

Uncovering Offshore Financial Centers: Conduits and Sinks in the Global Corporate Ownership Network

Javier Garcia-Bernardo, Eelke Heemskerk



UNIVERSITEIT
VAN AMSTERDAM

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- **CORPNET** — Corporate Network Governance: Power, Ownership and Control in Contemporary Global Capitalism
- *What are the **features**, **origins** and **power** political consequences of corporate networks in modern economic life?*
 - Nature: map and analyze the network
 - Origins: uncover generating mechanisms
 - Power: understand how it operates
- PI: Eelke Heemskerk
- PostDocs: Frank Takes, Jan Fichtner
- PhDs: Diliara Valeeva, Milan Babic, Javier Garcia-Bernardo



Corporate networks

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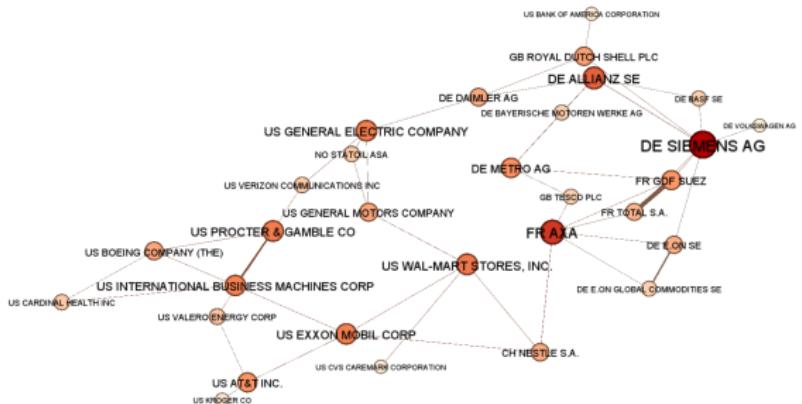


Figure: Board interlock network of 30 firms

Projects on board interlocks

- **Structure of network:** Hierarchical structure.
- **Network dynamics:** Origins of the network: Network and social-driven mechanisms.
- **Social distance:** Consequences of the network: Co-investment strategies.

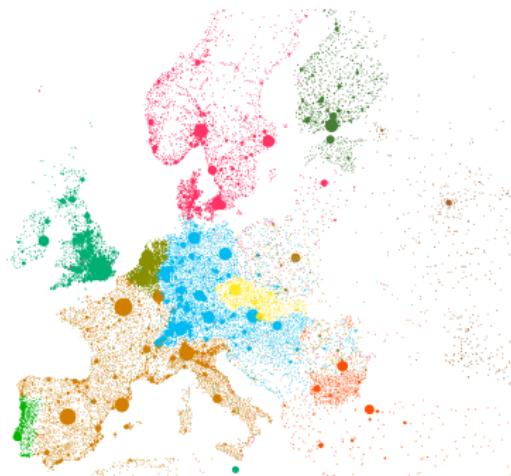


Figure: Communities of board interlocks in Europe

E.M. Heemskerk, F.W. Takes, J. Garcia-Bernardo and M.J. Huijzer 'Where is the global corporate elite? A large-scale network study of local and nonlocal interlocking directorates', *Sociologica* 2016(2): 1-31, 2016. doi: 10.2383/85292.

