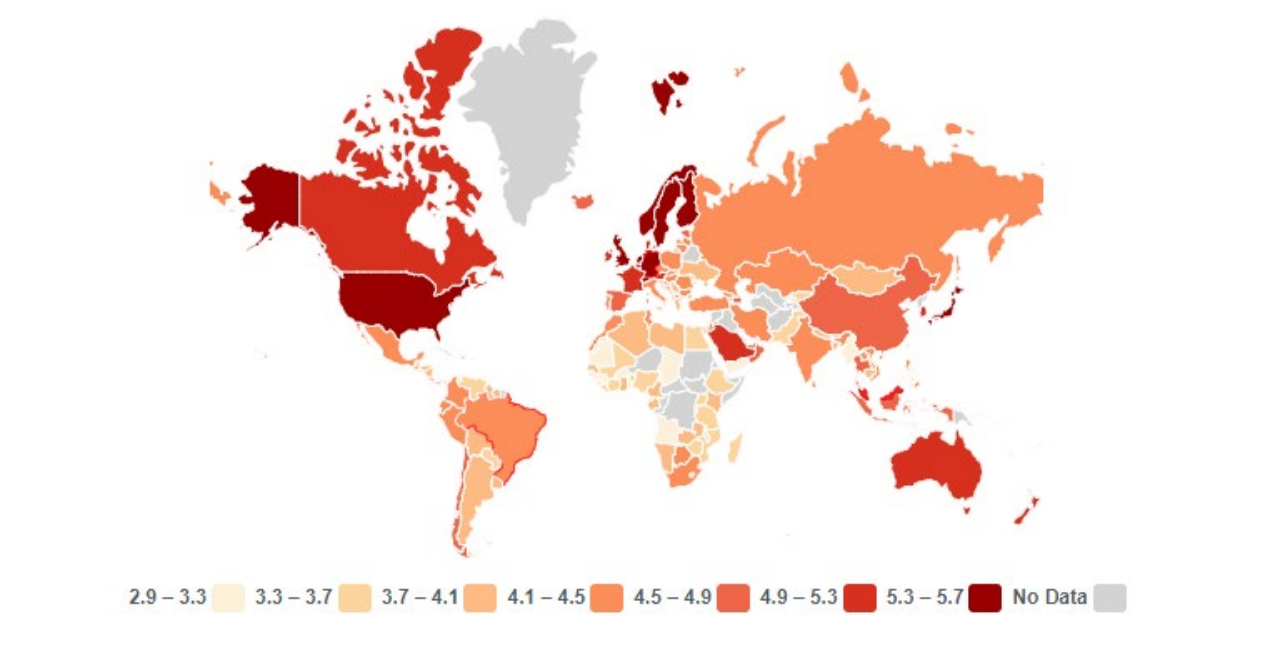
EXECUTIVE NETWORKS AND GLOBAL STOCK LIQUIDITY

William R. McCumber

CIRANO – Walton Workshop on
Networks in Trade in Finance
October 19th, 2019

WHY DO WE CARE?



- Liquidity is important – it lowers the direct/indirect cost of equity issuance, and lowers the risk premium required to hold the stock
- This is especially important in markets that are less developed – better liquidity makes these firms more attractive to institutional investors, who in turn do good things
- If you believe that financial development is good, then things affecting global stock liquidity are things to care about

NETWORKS AND MARKETS (SO FAR)

- Information diffuses more quickly through denser networks (Walden, 2018)
- More central traders are more profitable (Ozsoylev, Walden, Yavuz, and Bildik, 2014; Walden, 2018)
- Sophisticated traders are able to profit from "bits and pieces" of information dropped by more connected board members (Akbas, Meschke, and Wintoki, 2016)
- Firms whose executives are more connected have narrower bid-asked spreads and lower stock liquidity costs (Egginton and McCumber, 2018)

BUT

These stories are all information diffusion stories in highly developed and transparent markets.

WHERE MARKETS ARE LESS DEVELOPED…

- Trading costs are higher in countries with weaker investor protections (accounting standards, judicial efficiency) and political stability (Eleswarapu and Venkataraman, 2006)
- Firms with more political connections underperform less connected peers and are more likely to receive IMF/WB bailouts (and subsequently, perform even worse) (Faccio, Marsulis, and McConnell, 2007; Faccio, 2006, 2010)
- Executive connections lead to a lower cost of equity in underdeveloped markets with weak protections (Ferris et al., 2017)
- These effects are exacerbated in countries with higher levels of corruption

SO ARE CONNECTIONS GOOD OR BAD? YES!

