords that mirror „standard“ internet usage
 - Examples: gmail, maps, translate, wikipedia, youtube
- Users set their own control keywords
 - Control keywords worked well so far
 - But control keywords are context-dependent

$$search\ score_o = \frac{search\ volume_o}{\sum search\ volume_c}$$

- Built-in time-series adjustments
 - Seasonal adjusted data
 - Trend-only data

Two measures for internationalization

- Degree of internationalization: dispersion of search scores
 - Indicator for equality of search volumes across locations
 - Inverted Gini coefficient
 - Inverted Herfindahl index
 - Inverted entropy
 - Unweighted data
- Volume of internationalization: global search scores
 - Indicator for total amount of search volumes
 - Weighted data

globaltrends workflow

Setup

```
initialize_db(), start_db(), disconnect_db(),  
add_control_keyword(), add_object_keyword()
```

Download data

```
download_control(), download_control_global()  
download_object(), download_object_global()
```

Compute data

```
compute_score(), compute_voi(), compute_doi()
```

Export data

```
export_score(), export_voi(), export_doi()
```

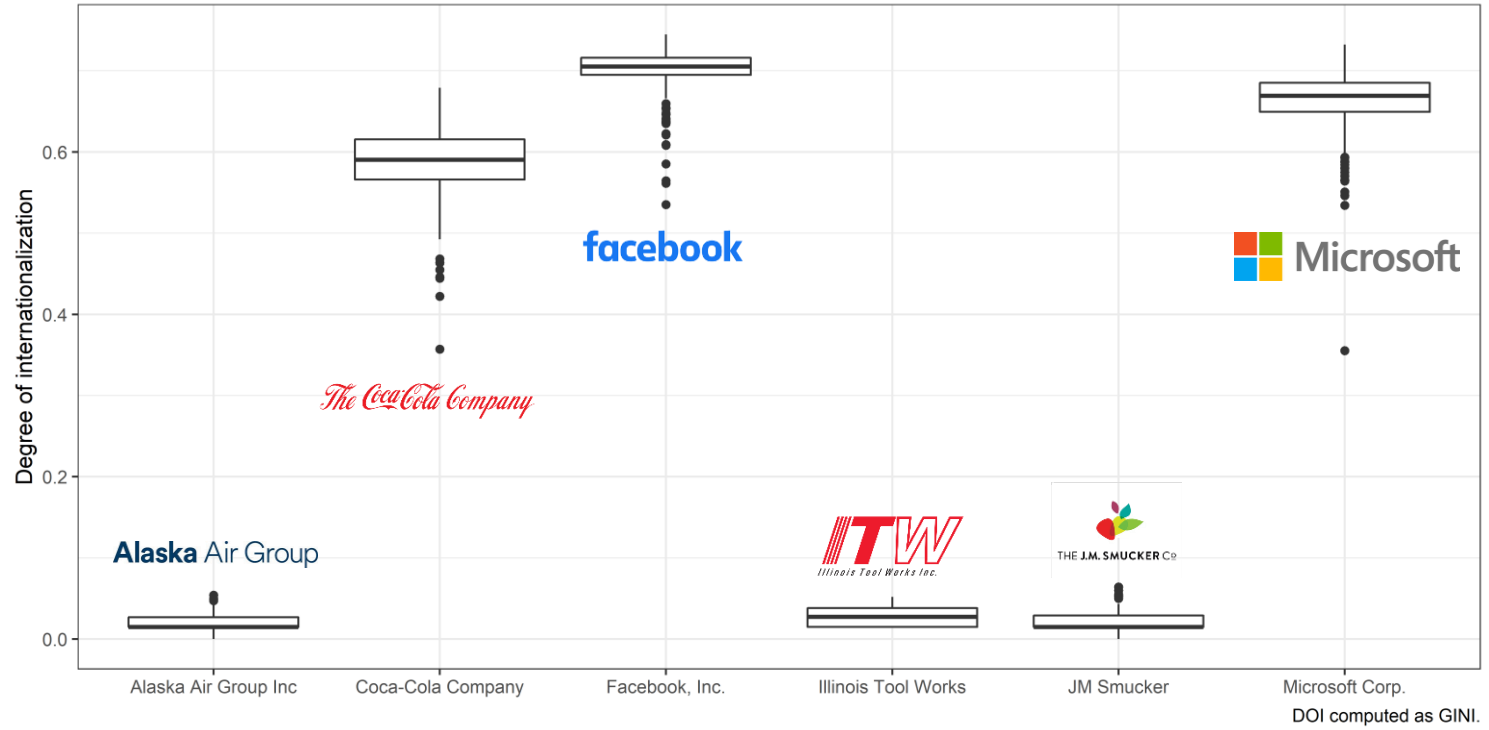
Visualize data

```
plot_bar(), plot_ts(), plot_box()
```

