The Globalization of Corporate Control*

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September 27, 2021

Submitted to 2022 ISOM.
Preliminary and Incomplete.

Abstract

The internationalization of corporate control is a major facet of globalization. However, it is challenging to map corporate control, as ownership structures are complex, with pyramid arrangements and equity cross-holdings between parents, subsidiaries, and holding companies. In addition, ownership and control are often channeled via "shell" vehicles in financial offshore centers. We first identify ultimate controlling shareholders from these complex structures to provide a panoramic overview of the internationalization of corporate ownership and control across more than 40,000 publicly-traded firms, consisting of 90% of world market capitalization in 2007, 2012, and 2019. We observe considerable cross-country differences in the fraction of domestically-incorporated firms controlled by foreign entities. We also show that a sizable portion of controlling equity stakes are held via tax-haven-incorporated companies. Even locals use vehicles in tax-haven to control domestic companies. The dynamic analysis further reveals that while corporate control patterns appear persistent, an increasing number of individuals/families and institutional investors (banks, HF/VC/PE) use entities in financial centers to exert control. Second, we characterize the internationalization of corporate control. Institutions and openness correlate strongly with foreign control, though statutory corporate and income taxes are less important. Third, we parameterize international corporate ownership and control with the gravity model. Bilateral links are more potent for more populous, more affluent, and proximate countries. Nonetheless, the gravity model's explanatory power for the corporate structure is noticeably smaller than for international trade in goods and services. Accounting for tax haven status improves the model fit considerably. In addition, historical links play a role, while deeply-rooted cultural and genetic similarities appear less relevant, suggesting that the underlying forces of the internationalization of control differ from those of trade.

*Corresponding authors: Elias Papaioannou; E-mail: eliaspapaioannou@london.edu; Website: https://sites.google.com/site/papaioannouelias/. Luís Fonseca; E-mail: lfonseca@london.edu; Website: https://luispfonseca.com. We are providing a synopsis of our preliminary findings for your consideration. We are also attaching an older presentation at the European Central Bank to illustrate our approach. We have just finished updating the data on corporate control for 2019 that we plan using for the paper. We remain at your disposal for any clarifications on our ongoing research.

1 Introduction

1.1 Results Preview

In the first part of the paper, we provide a mapping of bilateral (country-pair) corporate ownership and control links for listed corporations across the world before and after the 2007-2010 global financial crisis (2007 and 2012) and before the Great Lockdown (in 2019). Relying on a plethora of sources (e.g., regulatory filings, company reports, government publications, financial media), we augment Bureau van Dijk's ORBIS database on corporate ownership and identify ultimate controlling shareholders from the complex structures of corporate holdings. Our analysis spans more than 40,000 unique listed firms (covering about 90% of global stock market capitalization) in more than 130 jurisdictions, reflect about 90% of the world population and GDP.

With the newly-compiled data, we provide an anatomy of international corporate control and cross-border ownership of listed corporations in 2007, 2012, and 2019. We distinguish between three nationality types for the *ultimate* controlling entity and for the nationality of the *immediate* controlling entity: (individual, family, bank, state, private firm, PE/HF/VC): (a) domestic, (b) foreign, and (c) foreign tax haven.[1] The descriptive analysis reveals large cross-sectional differences in cross-border corporate ownership and control around the world. First, the degree of "openness", reflecting the share of market capitalization (and share of listed firms) controlled by foreign entities differs considerably across the world, ranging from close to zero for large advanced economies such as the US and Korea, to around 50% or higher for small and often low taxation countries like Luxembourg and Switzerland. The middle ground is occupied by countries of different continents and development levels, such as Poland, South Africa, India, or Peru. The dynamic analysis reveals strong inertia in corporate control, by both local and foreign entities. Second, the usage of tax havens vehicles is, on average, moderate, but quite large for many counties. Besides, the role of tax havens has been increasingly steadily in almost all countries. For example, in Europe, the control of around 35% of Ukraine's market capitalization is in or goes through offshore financial centers, while in Russia and the Baltics it hovers at 25%; and in Greece and Spain at 15%. In contrast, entities incorporated in tax havens do not play as significant a role in controlling listed corporations in Germany, Italy, and France. Yet, even in these countries, we do observe that an increasing number of listed firms is owned and controlled by tax-haven incorporated entities. Besides, tax haven entities are used by most types of controlling shareholders, individuals/families, banks, and PE/HF/VC.