GOOD

- More connections lowers information asymmetries between market participants, lowering cost of:
- Equity (Ferris, Javakhadze, and Rajkovic, 2017)
- Debt (Engelberg, Gao, and Parsons, 2012; Fogel, Jandik, and McCumber, 2018)
- Stock liquidity (Egginton and McCumber, 2018)

NOT SO GOOD

- Greater CEO connectedness associated with poor firm performance, lower pay-performance sensitivity, and fewer turnovers, i.e. entrenchment (El-Khatib, Fogel, and Jandik, 2015)
- Board connectedness associated with more informed trading (Akbas et al., 2016)
- Executive connections mean increased likelihood of fraud (Khanna, Kim, and Lu, 2015)
- Executive and political connections increase probability of bailouts and poor performance (Faccio et al., 2007)

the primary question in this study -

DO EXECUTIVE NETWORKS AFFECT STOCK LIQUIDITY IN GLOBAL (EX US/CAN) MARKETS?

Step 1: Define and measure connections

Step 2: Measure stock liquidity, globally

Step 3: Associate the two, preferably with market opacity as a mitigating factor

BOARDEX – NETWORK RAW MATERIALS

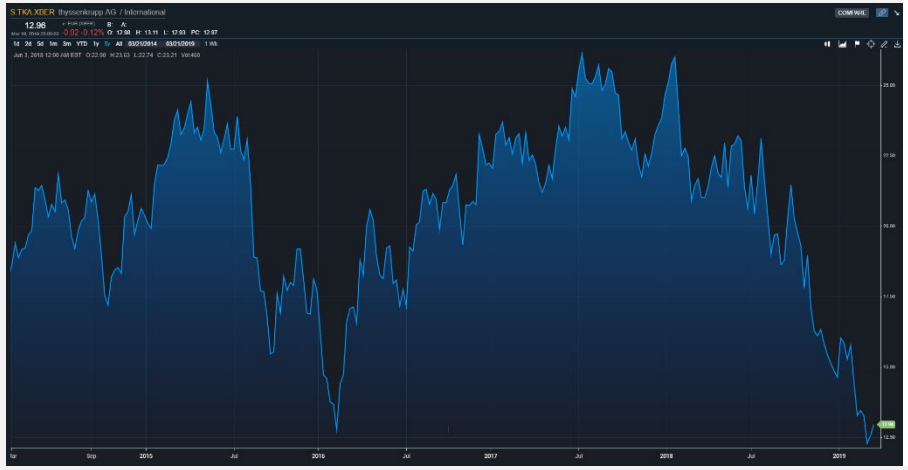
2007-2017 executives, globally:

707,771 unique executives serving 580,286 entities – hundreds of millions of links between them

NETWORKS AND CENTRALITY

- Social networks are made of people (nodes) and the relationships between them (links)
- Current, vs. historical, current networks most relevant for our purposes of immediate information flows (direct, indirect) and/or benefits to executives
- Two executives are "linked" if they sit on the same board at the same time
- Four measures of centrality, one "averaged" measure:
  - Degree – how big is your Rolodex?
  - Eigenvector – how influential are your connections?
  - Closeness – is your network close and dense, or far and sparse?
  - Betweenness – can you control information flows between other nodes?
  - *Central Index* – a summary measure of the above four, a simple average of the percentages

HEINRICH HIESINGER
CEO AND CHAIRMAN, THYSSENKRUPP AG, GERMANY



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Company News, Capital market-relevant press releases, 2018-07-05, 06:35 PM

Dr. Heinrich Hiesinger asks the Supervisory Board to end his mandate as Chief Executive Officer of thyssenkrupp AG in mutual agreement

Dr. Heinrich Hiesinger, CEO thyssenkrupp AG, today asked the Executive and the Personnel Committee of the Supervisory Board of the thyssenkrupp AG for talks to find a mutual agreement for stepping down from his position as CEO of the thyssenkrupp AG.