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Ownership network

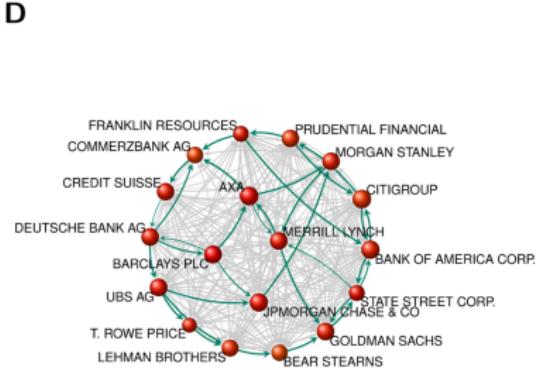
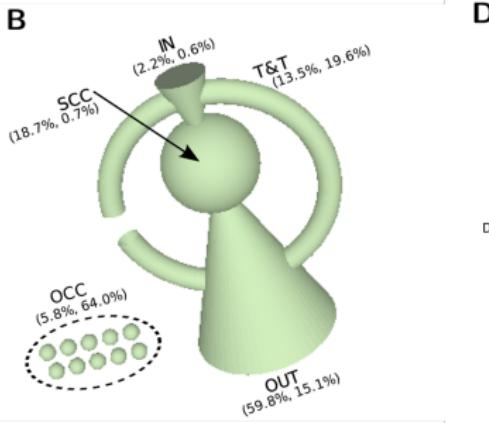
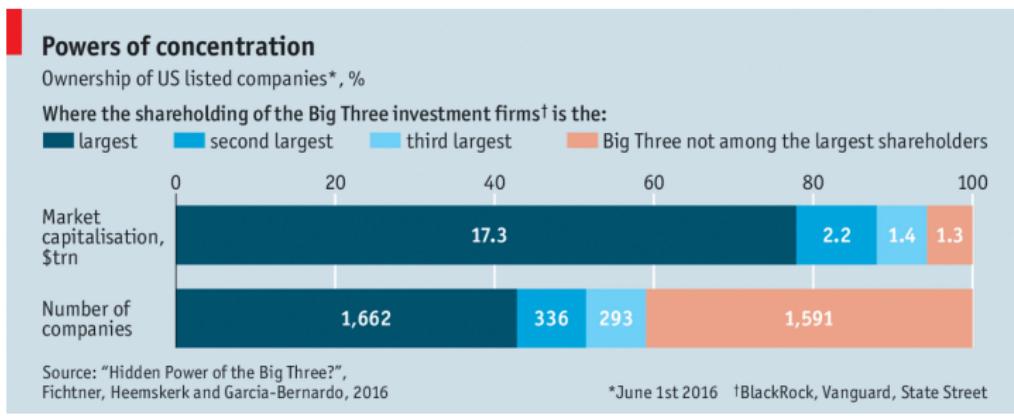


Figure: 0.61% of nodes possess 80% of the control – to compare, 4.35% of companies represent 80% of operating revenue, 5-10% of people obtain 80% of income

S. Vitali, J.B. Glattfelder and S. Battiston, S, The network of global corporate control, *PLoS one* 6(10), e25995, 2011.

Project 1: Concentration of ownership

- **The Big Three:** BlackRock, Vanguard and State Streets are the largest shareholder of 88% of the US market (and growing).



Economist.com

J. Fichtner, E.M. Heemskerk and J. Garcia-Bernardo. Hidden Power of the Big Three? Passive Index Funds, Re-Concentration of Corporate Ownership, and New Financial Risk, *Business and Politics* 17(1): 1-29, 2017. doi: 10.1017/bap.2017.6.

Project 2: Concentration of ownership

- **State capitalism:** Increase market share of states – e.g. Sygenta deal for \$43 Billion.