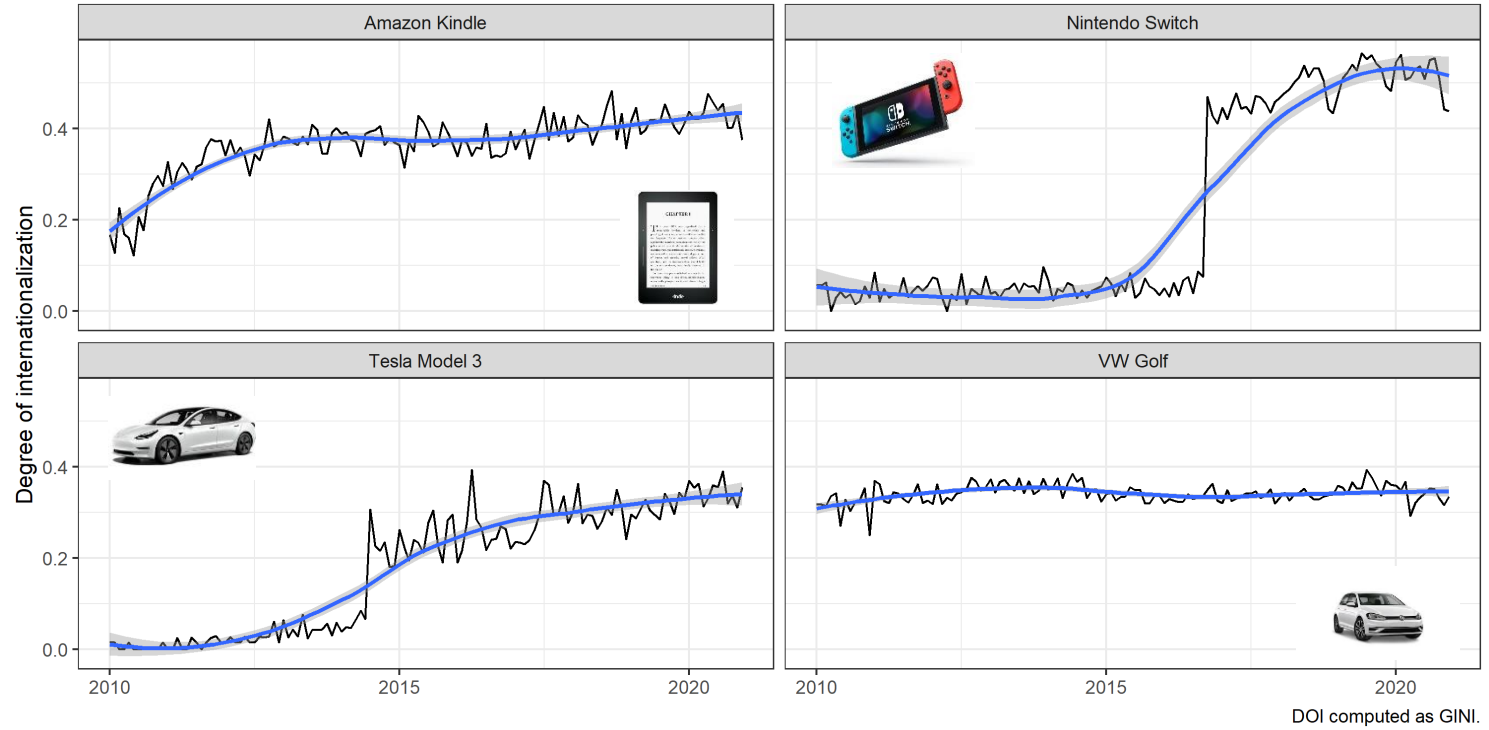
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WHAT CAN YOU DO WITH GLOBALTRENDS?