Dr. Heinrich Hiesinger: "Today I informed the Supervisory Board that I would like to step down from my position as CEO of thyssenkrupp. I take this step very consciously to enable a fundamental discussion in the Supervisory Board on the future of thyssenkrupp. A joint understanding of Board and Supervisory Board on the strategic direction of a company is a key pre-requisite for successfully leading a company. The broad support of our shareholders and the Supervisory Board was the basis for the success of our Strategic Way Forward since 2011. This path always balanced the interests of our customers, employees and shareholders. Today thyssenkrupp is a completely different company regarding culture, values and performance. The joint venture of our steel activities with Tata is the next significant step to turn thyssenkrupp into a strong industrial company. We can be proud of what we achieved until now. For this I would like to thank all employees. They are the most valuable capital of thyssenkrupp."

Prof. Dr. Ulrich Lehner: "The Board under the leadership of Heinrich Hiesinger has freed thyssenkrupp from an existential crisis and made the company ready for the future by implementing the strategy which was agreed by the Supervisory Board. Without Heinrich Hiesinger

In 2013, Mr. Hiesinger was CEO and Chair of Thyssenkrupp AG (he stepped down in 2018). His degree centrality was in the 83rd percentile of all global executives that year, and his betweenness centrality was in the 96th percentile.

ALICIA TIAH
CEO OF TA ENTERPRISE
(A NICHE FINANCIAL SERVICES AND HOLDING COMPANY)
KUALA LUMPUR, MALAYSIA

Ms. Tiah is heralded in the media as an example of a powerful, influential woman, and a role model for Malaysian girls. She was in the 47th percentile of degree centrality in 2013, and in the 33rd percentile in betweenness centrality.

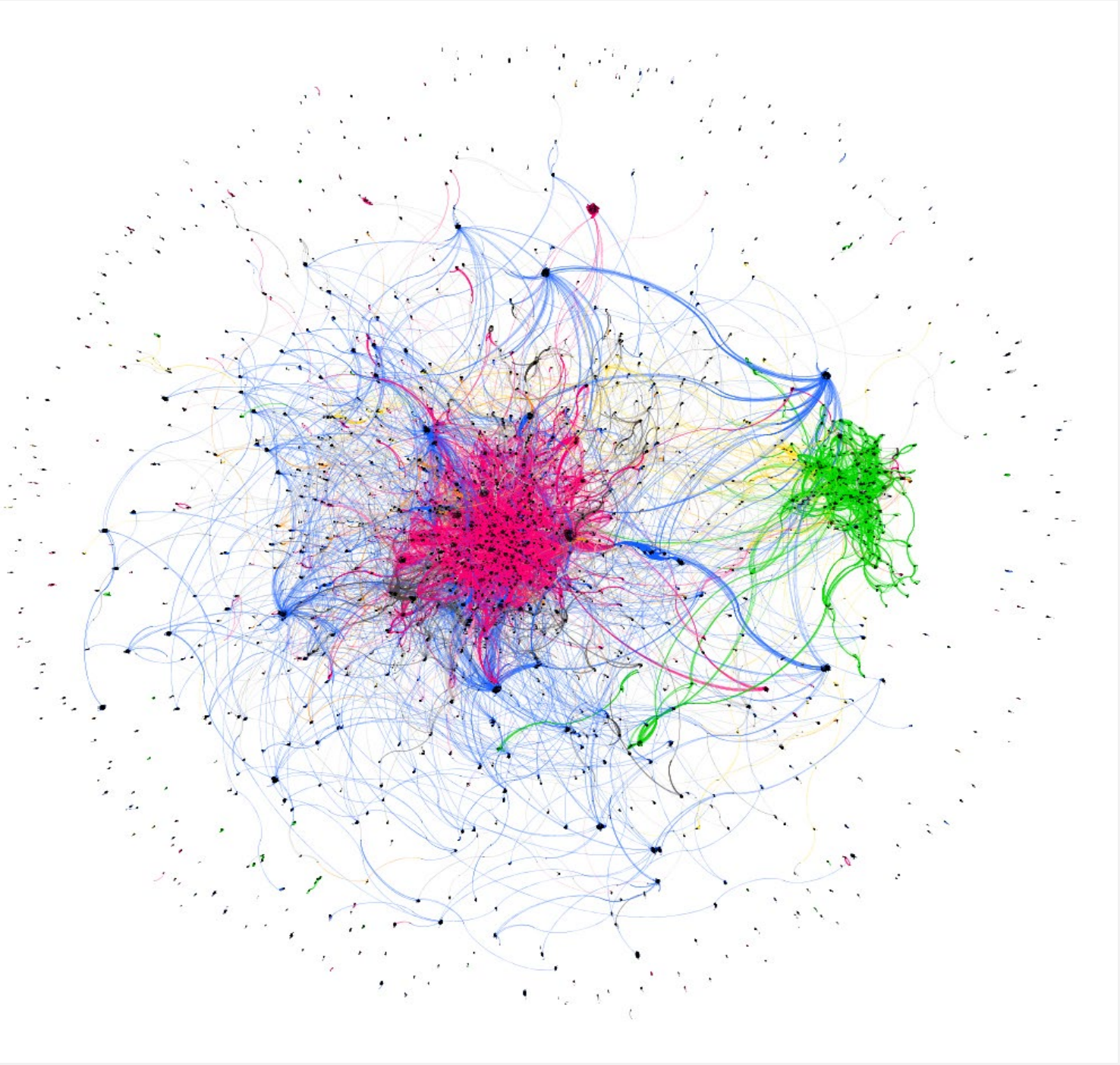
Still the CEO after a recent failed hostile takeover attempt.