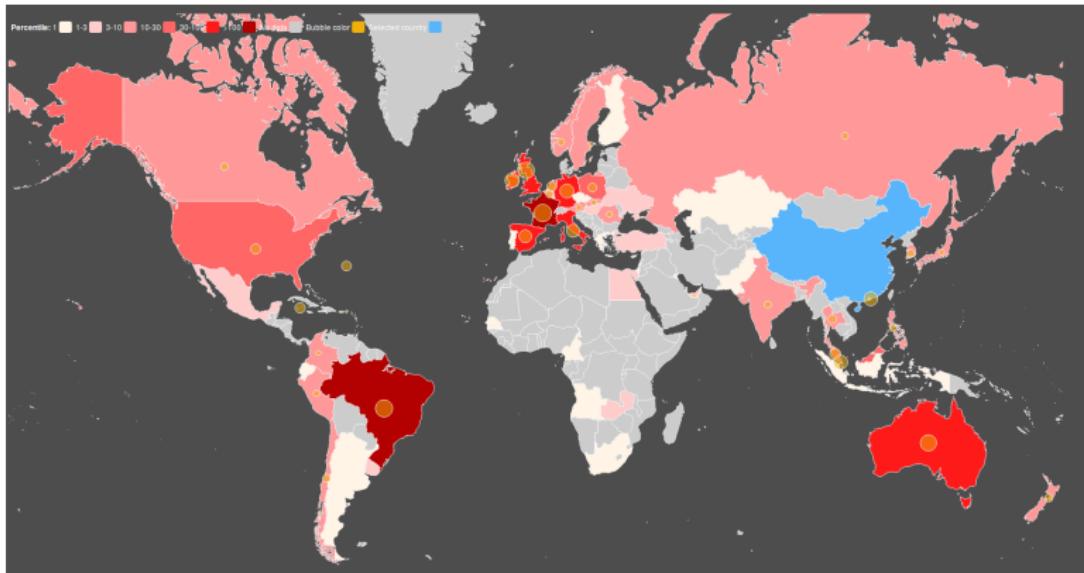


Figure: <http://corpnet.uva.nl/soe/>

Project 3: Offshore financial centers

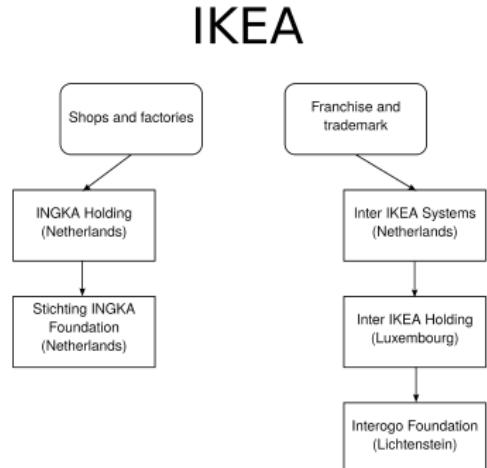
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- OFCs “process” around \$6 000 000 000 000 yearly.
- Problematic because:
 - Unnecessary system complexity
 - Accountability
 - Tax avoidance: Around €150 billion are lost by tax avoidance in Europe.
- The Netherlands play a key role: €4 trillion in equity capital and loans granted abroad.



Characterizing OFCs

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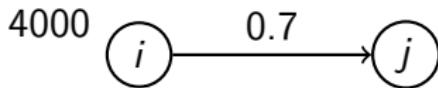
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 - OFC homogeneity assumption
- Solution: **Networks!**

Our data

- Orbis database
- Based on data from chambers of commerce
- 71,201,304 ownership links between firms
- Better coverage for high-income countries
- Poor data quality → fiscal secrecy
- Findings likely represent lower bound

Ownership network

- Ownership network $N = (V, E)$
- Nodes are firms $i \in V$
 - Have value associated to them R_i
 - Are based in a particular country $\phi(i)$
- Directed links indicate ownership relation / value flow $(i, j) \in E$
 - Have an associated weight in $[0; 1]$ $w(i, j)$
- $w(i, j) = 0.7$, $R_i = 4000$ gives:



Ownership chains and value

- We create the set of all ownership chains C from the ownership network. A ownership chain:

- 1 starts at node v ,
- 2 is a simple path (has no repeated nodes),
- 3 has multiplicative ownership value greater than θ , i.e., $w_p \geq \theta$

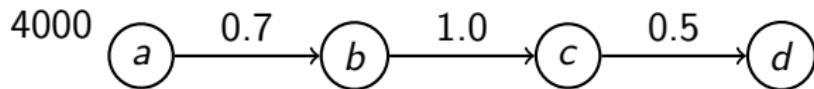
$$w_p = \prod_{i=1}^{\ell-1} w(v_i, v_{i+1})$$

- 4 is maximal in length, i.e., cannot be extended by adding another node.

