Global trade network and currency risk premium

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This file is produced by `SuperCENT_case_study_trade_premium.Rmd` which contains both codes to reproduce the results in "Network Regression and Supervised Centrality Estimation" and the descriptions and instructions of the code chunks. To reproduce this report, `Knit` this file in RStudio. One can set `echo = T` for the each chunk or globally `knitr::opts_chunk$set(echo = T)` to show the code in the report.

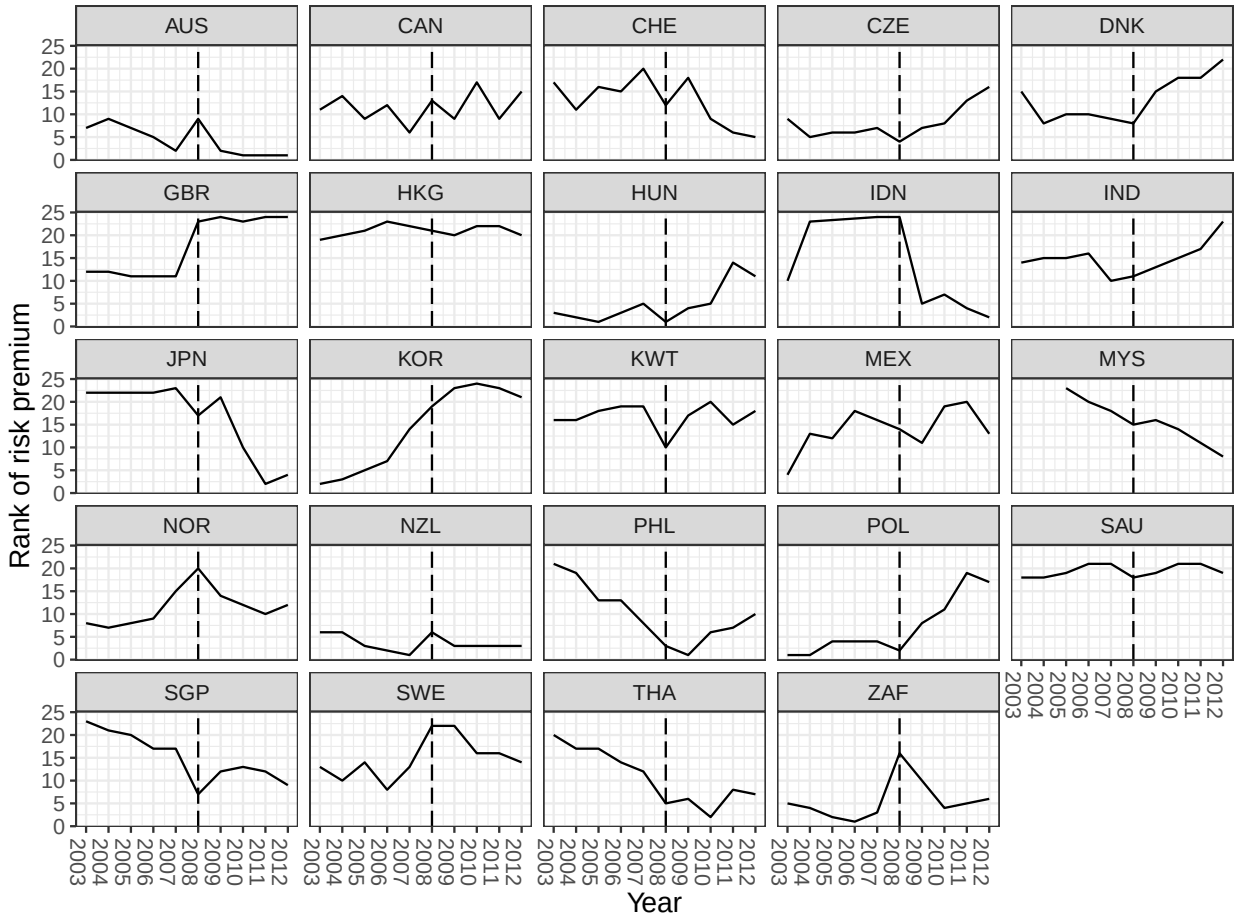
1 Data

We first read the data. The data is constructed using the following scripts.