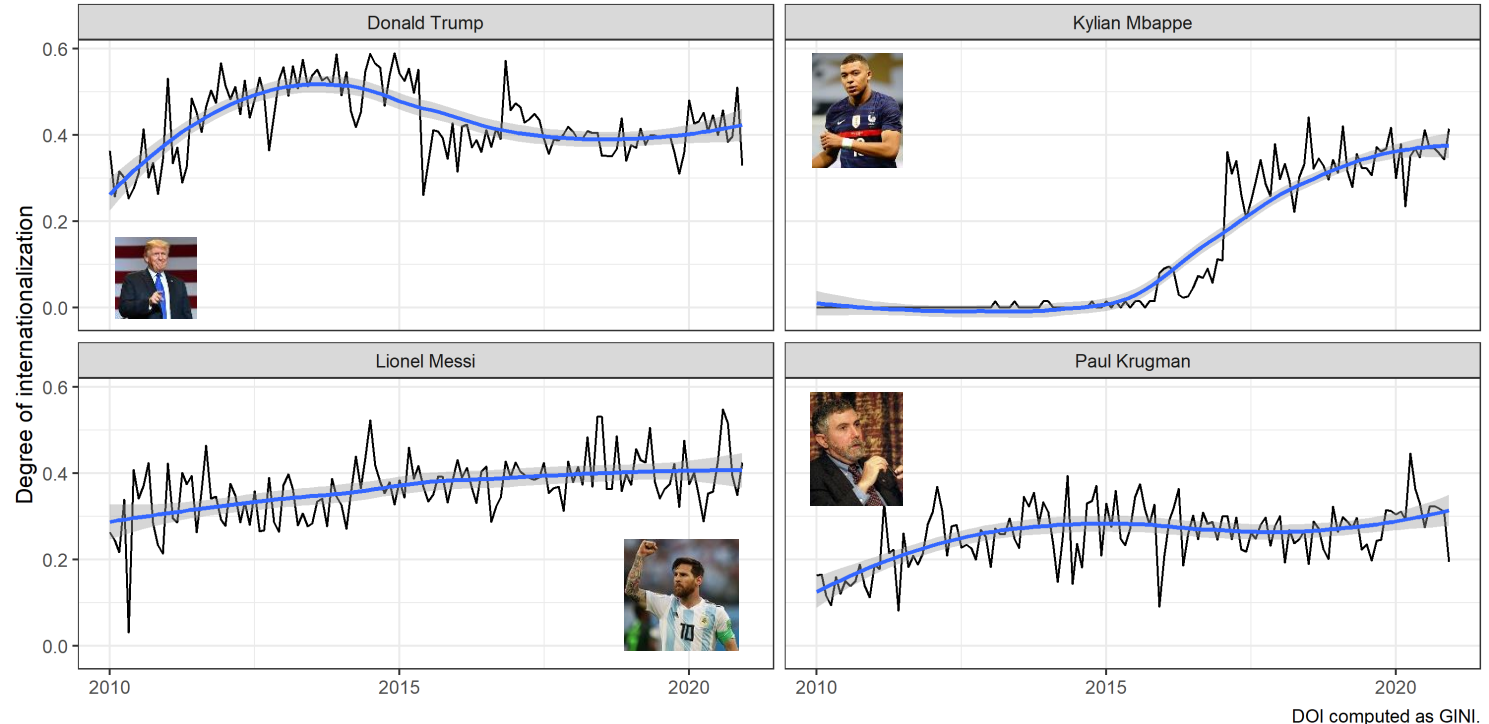
Internationalization of firms



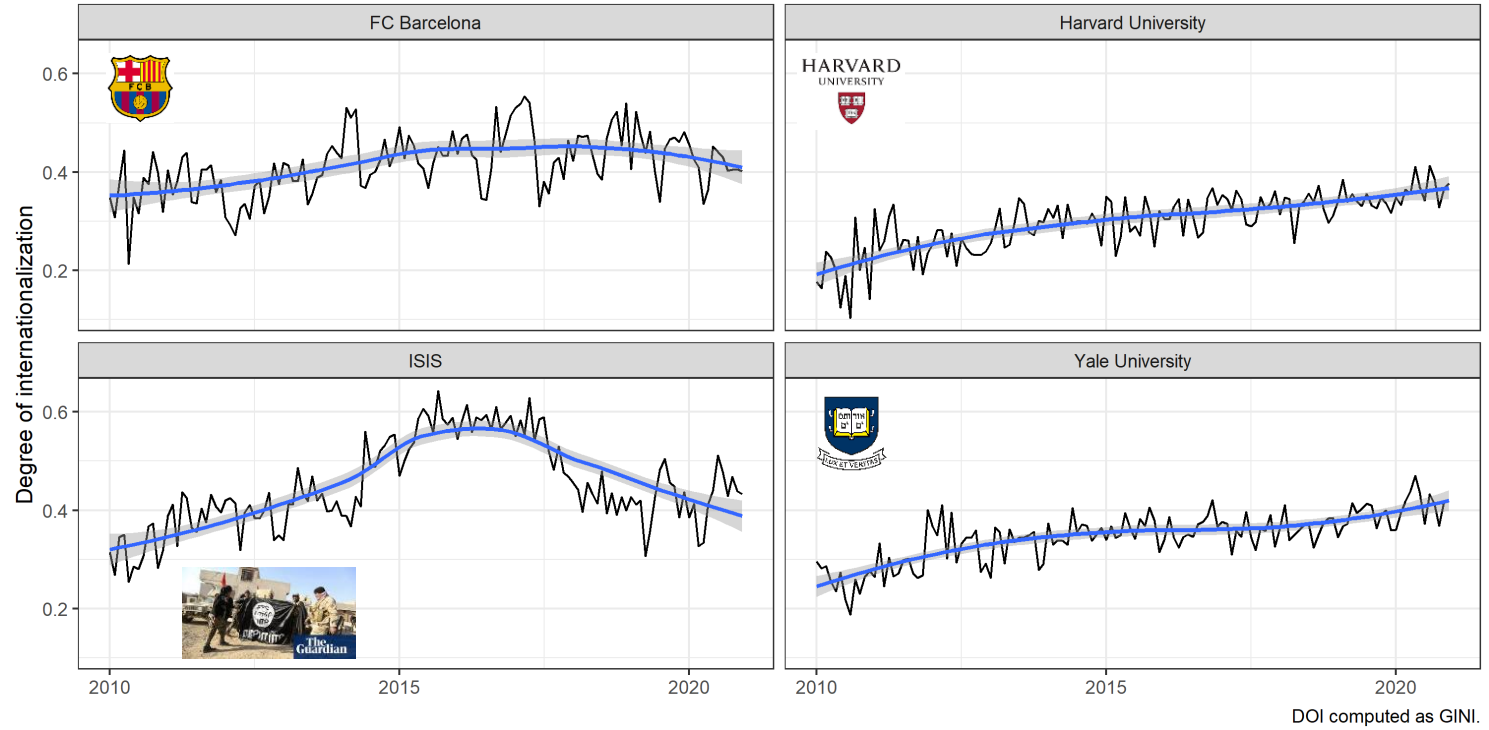
Internationalization of products



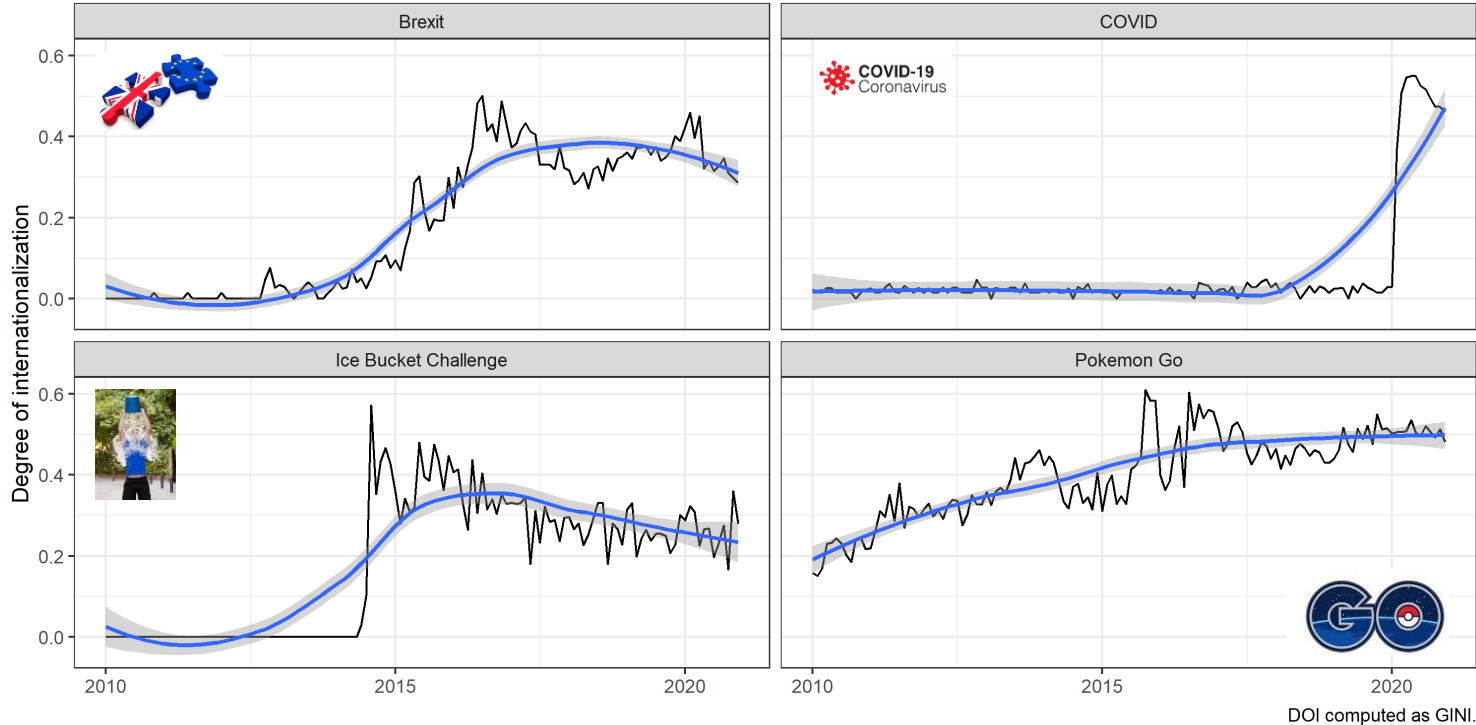
Internationalization of individuals



Internationalization of non-corporate organizations

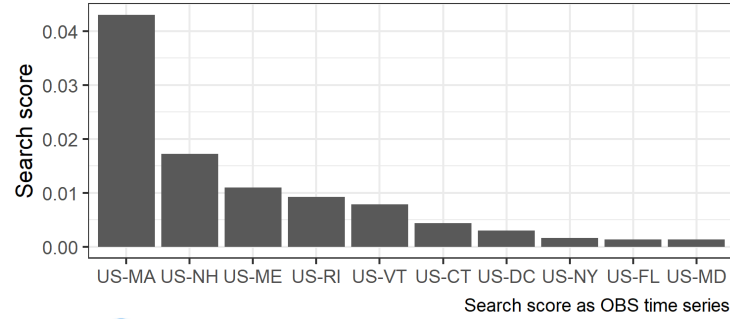


Internationalization of trends and phenomena