Tony Tiah fails in takeover bid for TA Enterprise

theedgemarkets.com / theedgemarkets.com
September 12, 2018 23:01 pm +08

KUALA LUMPUR (Sept 12): Datuk Tony Tiah Thee Kian, who launched a mandatory takeover offer (MGO) for TA Enterprise Bhd at 66 sen per share in July, has failed to garner the required acceptance from minority shareholders which would have given him control of over 50% of the total voting shares in the group.

As at the close of the offer today, Tiah and persons acting in concert (PACs) with him only held



German and Malaysian subnetwork, 2013

3,259 German, 1,845 Malaysian, and 65,236 other executives. 363,344 connections.

Dots are people, with size scaled by degree centrality. Lines are board relationships,.

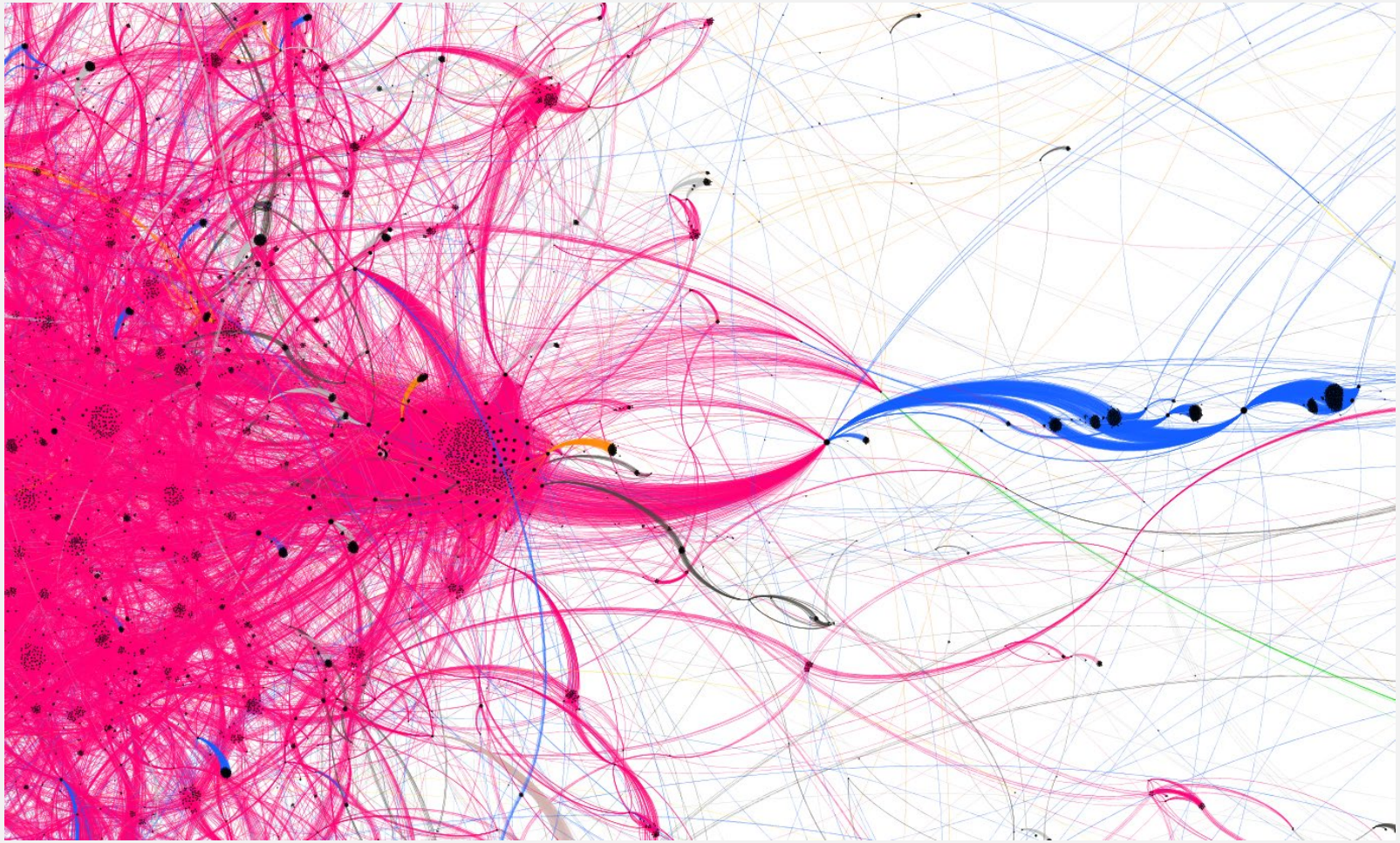
Colors represent the country where the entity is headquartered. Red is Germany – 49% of observations, green is Malaysia – 12.8% of observations, blue is the United States – 22.9% of observations. Other colors indicate Switzerland, France, Netherlands, Singapore, and Luxembourg.