- `real_gdp_long.csv`: GDP data generated using `construct_gdp_data.R`.
- `FX.csv`: risk premium constructed based on Richmond, R. J. (2019). "Trade network centrality and currency risk premia." *The Journal of Finance*, 74(3), 1315-1361. See instructions here.
- `trade_data_sub.csv`: bilateral trade data generated by `construct_trade_data.R`.

2 Risk primium

The following chunk produces Figure 11. The figure shows the time series plot of the rank of the 5-year moving average of risk premium from 2003 to 2012 for the 24 countries/regions. In each year, we rank the 24 countries/regions from 1 to 24 from the largest risk premium to the smallest, i.e., in descending order of the risk premium.



3 2003 - 2012

We first run the two-stage and SuperCENT with 10-fold cross-validation on 1999-2008 with a window of 5. Specifically, when considering year t, all the relevant quantities are the averages from year $t-4$ to year t.

Following Richmond (2019) we define the trade linkage as the trade amount normalized by the pair-wise total GDP, which represents the relative trade (export/import) intensity between two countries. Specifically, the trade linkage between two countries is computed as

$$a_{ijt} = \frac{S_{ijt}}{GDP_{it} + GDP_{jt}},$$

where S_{ijt} is the dollar value of goods and commodities exported from country i to country j at time t, and GDP_{it} is the GDP of country i at time t in U.S. dollar. We define GDP share as the percentage of country/region GDP among the world GDP, where the world GDP is the total GDP of all available countries in the sample for that year. The model are, for each t,

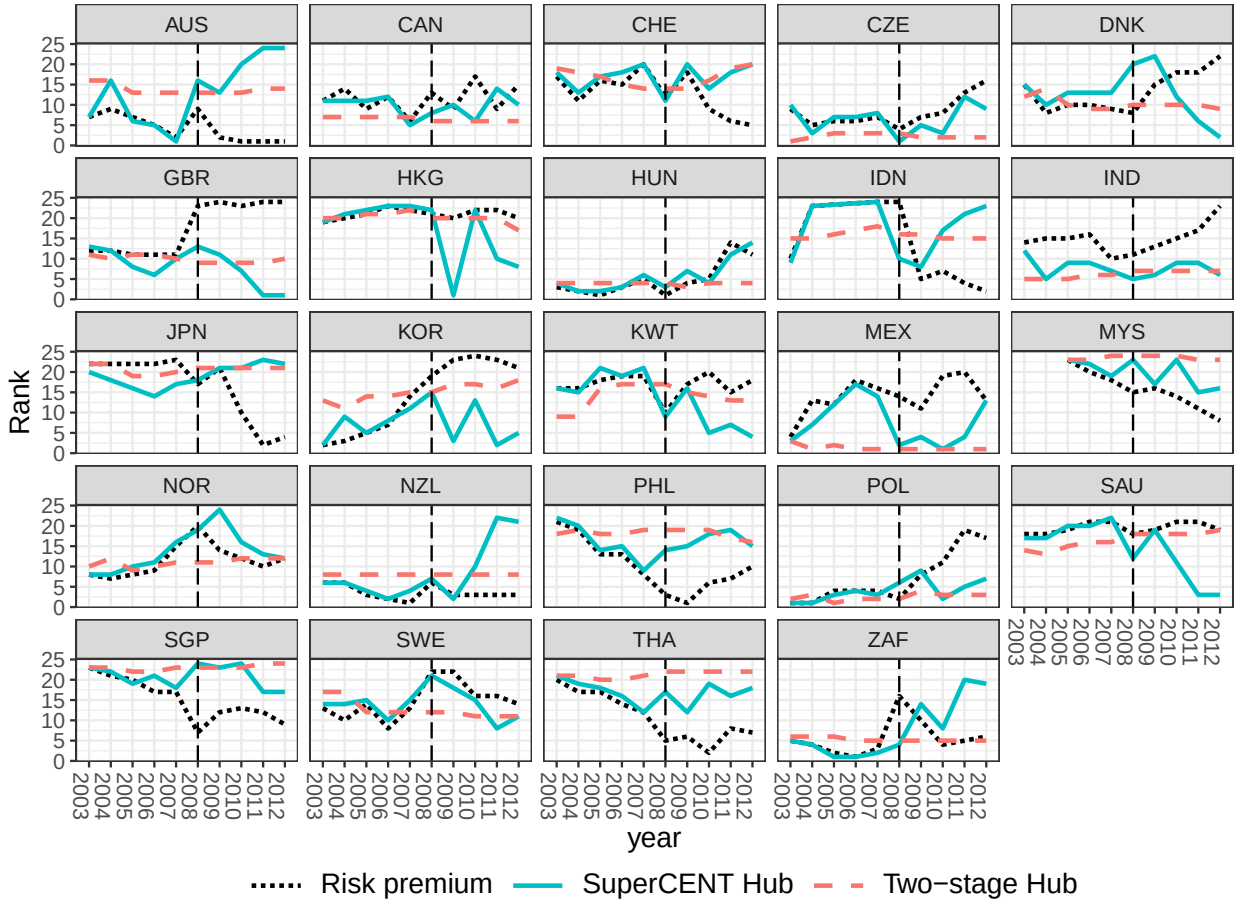
$$a_{ijt} = d\ \text{Hub}_{it} \times \text{Authority}_{jt} + e_{ijt}, \quad (1)$$