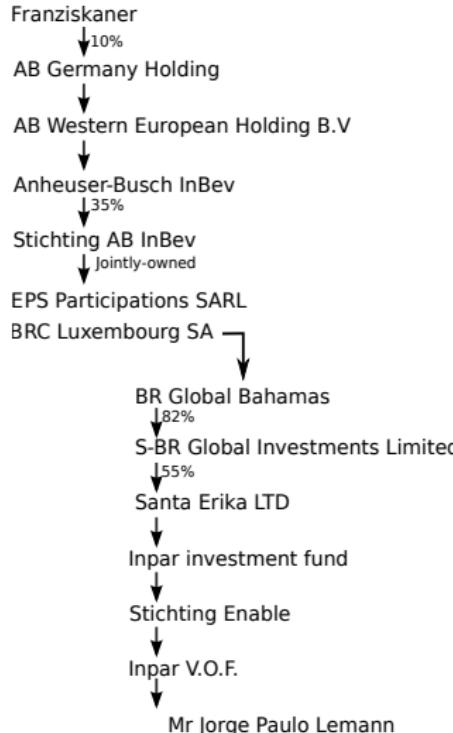
- Chain value

$$V_p = R_{v_1} \cdot w_p$$

- $p = (a, b, c, d)$ and $w_p = 0.35$ and $V_p = 1400$



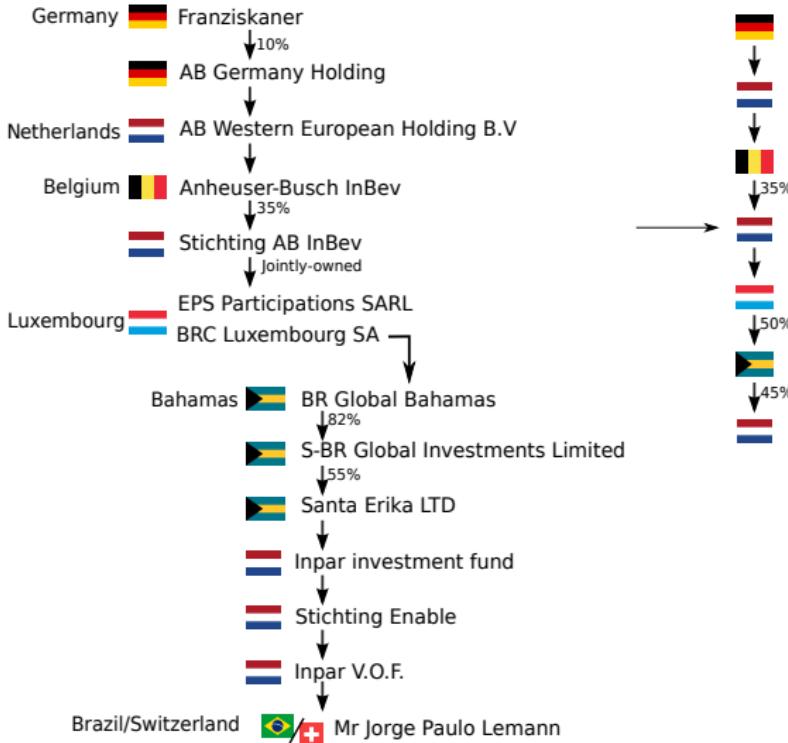
Ownership chain → OFCs



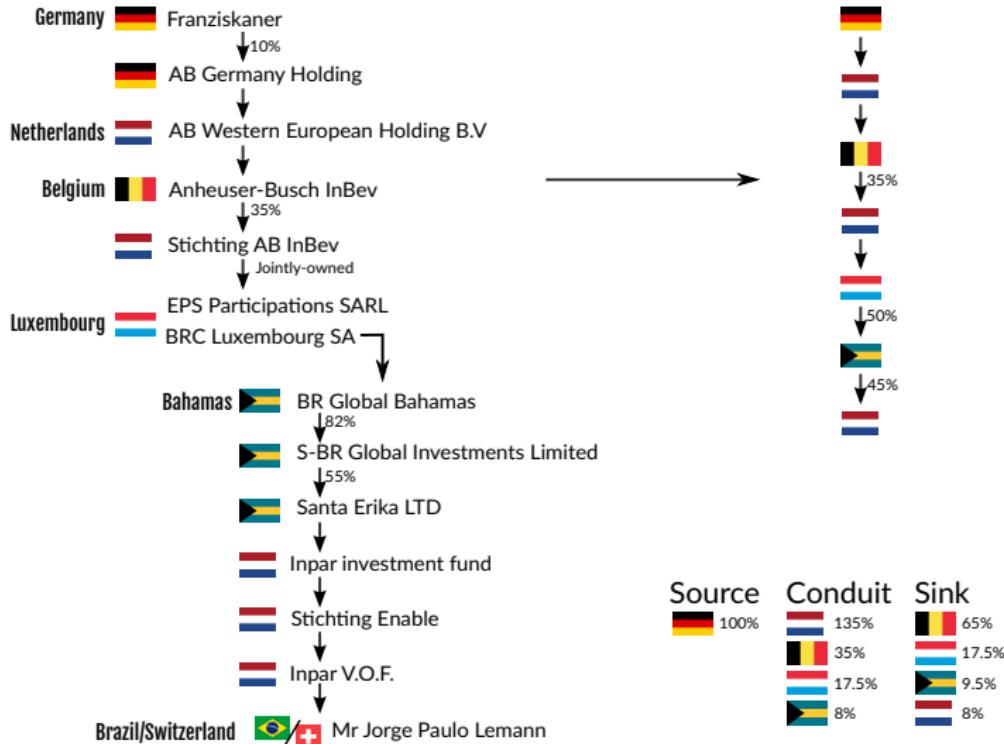
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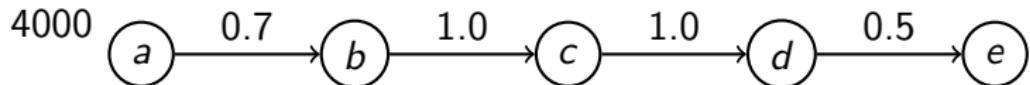


Ownership chunks

- **Ownership chunk:** subpath of length $2, 3, \dots, \ell$ (generated from a chain of length ℓ).
- Chunk q has an associated value that depends on the multiplicative ownership.