Eastern edge of German cluster, 2013

This close up allows us to see very connected people (large dots), clusters of executives, where there are lots of dots in a ball, and the density of the networks around them.

Red lines represent German entities, blue represents United States entities. Also visible are French entities (orange), Switzerland (dark grey), and Malaysian (green). Other colors represent other countries.

Dense areas may better enable information flows. Larger nodes may further improve the information environment – or – inhibit meaningful disclosures and/or insulate themselves from accountability.

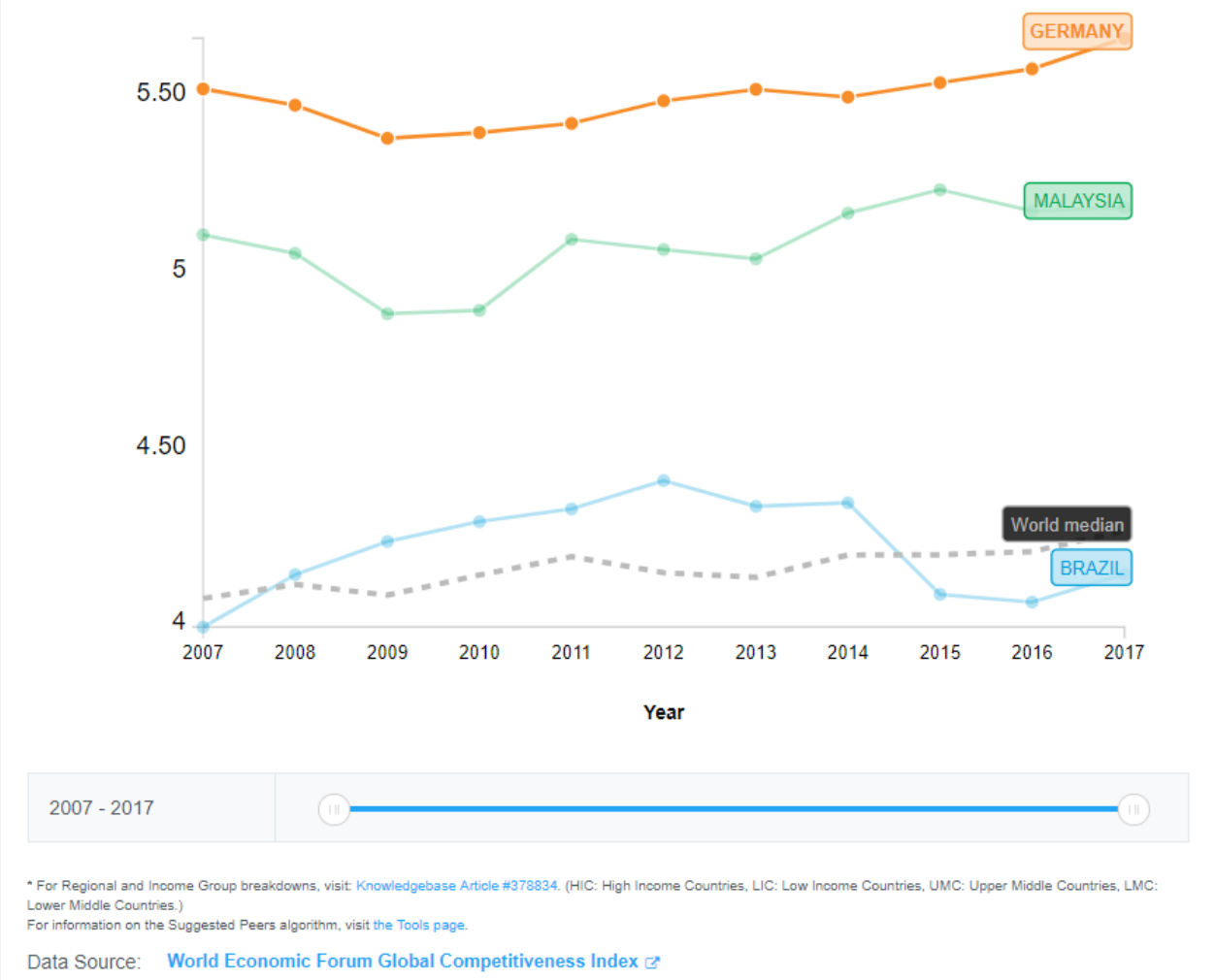


MEASURING GLOBAL STOCK LIQUIDITY

- Compustat Global daily price data: January 1, 2007 – December 31, 2017
- Estimate daily bid-asked spread for each firm (ex US/CAN) following Corwin and Schultz (2012)
- For each year, compute the average annual bid-ask spread (*Liquidity)*
- All prices converted to USD in regression analyses

FINANCIAL MARKET DEVELOPMENT

- World Bank data for strength of Investor Protections and Global Competitiveness Index
- The GCI is an index comprised of 12 "pillars" and 150 inputs believed to contribute to economic growth, e.g. financial market development, labor and goods markets efficiency, infrastructure, formal institutions
- Investor Protections (1 worst, 10 best) is an index measuring the efficacy of financial disclosure requirements, accounting transparency, shareholder protections, and ownership disclosures – in other words, our market opacity measure



FINAL SAMPLE

Oh, and New Zealand…don't forget the Kiwis…

[40 countries] - 3,128 firms - 4,809 CEOs, 4,694 CFOs - 14,187 firm-year observations

Sample of descriptive statistics (from table 1)