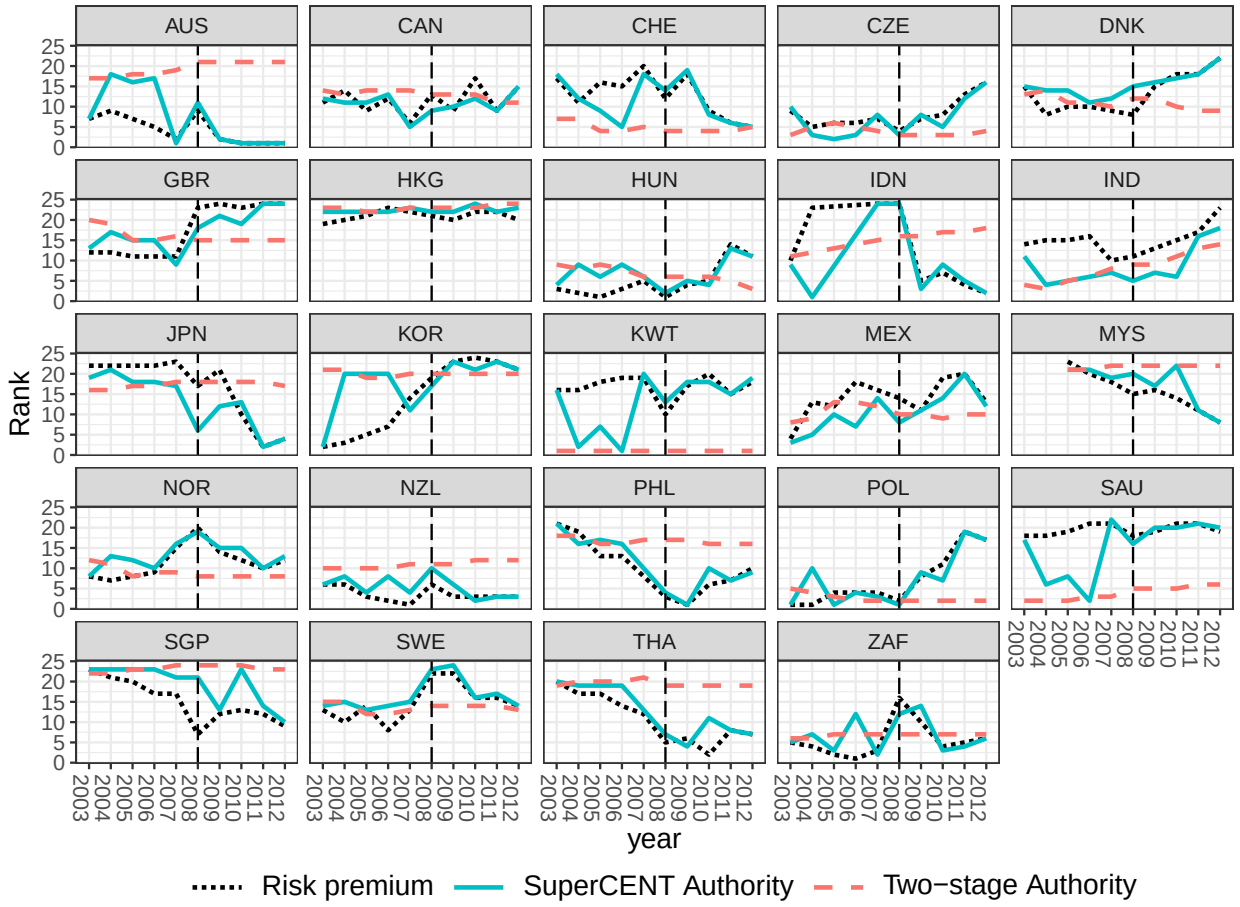
$$\text{rx}_{it} = \alpha + \beta_{ut} \cdot \text{Hub}_{it} + \beta_{vt} \cdot \text{Authority}_{it} + \beta_{xt} \cdot \text{GDP share}_{it} + \epsilon_{it}. \quad (2)$$