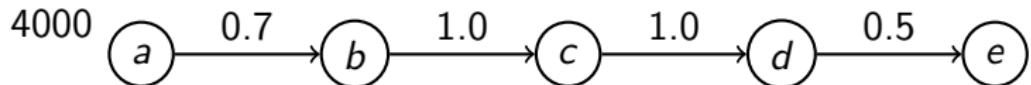
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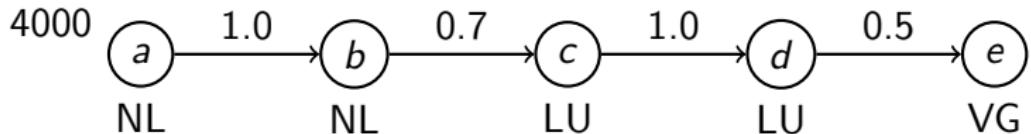
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- Given $p = (a, b, c, d, e)$, we can create the following chunks of size three:
 - $q_1 = (a, b, c)$ with $V_{q_1}^p = 2800$
 - $q_2 = (b, c, d)$ with $V_{q_2}^p = 2800$
 - $q_3 = (c, d, e)$ with $V_{q_3}^p = 1400$

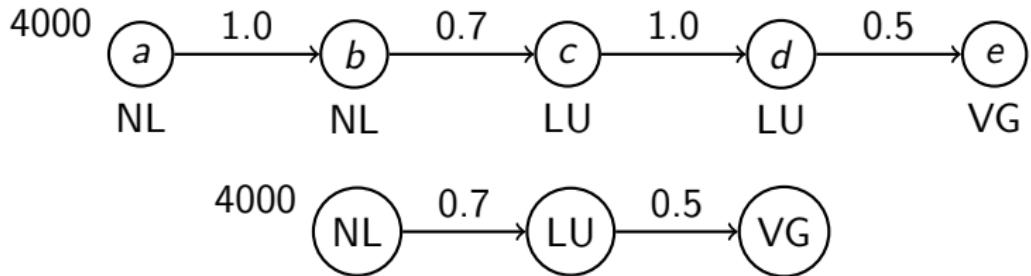
Country chains

- For each previously obtained chunk $q = (v_1, v_2, \dots, v_\ell)$, we create a country chunk g by mapping each node v in the chunk to its respective country $\phi(v)$.
- Subsequent nodes of the same country $\phi(v_i) = \phi(v_{i+1})$ are merged – e.g.:



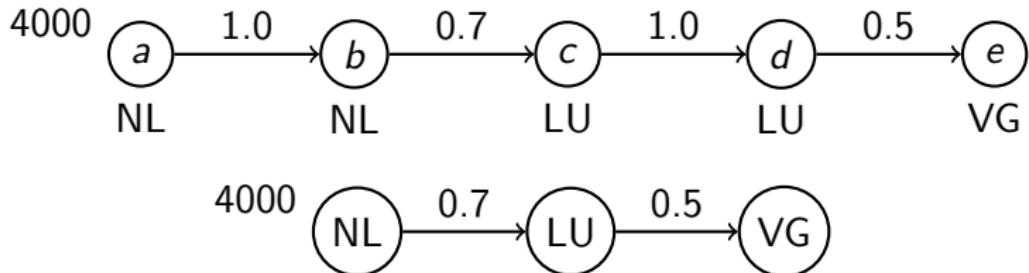
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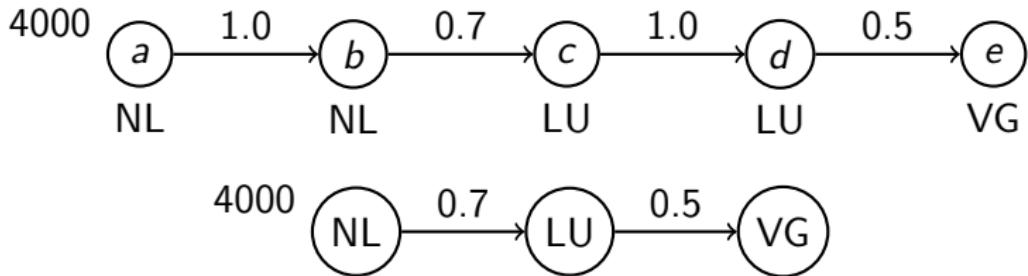
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- The value of the country chain ($V^\phi(g)$) is the sum of all ownership chunks that map to this particular country chain.