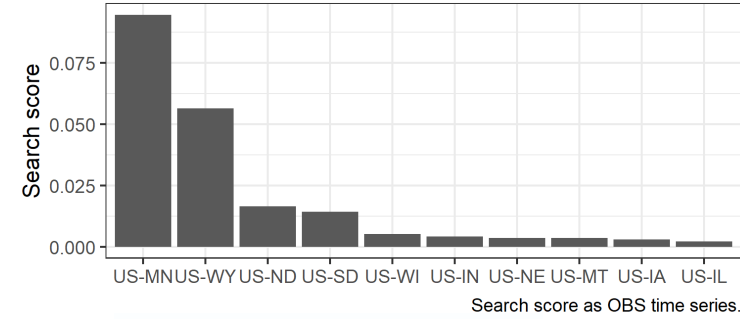


Within-country dispersion

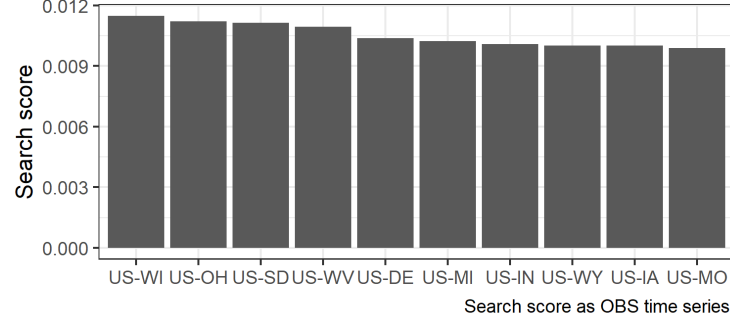
The Boston Globe



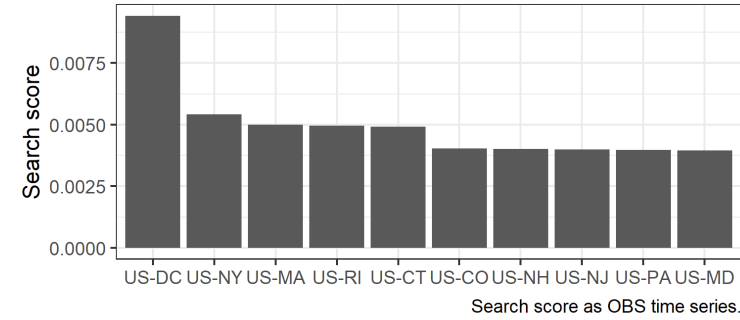
★ StarTribune



USA TODAY

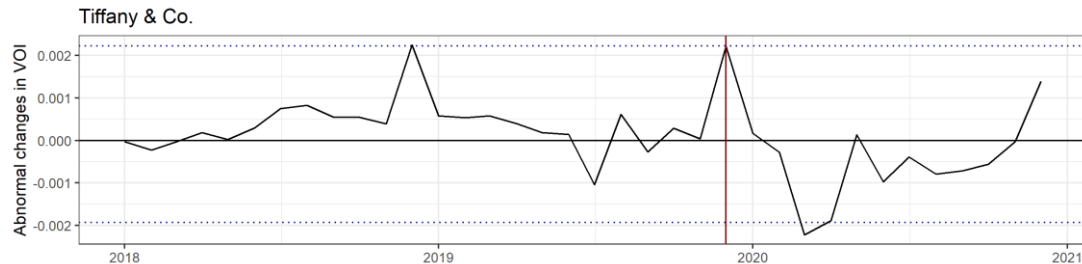
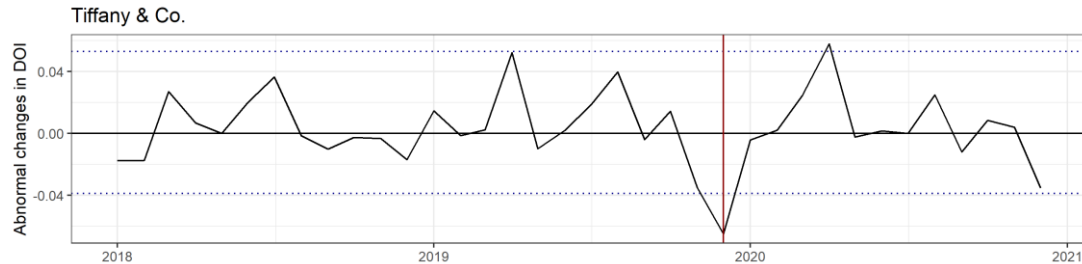
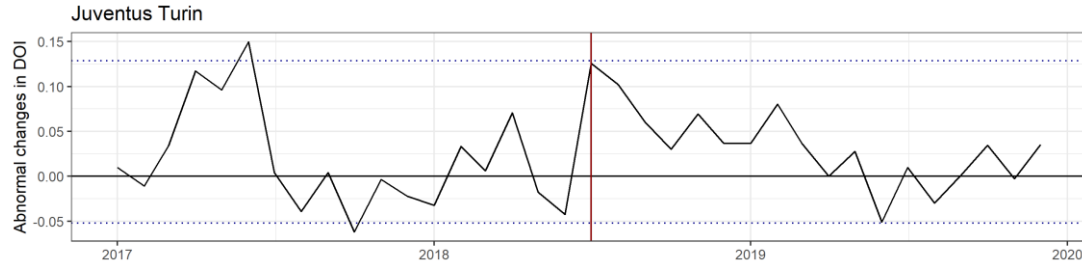


THE WALL STREET JOURNAL.