3.1 Centrality trend: Figures 12-13

The following chunk produce Figure 12-13. Figure 12 shows the time series plots of the ranking of the hub centrality estimated by two-stage and SuperCENT for the 24 countries/regions, together with the ranking

of the currency risk premium. Figure 13 is for the authority centrality. We rank the centrality in ascending order and the risk premium in descending order.





3.2 Long-short strategy

3.2.1 Figure 14

We examine a long-short strategy based on the centrality estimated by SuperCENT-CV and two-stage based on theory that a country with low centrality exhibits a higher expected currency premium than the ones with high centralities. The following chunk produces Figure 14 which shows the year $t + 1$ return based on this strategy.

3.2.2 Table II

The following chunk produces Table II, the 10-year average return based on this strategy with the top and bottom 3, 4, and 5 currencies, respectively.

4 10-year

We run the two-stage and SuperCENT with 10-fold cross-validation on 1999 with a window of 10, i.e., 1999-2008. Specifically, we take the 10-year average of trade volume and GDP to construct a 10-year trade network and GDP share. Similarly, we take the 10-year average of risk premium as the response.

Table 1: The 10-year average return

	Top/Bottom 3		Top/Bottom 4		Top/Bottom 5	
	Hub	Authority	Hub	Authority	Hub	Authority
SuperCENT CV	0.0031	0.0021	0.0036	0.0019	0.0033	0.0014
Two-stage	0.0003	-0.0014	0.0008	-0.001	0.001	-0.0006
Relative difference	1 136%	253%	338%	285%	237%	320%

4.1 Table III

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Tue, Jul 26, 2022 - 08:44:40

Table 2:

	Dependent variable:		
	Risk premium		
	Two-stage-naive	Two-stage	SuperCENT CV
	(1)	(2)	(3)
GDP share	-0.0159^{*}	-0.0159^{*}	-0.0162^{***}
	(0.0083)	(0.0083)	(0.0037)
Hub	-0.0011	-0.0011^{*}	-0.0021^{***}
	(0.0006)	(0.0007)	(0.0002)
Authority	-0.0005	-0.0005	-0.0003
	(0.0006)	(0.0006)	(0.0003)
Observations	24	24	24
Note:			*p<0.1; **p<0.05; ***p<0.01
			Year 2008-2008

The following chunk calculates the miscellaneous values.