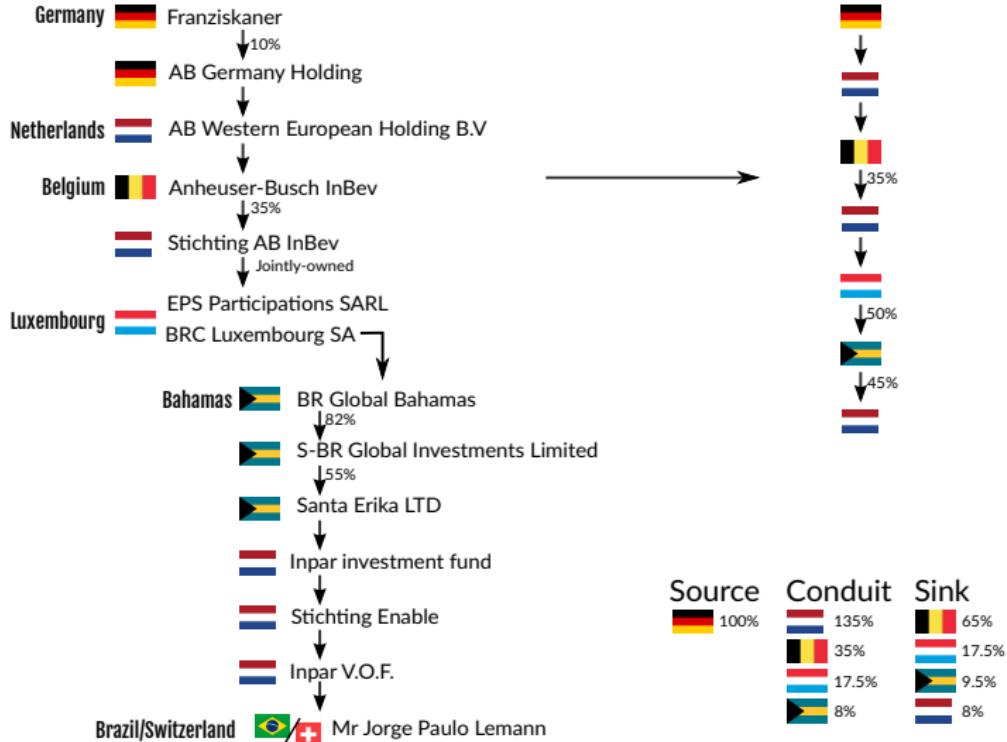
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- We avoid double counting the chunks that map to the same country chain and have the same origin.

Country chains



Results on our data

- 71,201,304 ownership links between firms
- 11,404,819 transnational ownership chains
- 108,159,506 chunks
- 377,098 country chains
 - 7,172 chains of size two
 - 52,655 chains of size three

- A country is a **sink** if less value leaves the country than enters the country. Measured using G^2 : country chains of length 2.
- **Sink-OFC centrality** of a country c is defined as

$$C_{sink}(c) = \frac{\sum_{g \in G^2 \wedge g[1]=c} V^\phi(g) - \sum_{g \in G^2 \wedge g[0]=c} V^\phi(g)}{\sum_{g \in G^2} V^\phi(g)}$$

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- Problem: metric depends on size of country.
- Solution: normalize based on value GDP_c of the country, obtaining:

$$C_{sink-normalized}(c) = C_{sink}(c) \cdot \frac{\sum_{i \in I} GDP_i}{GDP_c}$$

Sink countries

Country	Value (US Billion)	C _c
British Virgin Islands	940.54	5235.2
Luxembourg	810.85	71.1
Hong Kong	736.22	14
Jersey	457.7	397.3
Bermuda	414.9	374
Cyprus	284.9	62.1
Taiwan	225.03	2277.4
Malta	172.88	99.3
Mauritius	157.74	75.3
Cayman Islands	148.51	330.7
Lichtenstein	143.91	225.3
Curaçao	64.96	114.6
Bahamas	64.72	39.8
Western Samoa	37.35	276.4
Gibraltar	13.38	33.8
Monaco	12.92	10.7
Seychelles	12.31	59.7
Belize	10.84	37.5
Guyana	8.05	14.1
Liberia	6.17	17.5
Marshall Islands	3.72	99.6
St Vincent and the Gren	2.03	14.3
Nauru	1.61	67.2
Anguilla	0.93	26.8