Event studies

Cristiano
Ronaldo
Transfer



LVMH

Announced
acquisition by
LVMH

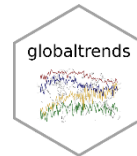
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WHY SHOULD YOU CARE?

Why you should care about globaltrends...

- Academics and practitioners
 - Systematic access to Google Trends as amazing data source
 - Re-normalization allows large scale data analysis
 - SQLite database to share data
- R users
 - We do not replace `gtrendsR` -> we use `gtrendsR`
 - System of functions that build around data accessed through `gtrendsR`
 - “One stop solution”
- R developers
 - Who is your average user?
 - Most people in academia do not use R -> they cope with R
 - Make the package comfortable for the type of user you target

Thank you!



Package and documentation available on GitHub:

<https://github.com/ha-pu/globaltrends>

globaltrends is work in progress:
Comments, suggestions, bug reports,
recommendations are highly welcome and appreciated!



Q&A



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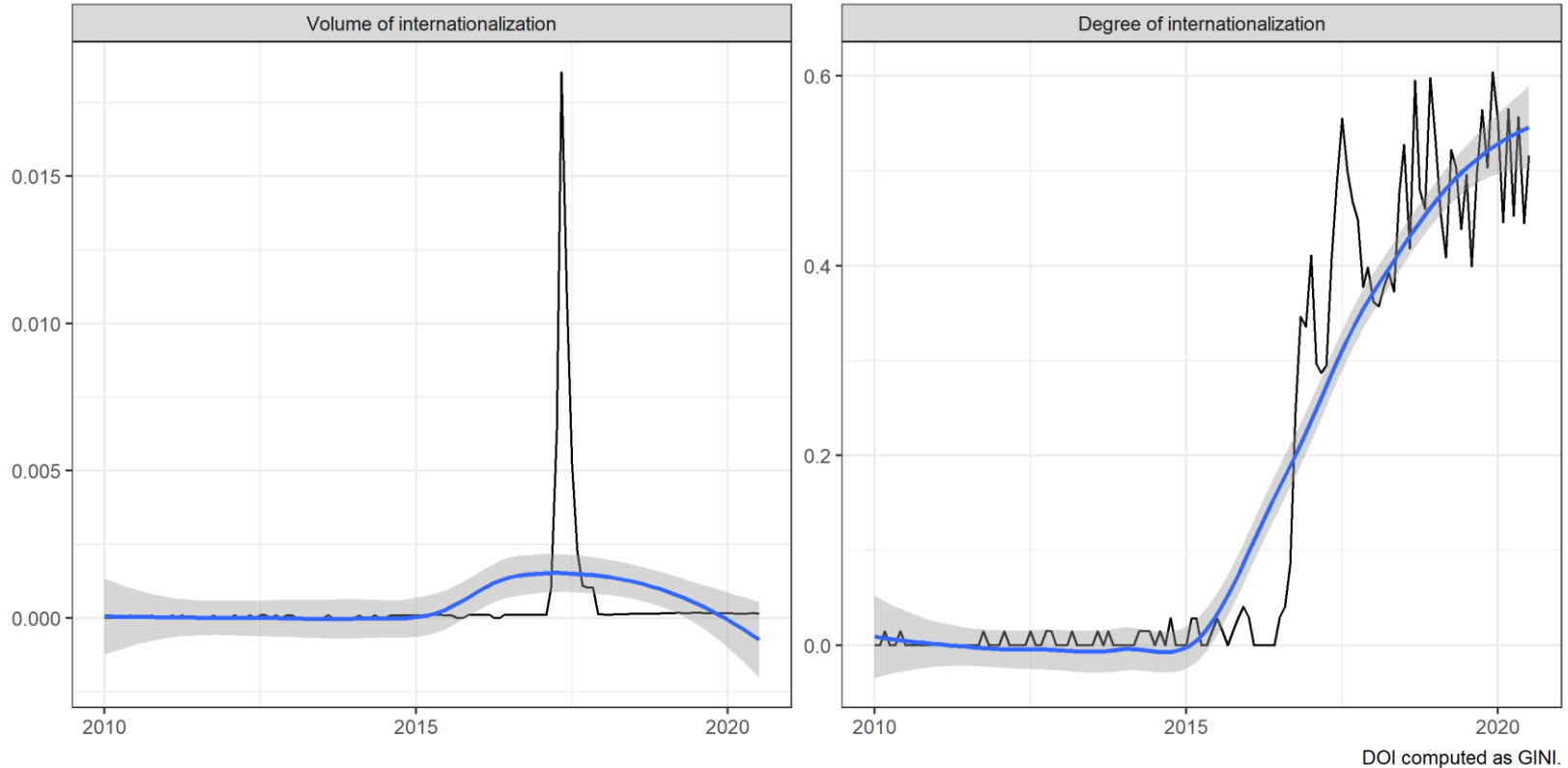
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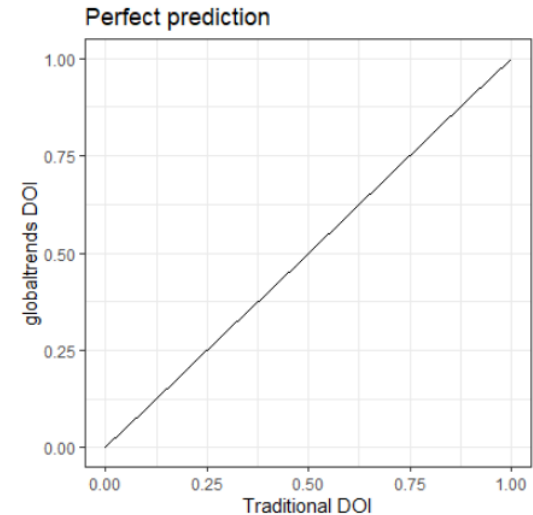
E-Mail: harald.puhr@wu.ac.at