In the second part of the paper, we explore the correlates of the internationalization of corporate control and ownership, looking at features at both the "destination" (incorporation of

[1] We employ two tax haven classifications, separately and jointly; OECD (2000) and Tørsløv, Wier, and Zucman (2018).

publicly-traded company) and the "origin" (nationality of controlling entity). While these correlations do not have a causal interpretation, they are useful characterizing the degree of openness in corporate holdings and control. First, size matters. Foreign control of listed corporations is smaller in richer and more populous countries, echoing the international trade and portfolio investment patterns. Second, high statuary corporate taxes go hand-in-hand with a smaller share of foreign-owned shares in domestically-incorporated firms. Third, institutional features also correlate with the internalization of control, both in the cross-section and also when we examine dynamics (changes).

In the third part of the paper, we delve into bilateral (country-pair) ownership and corporate control links. We commence documenting the pervasive use of offshore centers. Six out of the eight largest bilateral control links entail at least one financial center (Cayman Islands, Bermuda, Hong Kong and Singapore), while only one out of the ten largest links in international goods trade involves a tax haven (Hong Kong – China). We further uncover the wide use of financial offshore centers for the control of domestic firms by domestic nationals. For example, at least 10% of the market cap of Russian listed firms, controlled by Russian entities has a major shareholder in Cyprus.

We then estimate gravity-style regressions to characterize the vast heterogeneity of international corporate control and ownership. For comparison, we use analogous specifications in international (goods and services) trade, as a voluminous literature shows a close link between size, distance, and international trade. Some interesting new regularities emerge. First, a simple gravity specification fits well international corporate control and ownership patterns. Links are stronger for proximate dyads, larger, and richer countries. However, the model fit for corporate ownership and control are considerably worse than international trade in goods and services. Second, the model fit improves considerably when we add indicators identifying when the controlling entity or the firm are incorporated in tax havens. The magnitudes imply considerable effects: tax haven countries have links around 4 times larger, on average, both regarding foreign control of domestic companies and regarding the control of foreign companies.

Third, we augment the gravity specifications with variables reflecting historical, linguistic, and cultural links. Colonial relationships matter considerably for international corporate control and ownership holdings, while their role in trade is much smaller. In contrast, deep genetic ties play no role in shaping corporate ownership and control, while they correlate strongly with international goods trade.

Forth, when we distinguish by controlling shareholder type, we find that families/individuals are more sensitive to (geographic and cultural) distance, as compared to institutional investors and banks, which in turn use considerably more tax haven entities.

1.2 Related Literature and Contribution

Our paper relates and contributes to various strands of research in international economics and corporate finance.

First, our paper connects to the voluminous literature on the determinants (and implications) of various facets of globalization, such as bilateral trade, FDI, portfolio, bank, and debt flows (Lane and Milesi-Ferretti (2008), Portes and Rey (2005), Wei (2000), Aviat and Coeurdacier (2007), Papaioannou (2009), Hau and Rey (2008)). Rather than looking at flows that appear quite volatile, we examine international corporate control and ownership patterns that are more persistent (Aminadav and Papaioannou (2020)). Besides, looking at corporate control allows for a more in-depth mapping of global market integration. Additionally, our data allows mapping actual ties, incorporating indirect links often via offshore shell and holding companies; for example, a Russian national controlling a UK-incorporated listed corporation via a Cypriot or Maltese "shell" company. Hence, we address one major shortcoming of most international asset holdings and liabilities positions datasets (IMF International Financial Statistics (IFS), US Treasury International Capital (TIC) System, Lane and Milesi-Ferretti (2018)) that following the residence principle, miss indirect exposure. International institutions, policymakers, and various agencies increasingly acknowledge this issue. Nonetheless, there has been limited progress capturing indirect exposure, which anecdotal evidence and case studies suggest they are becoming increasingly extensive. [2] Important exceptions are the parallel and independent works of Coppola et al. (2021) and Damgaard et al. (2019). Copolla et al. (2021) study international bond and equity issuance via special purpose vehicles (SPV) often incorporated in offshore centers and document the chief role of tax havens. Damgaard et al. (2019) combine foreign direct investment data from various sources to approximate real and "phantom" FDI, often channeled via countries with tailored for multinationals low tax systems.