Country	# of Obs.	# of Firms	Spread	Central Index	Degree	Eigen	Between	Close	SIP	GCI	Price	Volume	σ(Return)
Argentina	4	1	0.011	0.54	0.62	0.53	0.59	0.43	5.75	3.84	21.84	10.81	4.66%
Australia	2182	527	0.024	0.49	0.54	0.42	0.57	0.45	5.71	5.15	3.85	13.19	4.50%
Austria	203	37	0.010	0.49	0.58	0.37	0.64	0.39	5.12	5.17	52.47	10.62	2.33%
Belgium	322	68	0.010	0.50	0.55	0.40	0.61	0.42	6.54	5.16	93.22	9.48	2.37%
Brazil	261	63	0.013	0.46	0.54	0.34	0.62	0.35	5.90	4.15	18.68	13.31	3.20%
Chile	130	22	0.010	0.47	0.57	0.39	0.57	0.36	6.15	4.67	55.81	13.82	1.82%
China	60	13	0.027	0.50	0.58	0.36	0.65	0.39	4.63	4.90	7.32	16.62	2.77%
Denmark	166	31	0.021	0.55	0.62	0.41	0.73	0.46	6.53	5.41	90.27	11.11	2.67%
Finland	255	45	0.012	0.54	0.63	0.40	0.71	0.43	5.69	5.46	17.90	11.74	2.50%
France	1477	320	0.013	0.42	0.50	0.33	0.53	0.34	5.88	5.15	58.03	9.58	2.95%
Germany	1282	261	0.014	0.42	0.47	0.32	0.54	0.33	5.39	5.50	55.89	10.48	3.24%
Greece	107	23	0.012	0.50	0.61	0.37	0.61	0.40	4.57	4.03	11.30	12.03	3.35%
Hong Kong	31	5	0.246	0.61	0.63	0.53	0.69	0.59	8.60	5.42	20.18	15.39	5.52%
India	975	233	0.015	0.54	0.61	0.44	0.61	0.50	6.71	4.39	9.30	12.97	2.81%
Indonesia	83	16	0.014	0.54	0.65	0.39	0.66	0.45	5.78	4.49	32.92	15.67	4.30%
Ireland	191	41	0.047	0.46	0.49	0.40	0.53	0.42	7.96	4.99	8.29	12.00	6.28%
Israel	321	74	0.015	0.46	0.53	0.41	0.52	0.38	7.90	5.04	14.68	11.27	3.38%
Italy	443	98	0.016	0.50	0.56	0.39	0.63	0.41	6.01	4.43	12.26	12.71	2.86%
Japan	440	117	0.008	0.45	0.59	0.31	0.59	0.31	6.78	5.42	270.42	13.91	2.53%
Korea, Rep.	192	48	0.011	0.42	0.46	0.33	0.54	0.34	6.28	5.04	5445.24	12.84	2.61%
Luxembourg	46	13	0.028	0.57	0.61	0.45	0.69	0.51	4.43	5.11	18.97	11.28	5.01%
Malaysia	287	66	0.010	0.46	0.54	0.35	0.57	0.39	8.26	5.09	1.33	13.62	2.18%
Mexico	191	36	0.026	0.58	0.65	0.51	0.66	0.49	5.89	4.30	18.76	13.17	3.81%