Fidget Spinner example DOI vs. VOI



Predictive Robustness

- To test for biases we create a predictive model and predict global trends DOI with traditional DOI measures
 - Compound of RIMS, TNCI, FSTS
 - Number of foreign countries with subsidiaries
 - Share of foreign subsidiaries
- A perfect predictive relationship would yield
 - $\beta = 1$ and
 - $R^2 = 1$
- To test for biases, we interact covariates for potential sources of bias
 - Language, Internet usage, China....



Predictive Robustness

- Predictive validity and reliability of traditional measures is significant and positive in all specifications
 - Traditional DOI
 - Number of foreign countries
 - Share of foreign subsidiaries
- However, coefficients and R^2 indicate conceptual differences

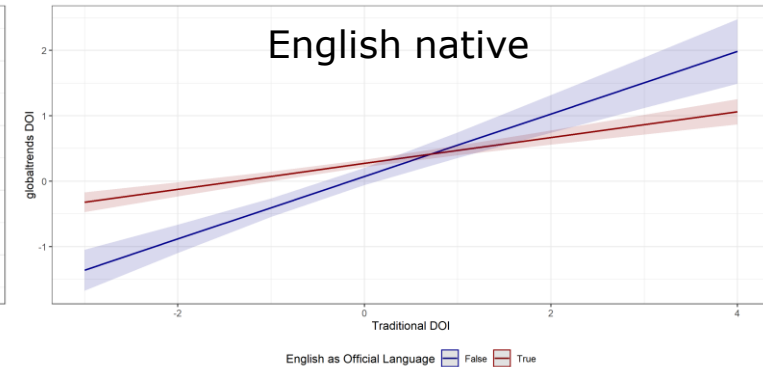
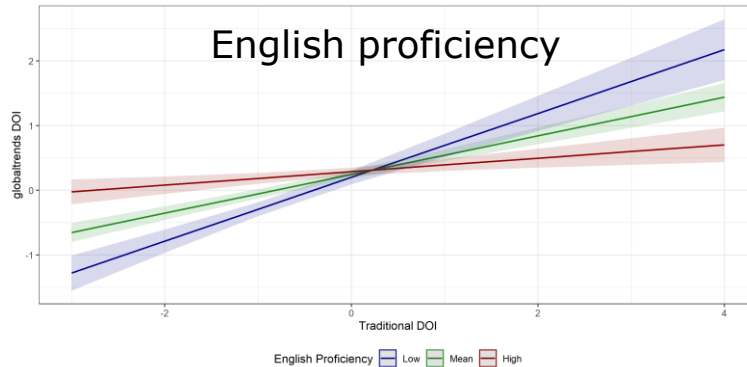
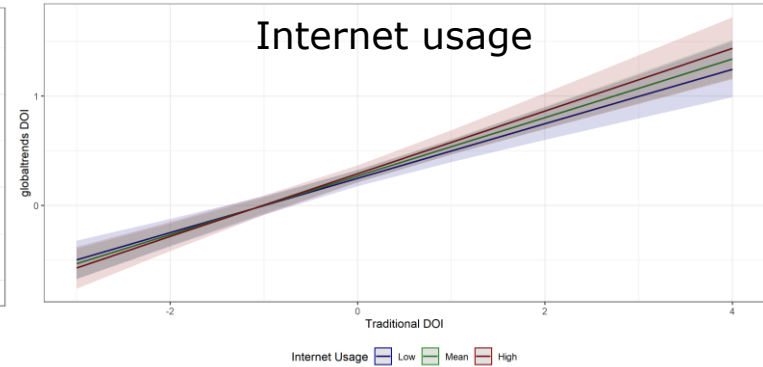
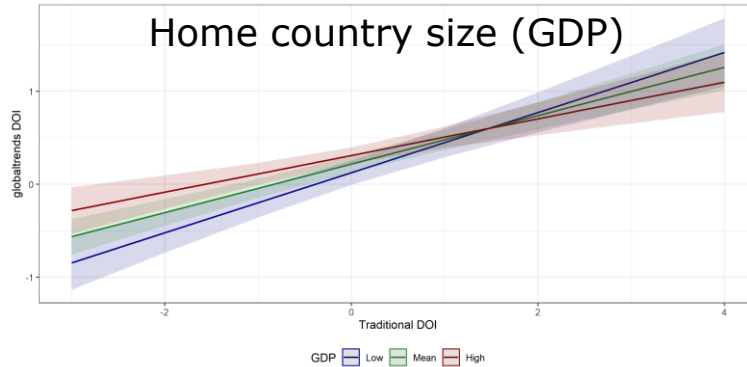
	globaltrends DOI		
	(1)	(2)	(3)
Traditional DOI	0.259*** p = 0.000		
Number of foreign countries		0.338*** p = 0.000	
Share of foreign subsidiaries			0.135*** p = 0.000
Constant	0.269*** p = 0.000	-0.001 p = 0.964	-0.002 p = 0.940
Observations	1,103	1,025	1,025
Dataset fixed effects		Included	
R^2	0.150	0.114	0.018
Adjusted R^2	0.148	0.113	0.017