5 Supplement

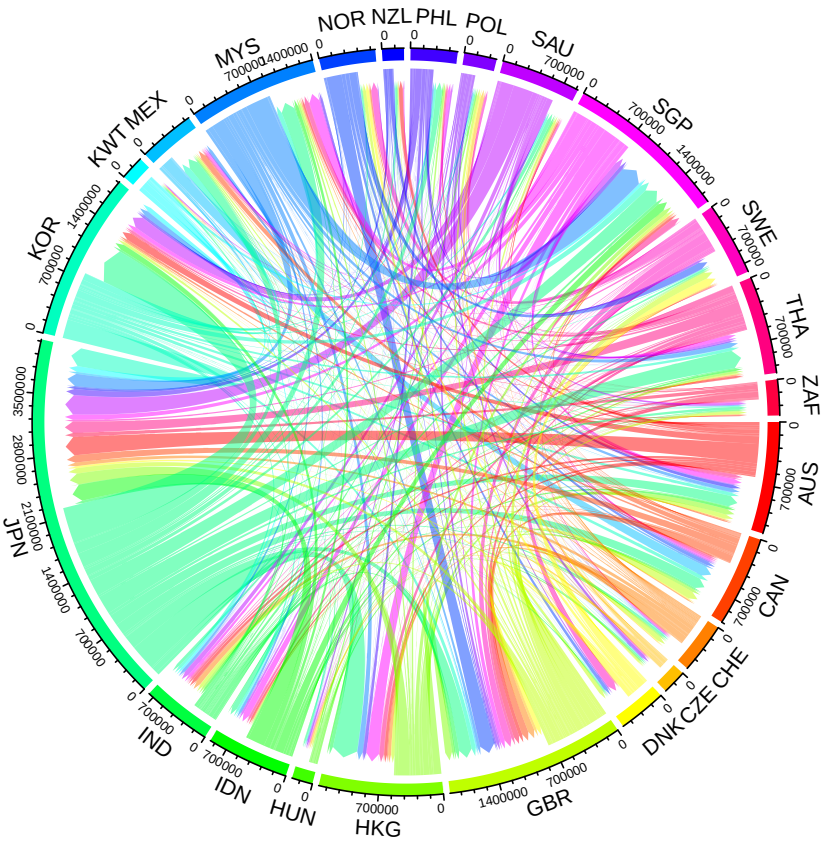
5.1 Table SI: Country code

The following chunk produces Table SI which provides the country acronyms and full names.

code	country
AUS	Australia
CAN	Canada
CHE	Switzerland
CZE	Czech Republic
DNK	Denmark
GBR	United Kingdom
HKG	Hong Kong Sar, China
HUN	Hungary
IDN	Indonesia
IND	India
JPN	Japan
KOR	South Korea
KWT	Kuwait
MEX	Mexico
MYS	Malaysia
NOR	Norway
NZL	New Zealand
PHL	Philippines
POL	Poland
SAU	Saudi Arabia
SGP	Singapore
SWE	Sweden
THA	Thailand
ZAF	South Africa

5.2 Figure S21 Trade circular plot: 1999 - 2008

The following figure shows the average trade volume from 2003 to 2012 among the 24 countries/regions. The arrows reflect the trade directions and the widths represent the volume.


NOR
NZL
PHL
POL
SAU
SGP
SWE
THA
ZAF
AUS
CAN
CHE
CZE
DNK
GBR
HKG
HUN
IDN
IND
JPN
KOR
KWT
MEX
MYS

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