Table 2: Descriptive Statistics by CEO Network Centrality

	Full Sample				Low Centrality Index			High Centrality Index			Difference	
	N	Mean	Median	Std. Dev.	N	Mean	Median	N	Mean	Median	Mean	Median
Spread	14187	0.018	0.009	0.048	7126	0.020	0.010	7061	0.017	0.009	-0.003***	-0.002***
Central Index	14187	0.477	0.450	0.223	7126	0.292	0.300	7061	0.664	0.645	0.373***	0.345***
Degree	14187	0.545	0.530	0.211	7126	0.387	0.380	7061	0.704	0.710	0.317***	0.330***
Eigen	14187	0.378	0.340	0.231	7126	0.211	0.190	7061	0.547	0.530	0.336***	0.340***
Between	14187	0.583	0.650	0.301	7126	0.358	0.310	7061	0.810	0.850	0.452***	0.540***
Close	14187	0.402	0.360	0.254	7126	0.210	0.200	7061	0.596	0.590	0.386***	0.390***
SIP	14187	6.220	6.000	1.257	7126	6.243	6.000	7061	6.196	6.000	-0.047**	0.000
GCI	14187	5.080	5.177	0.445	7126	5.114	5.181	7061	5.046	5.165	-0.068***	-0.016***
Price	14187	145.561	6.395	6536.889	7126	80.675	5.162	7061	211.045	7.975	130.370	2.813***
Volume	14187	12.016	12.326	2.635	7126	11.303	11.589	7061	12.736	12.997	1.433***	1.409***
σ(Return)	14187	0.033	0.024	0.051	7126	0.037	0.026	7061	0.030	0.022	-0.007***	-0.004***

Table 2 reports descriptive statistics on CEO network centrality, equity liquidity, and firm characteristics for the observations in the sample. The sample consists of all firms with non-missing values covered by Compustat Global daily price data, BoardEx, and the World Bank Global Competitiveness Index data over the period January 1, 2007 through December 31, 2017. The right-hand portion of the table reports the results of differences in means/medians analysis where the sample is divided into two subsamples based on CEO centrality. Specifically, we divide the sample into two groups based on the CEO's value of *Central Index* in a given year, observations where the CEO exhibits a value of *Central Index* above (below) the median are classified as being in the "High Centrality Index" ("Low Centrality Index") subsample. Variable definitions are provided in Appendix A. Statistical significance on differences in means and medians is computed using t-tests for mean estimates and k-sample tests for median estimates. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

A quick look at univariate differences shows that there is a significant difference in *Spread* comparing firms with low centrality CEOs compared to high centrality CEOs (where low/high is a simple indicator below/above median)

MAIN TESTS

$$Spread_{i,j,t} = \beta_0 + \beta_1 Central_{i,j,t}[+\beta_2 BottomIP_{j,t} + \beta_3 Central_{i,j,t} \times BottomIP_{j,t}] + \beta_4 Competitiveness_{j,t} + \gamma Controls_{i,j,t} + \varepsilon_{i,j,t}$$

- *Spread* is the Corwin and Schultz (2012) measure of liquidity
- *Central* is a centrality measure
- *Competitiveness* is the World Bank GCI
- *BottomIP* is an indicator equal to one if the observation is in a country below the median global score in Investor Protections that year, i.e. more opaque
- *Central x BottomIP* is an interactive term between centrality and low investor protections
- *Controls* is a vector of control variables including price, volume, volatility, and multidimensional fixed effects for year, industry, and country
- Errors are robust and clustered by country

DOES CENTRALITY MATTER, EX US/CAN?