Country biases

- We observe very small home country size bias
- DOI measures are biased towards English speaking and English proficient countries
- Language biases do not compromise predictive validity and can be controlled with dummy variable for English native language

	globaltrends DOI				
	(4)	(5)	(6)	(7)	(8)
Traditional DOI	0.371*** p = 0.000	0.224*** p = 0.000	0.223*** p = 0.000	0.370*** p = 0.000	0.427*** p = 0.000
GDP	0.049*** p = 0.008				
GDP/capita		0.332*** p = 0.001			
Internet usage			0.077 p = 0.605		
English proficiency				0.054 p = 0.190	
English as official language					0.187*** p = 0.019
Traditional DOI x GDP	-0.034** p = 0.034				
Traditional DOI x GDP/capita		0.053 p = 0.521			
Traditional DOI x Internet usage			0.092 p = 0.506		
Traditional DOI x English proficiency				-0.185*** p = 0.000	
Traditional DOI x English as official language					-0.236*** p = 0.000
Constant	0.057 p = 0.521	0.110* p = 0.077	0.238*** p = 0.002	0.217*** p = 0.000	0.086 p = 0.326
Observations	1,096	1,096	1,098	1,089	1,099
Dataset fixed effects			Included		
R ²	0.161	0.161	0.152	0.171	0.164
Adjusted R ²	0.157	0.157	0.148	0.167	0.161

Home country biases

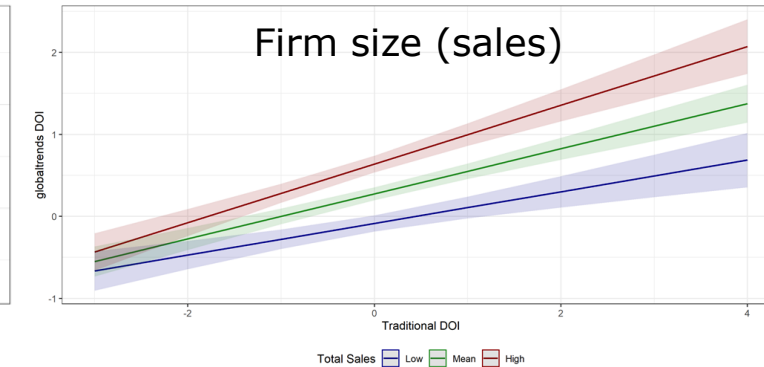
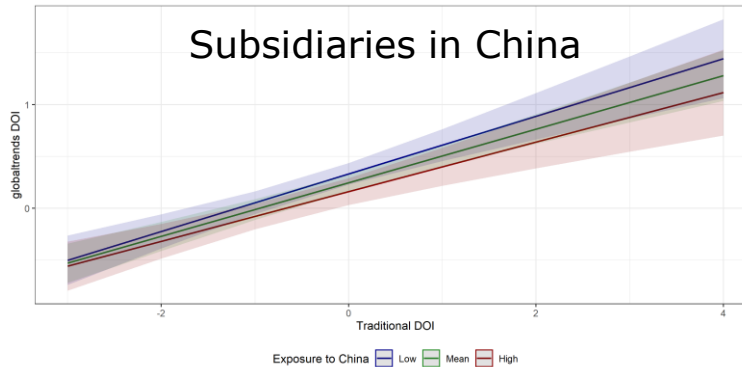
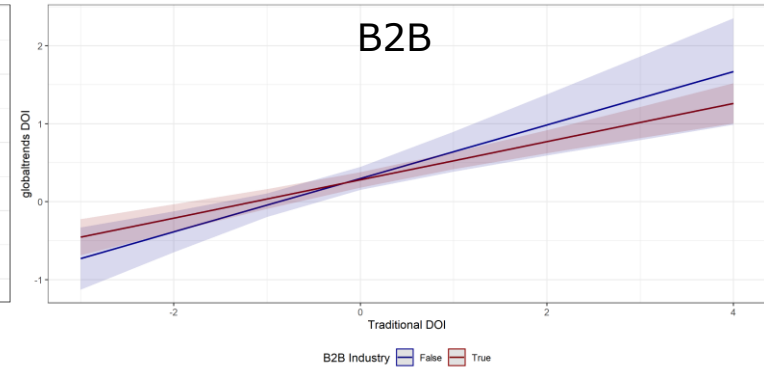
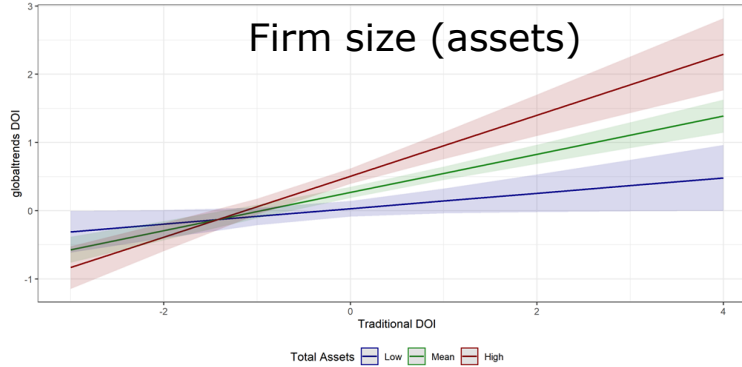


