Final Project

Nation’s trading community and its Economic growth

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Goal

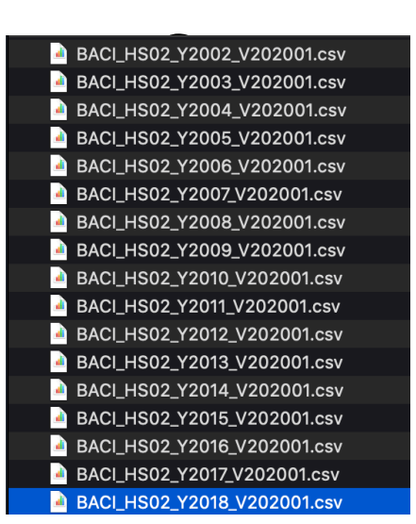
and its direction

- Verify the relation between nation’s trading community and its Economic growth by using correlation measure.
- Extract mathematical datas by network measure and analyze it by using statistical measures.

Data & Network Construction

- Data 1(Trading datas)

2002~2018



BACI_HS02_Y2018_V202001

t	i	j	k	v	q
2018	4	24	845420	101.397	26
2018	4	24	848180	2.328	0.007
2018	4	31	80212	1.982	0.196
2018	4	31	570110	1.60326152792357	0.0412437404222216
2018	4	32	340319	8.65819678272904	0.113
2018	4	32	610910	1.098	0.013
2018	4	32	710399	1.584	0.108
2018	4	36	40310	18.487	5.555
2018	4	36	71310	9.024	5.315
2018	4	36	71320	4.81974531309249	4.124
2018	4	36	80211	10.5979033117243	1.619354392908
2018	4	36	80212	4.44610729924723	0.778194350053881
2018	4	36	80221	17.48	2.021
2018	4	36	80232	3.07358698694563	0.368526021212808
2018	4	36	80290	14.2869324588126	0.943

- Data 2(GDP growth)

Constructing dictionary of growth rate for each country and for each year.

- Network Construction

- For Trading datas

- Undirected Network

- Node : Country

- Edge: Trades (integrated)

- Weight: amount of trade money

Measure

How can we verify the relation and predict the future?

- Clustering-Coefficient (Weighted)

$$\text{wclust(k)} = \frac{\sum_{i=1}^{M} \sum_{j=1}^{M} w_{ki} w_{kj} w_{ij}}{\sum_{i=1}^{M} \sum_{j=1, j \neq i} w_{ki} w_{kj}}$$

and $w_{ii} = 0$

- Correlation coefficient

$$r = \frac{\sum_{i=1}^{n} \left(X_i - \bar{X}\right) \left(Y_i - \bar{Y}\right)}{\sum_{i=1}^{n} \left(X_i - \bar{X}\right)^2 \sum_{i=1}^{n} \left(Y_i - \bar{Y}\right)^2}$$

$-0.1 < r < 0.1$: ignorable correlation

$0.1 < r < 0.3$: weak positive correlation

$r > 0.3$: strong positive correlation

Procedure

Correlation: Correlation between ‘Clustering Coefficient growth’ and ‘GDP growth’

$$CCgrowth_{i+1} = \frac{CC_{i+1} - CC_i}{CC_i}$$

$$GDPgrowth_{i+1} = \frac{GDP_{i+1} - GDP_i}{GDP_i}$$

- Year by Year approach
- Country by Country approach

Result

Year by Year approach

Correlation: Correlation between ‘Clustering Coefficient growth’ and ‘GDP growth’

Year	2003	2004	2005	2006	2007	2008	2009	2010
Corr	0.08826297	0.25992805	0.16494824	-0.00647334	0.12284286	0.28690894	0.38048975	0.25608373

Year	2011	2012	2013	2014	2015	2016	2017	2018
Corr	0.3474822	0.50770819	0.05141066	0.04198369	0.26279418	0.02486667	0.06984184	0.04334106

Result

Country by Country approach

trade in 2002

```
NLD: 373969913.50623184
CAN: 440088339.39786273
ITA: 476645318.73104715
FRA: 605994759.4930233
GBR: 609048805.49391
CHN: 662236530.2169294
JPN: 725036441.3063715
DEU: 1044792990.0371729
USA: 1793213667.399403
```

Top 9 in 2018

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ITA: 1028010318.859657
NLD: 1072652766.5335454
GBR: 1090353192.4777226
KOR: 1119808345.1324234
FRA: 1205656164.1064582
JPN: 1387022721.307623
DEU: 2636269962.3085814
USA: 3904026053.9708786
CHN: 4263280764.10578
```

Nation	CHN	USA	DEU	JPN	FRA	KOR	GBR	NLD	ITA
Corr	0.72093898	-0.29556308	-0.15231418	-0.02027347	-0.1072368	0.22388785	-0.11445957	0.09395785	0.08066241

Conclusion

Clustering Coefficient: Community Joining Measure

Clustering Coefficient Growth: Community expansion

- For each year, country whose trading community becomes larger tends to show high GDP growth, but it is ambiguous.
- Most economically grown countries show positive relation between expansion of community and GDP growth.