Table 3: CEO Network Centrality and Equity Liquidity

Dependent Variable = Spread	(1)	(2)	(3)	(4)	(5)
Central Index	-0.008***				
	(-3.425)				
Degree		-0.010***			
		(-2.791)			
Eigen			-0.007***		
			(-2.940)		
Between				-0.003**	
				(-2.478)	
Close					-0.008***
					(-3.206)
GCI	-0.020	-0.020	-0.019	-0.020	-0.020
	(-1.554)	(-1.567)	(-1.535)	(-1.569)	(-1.555)
Price	-0.000	-0.000	-0.000*	-0.000*	-0.000
	(-1.682)	(-1.516)	(-1.740)	(-1.907)	(-1.468)
Volume	-0.001*	-0.000*	-0.001**	-0.001**	-0.001*
	(-1.971)	(-1.869)	(-2.205)	(-2.413)	(-1.901)
σ(Return)	0.272***	0.270***	0.272***	0.273***	0.272***
	(4.077)	(4.041)	(4.097)	(4.106)	(4.084)
Constant	0.121*	0.123*	0.119*	0.121*	0.120*
	(1.774)	(1.796)	(1.746)	(1.793)	(1.758)
Observations	14,187	14,187	14,187	14,187	14,187
Adj. R^2	0.165	0.165	0.165	0.164	0.165

A one standard deviation increase in *Central Index* is associated with a 9.91% reduction in *Spread* at the mean, and a 19.82% reduction at the median. (*Degree*: 12.39%, *Betweenness*: 11.20%)

INVESTOR PROTECTIONS AS A MITIGATING FACTOR

- Where investor protections are weaker (e.g. disclosures more opaque), centrality may partially substitute for these via information channel effects (Ferris et al., 2017; Walden, 2018; Egginton and McCumber, 2018)
  - Centrality is more beneficial when protections are weaker
- Weaker investor protections could afford executives greater freedom to operate (potentially badly) with lower accountability and/or lower probability of detection/enforcement (Eleswarapu and Venkataraman, 2006; Faccio, 2007; Faccio et al., 2010)
  - Centrality exacerbates information asymmetries when protections are weaker
- Or, neither effect; centrality effects on stock liquidity do not differ by strength of investor protections / heterogeneous opacity

CENTRALITY & INVESTOR PROTECTIONS

Dependent Variable = Spread	(1)	(2)	(3)	(4)	(5)
Central Index	-0.013***				
	(-4.794)				
Central Index x Bottom Investor Protections	0.010***				
	(3.464)				
Degree		-0.015***			
		(-3.267)			
Degree x Bottom Investor Protections		0.011**			
		(2.226)			
Eigen			-0.012***		
			(-3.916)		
Eigen x Bottom Investor Protections			0.012***		
			(3.607)		
Between				-0.004***	
				(-2.866)	
Between x Bottom Investor Protections				0.002	
				(1.169)	
Close					-0.013***
					(-4.131)
Close x Bottom Investor Protections					0.010***
					(3.412)
Bottom Investor Protections	-0.003	-0.004	-0.002	0.001	-0.002
	(-1.232)	(-1.208)	(-1.111)	(0.329)	(-0.960)
GCI	-0.019	-0.019	-0.019	-0.020	-0.019
	(-1.546)	(-1.566)	(-1.519)	(-1.578)	(-1.537)

Information channel benefits of centrality are subsumed where investor protections are weaker.

Controlling for weak protections, interaction terms are positive and significant. Combined coefficients are statistically indistinguishable from zero.

OTHER FINDINGS AND ROBUSTNESS

- Replace CEO centrality measures with those of the CFO
  - Same results and story, though lower economic significance
- Even in dynamic "current" networks analysis, centrality rankings will display some persistence
- Therefore, examine whether changes in firms' CEO centrality – via exogenous shock of CEO turnover – display *changes in firm stock liquidity*
  - 942 events where we have complete data before/after event
  - Excludes "transition" year – too noisy
  - Change regressions show that an increase in CEO centrality lowers average bid-asked spreads

FINAL QUESTIONS OR COMMENTS?