Firm biases

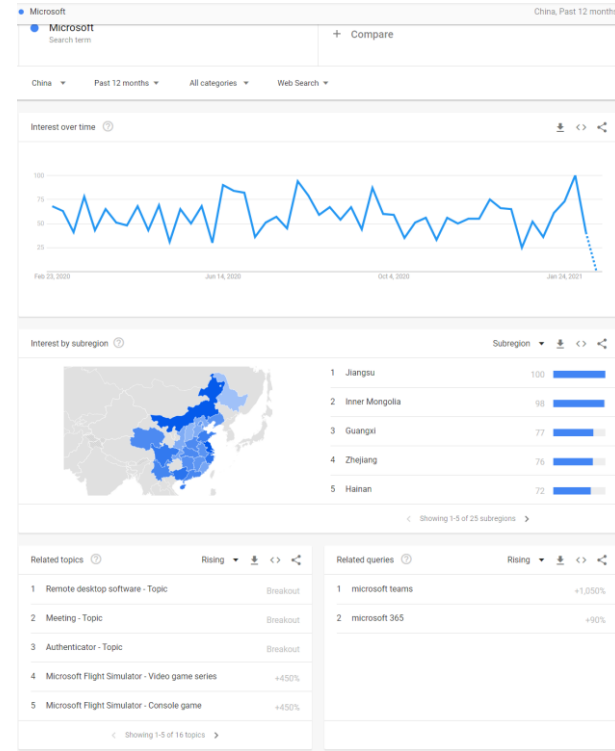
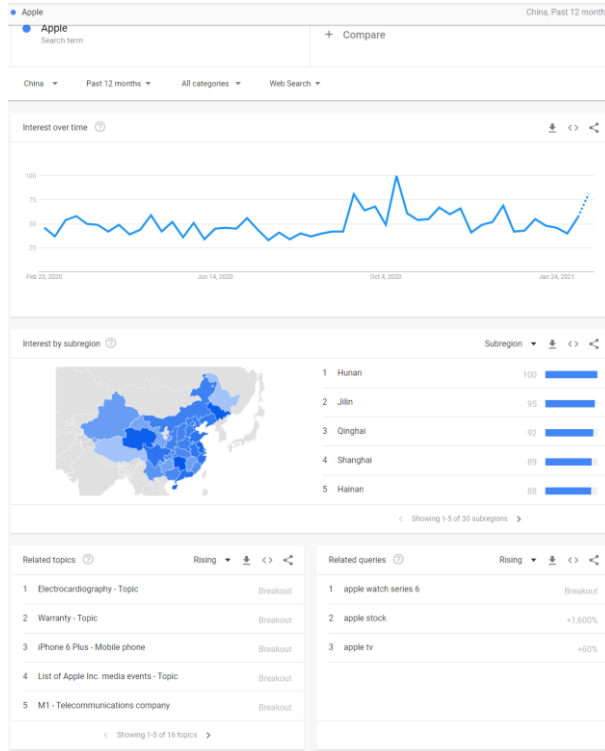
- We observe a small bias for firm size
- DOI measures not affected by B2B operations and exposure to China
- Size bias does not compromise predictive validity and can be controlled with firm size controls

	globaltrends DOI				
	(9)	(10)	(11)	(12)	(13)
Traditional DOI	0.273*** p = 0.000	0.265*** p = 0.000	0.280*** p = 0.000	0.343*** p = 0.000	0.258*** p = 0.000
Total sales	0.322*** p = 0.000				
Number of employees		0.268*** p = 0.000			
Total assets			0.248*** p = 0.000		
B2B industry				-0.019 p = 0.825	
Exposure to China					-0.097** p = 0.043
Traditional DOI x Total sales	0.073*** p = 0.003				
Traditional DOI x Number of employees		0.104*** p = 0.001			
Traditional DOI x Total assets			0.174*** p = 0.001		
Traditional DOI x B2B industry				-0.097 p = 0.244	
Traditional DOI x Exposure to China					-0.022 p = 0.547
Constant	0.265*** p = 0.000	0.253*** p = 0.000	0.268*** p = 0.000	0.300*** p = 0.000	0.244*** p = 0.000
Observations	1,077	1,074	1,075	1,093	1,084
Dataset fixed effects			Included		
R ²	0.238	0.205	0.174	0.152	0.153
Adjusted R ²	0.234	0.202	0.170	0.148	0.149

Firm biases

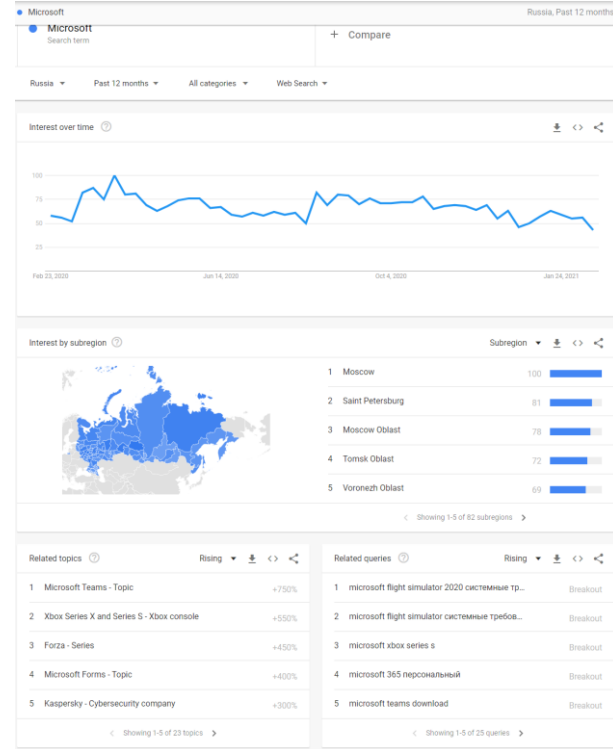
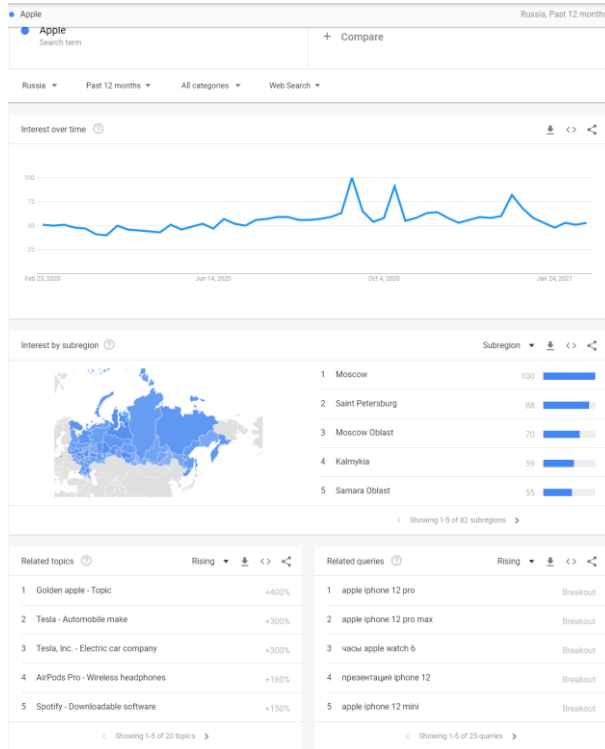


Google Trends results for China



<https://trends.google.com/trends/explore?geo=CN&q=Apple>
<https://trends.google.com/trends/explore?geo=CN&q=Microsoft>

Google Trends results for Russia



<https://trends.google.com/trends/explore?geo=RU&q=Apple>
<https://trends.google.com/trends/explore?geo=RU&q=Microsoft>