Conduit countries

- The extent to which a country is **conduit** is measured using G^3 : country chains of length 3.
- Inward conduit-OFC centrality** measures the value flowing from a sink-OFC, into the conduit country c , out to any country:

$$C_{conduit_{in}}(c) = \frac{\sum_{g \in G^3 \wedge g[1] = \text{sink} \wedge g[2] = c} V^\phi(g)}{\sum_{g \in G^3} V^\phi(g)}$$

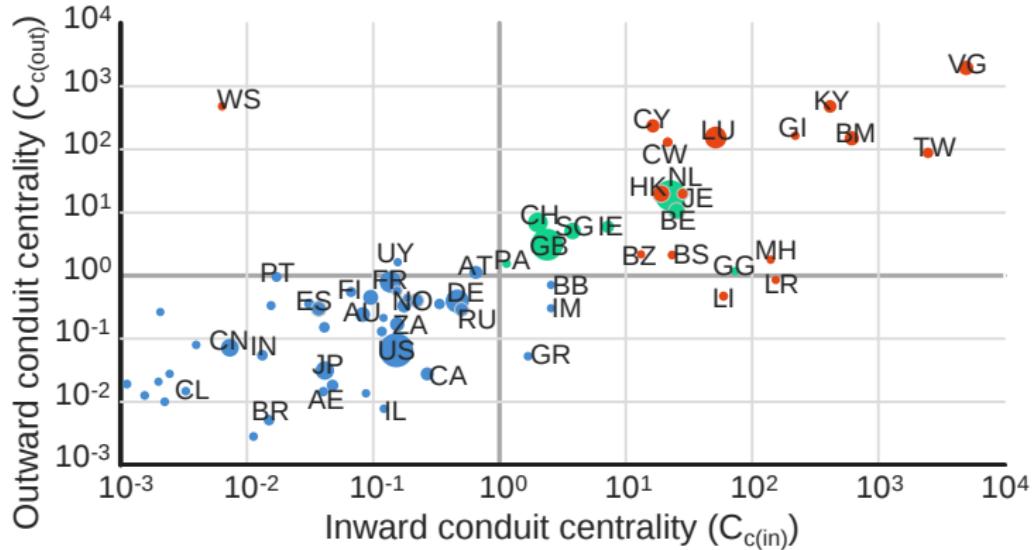
Here, $g[i] = \text{sink}$ denotes that the i -th node in the chain is a sink.

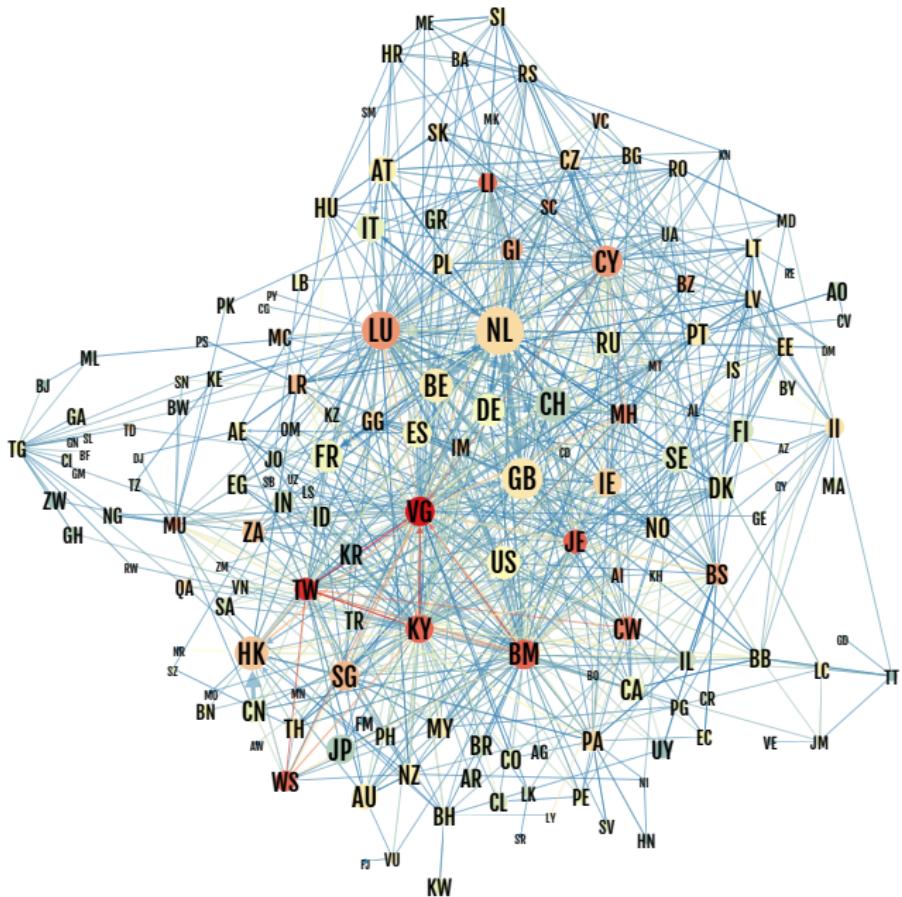
- Outward conduit-OFC centrality** measures the value flowing from any country, into conduit c , out to a sink-OFC:

$$C_{conduit_{out}}(c) = \frac{\sum_{g \in G^3 \wedge g[3] = \text{sink} \wedge g[2] = c} V^\phi(g)}{\sum_{g \in G^3} V^\phi(g)}$$

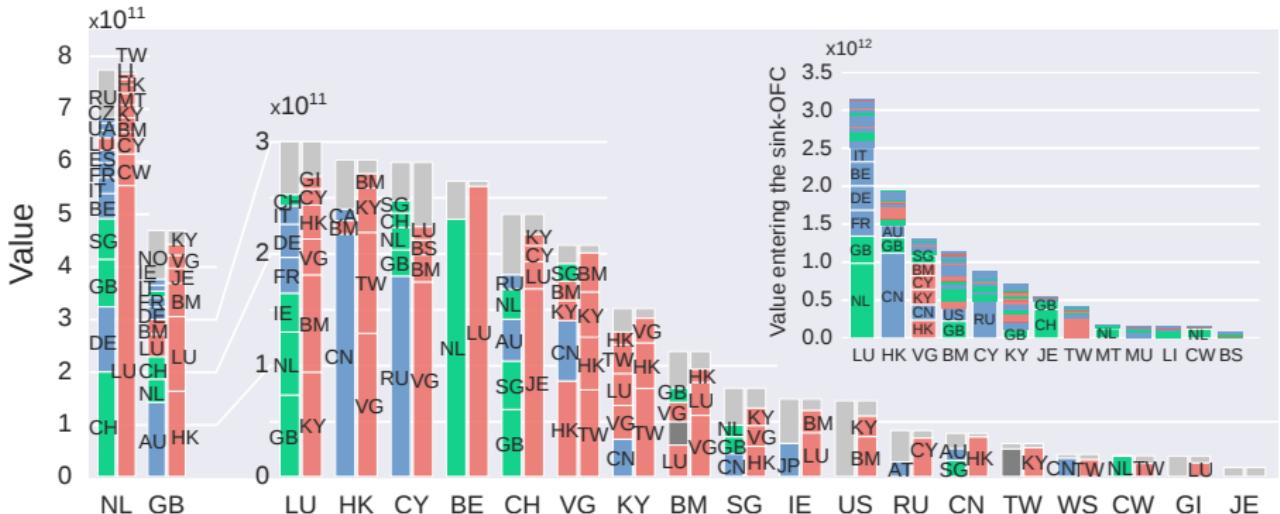
- Normalize by GDP

Conduit countries





Conduit country specialization



Findings

- The Netherlands is the conduit between European companies and Luxembourg, in the middle of 23% country chains (and growing).
- Hong Kong (for China) and Luxembourg (for EU countries) serve as the main countries in the route to typical tax havens.
- The United Kingdom is the conduit between European countries and former members of the British Empire, such as Hong Kong, Jersey, Guernsey and Bermuda.
- All conduit-OFCs are on our doorsteps.
- They are specialized geographically and sectorally.

Conclusions

- **Corporate networks** explicitly and implicitly contain rich information on corporations and jurisdictions.
- Offshore financial centers (OFCs) come in two flavors: **conduits** and **sinks**.
- OFCs can be detected using **corporate ownership chains**.
- Conduits are highly **specialized** in serving particular countries and industrial sectors.

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Thank you!

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- Interactive visualizations: corpnet.uva.nl/soe
 - Interactive visualizations: corpnet.uva.nl/ccs2016
 - Twitter: @uvaCORPNET @javiergb_com
 - Email: E.M.Heemskerk@uva.nl garcia@uva.nl
-
- F.W. Takes and E.M. Heemskerk, Centrality in the Global Network of Corporate Control, *Social Network Analysis and Mining* 6(1): 1-18, 2016.
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 - J. Garcia-Bernardo, J. Fichtner, E.M. Heemskerk and F.W. Takes, Uncovering Offshore Financial Centers: Conduits and Sinks in the Global Corporate Ownership Network, *arXiv* 1703.03016, 2017.