Rather than looking at corporate debt issuance and multinational activity, we look at corporate ownership and control, major facets of globalization that have not been much researched.[3]

Second, our findings that a non-negligible portion of international corporate control gets through offshore financial centers contributes to a nascent but fast-growing agenda on their growing role (Hines and Rice (1994), Zucman (2015), Tørsløv, Wier, and Zucman (2018), Hebous and Johannesen (2021)). The literature focuses on how corporations shift earnings across jurisdictions (Johannesen, Tørsløv, and Wier (2019), Guvenen et al. (2018)), how tax havens allow the wealthy to hide their assets (Alstadsæter, Johannesen, and Zucman (2018)), and money laundering and criminal activity (Andersen, Johannesen, and Rijkers (2020)). We document

[2] Bertaut et al. (2019) document considerable differences in home bias between TIC data patterns based on nationality and residence.

[3] For example, Coppola et al. (2021) are able to record both direct US investments into the Brazilian corporate bond market and indirect investments via subsidiaries in the Cayman Islands and Bermuda. Likewise, we are able to trace both direct equity stakes of US nationals to Brazil, but also indirect links via primate companies in offshore financial centers (e.g., Panama), but also other jurisdictions (Chile).

that offshore financial centers play a crucial conduit role in the internationalization of corporate control. Our data come from publicly available sources, often regulatory reports that firms periodically file to supervisors.[4] Hence, our study highlights the tax and convenience benefits of controlling listed corporations via tax haven incorporated entities.

Third, our paper contributes to research in corporate finance that links corporate control across countries to differences in investor protection, legal origin, culture, economic, and financial development (La Porta, Lopez-De-Silanes, and Shleifer (1999), Claessens, Djankov, and Lang (2000), Faccio and Lang (2002), Laeven and Levine (2007), Franks et al. (2012), Rajan and Zingales (1995), Pagano and Volpin (2005)). This research agenda mostly works with relatively small samples and countries.[5] In contrast, we take a panoramic view covering the vast majority of listed corporations across the world. In this regard, we extend the dataset of Aminadav and Papaioannou (2020) to have the widest coverage and identify ultimate control from the obscure pyramid and complex structures of corporate ownership structure. We can, therefore, document and analyze heterogeneity, which appears substantial. We differentiate by the type of the controlling entity, families, institutional investors (PE/VC/HF), banks, and state (agencies). Our key contribution in this research agenda is zooming in the internationalization of corporate control, a major facet of globalization that has not been much studied.[6] Besides, we examine bilateral links, paying attention to controlling rights channeled via small financial offshore centers that allow ultimate shareholders to bypass laws and regulations in both source and destination countries.

Paper Structure We structure our paper as follows. In section 2, we detail the data compilation. We discuss the main data sources, present our procedure to trace ultimate controlling shareholder entities, and give examples illustrating the considerable heterogeneity of cross-border corporate control. Section 3 commences with the mapping of international corporate control in 2007, 2012, and 2019. Then it presents descriptive evidence on the use of tax haven jurisdictions both in the cross-section and over time. Section 4 examines the internationalization of corporate ownership and control employing gravity specifications. Section 5 summarizes

[4]For example, regulatory filings show that Bruno Schroder controlled Schroeders, the UK multinational asset management company, via Vincitas and Veritas, both incorporated in the Bermuda Islands.

[5]For example, La Porta, Lopez-De-Silanes, and Shleifer (1999) sample includes the 20 largest listed firms in 27 mostly industrial countries. Claessens, Djankov, and Lang (2000) examine corporate ownership in 2,980 firms in 9 East Asian countries. Faccio and Lang (2002) work with a sample of 5,232 firms in 13 Western European countries. Lins (2003) maps ownership and control for 1,433 firms in 18 emerging markets. Even when Holderness (2016) re-examines La Porta et al. (1999) merging these data, he works with around 8,000 firms in 32 countries. In more recent work, Aminadav and Papaioannou (2020) compile data reflecting corporate control for 26,843 publicly-traded firms incorporate in 85 countries. We have expanded this data to cover more than 6000 additional firms.

[6]Corporate finance research studies the drivers of cross-border mergers and acquisitions [M&A]. Rossi and Volpin (2004) connect differences in investor protection and legal tradition on M&A activity. Erel, Liao, and Weisbach (2012) look at the role of accounting disclosure quality, currency returns, and valuation on cross-border mergers in the United States.

and presents avenues for future research.

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The Globalization of Corporate Control

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22 May 2019

Outline

Intro

Data

Country patterns

Bilateral patterns

Gravity

Tax Havens

Ties

Conclusion

Globalization of Corporate Control: Some facts in 2012

- Public companies worldwide worth 51 trn USD according to World Bank (45 trn in Datastream)
- Cross-border stakes in these worth 5.2 trn (out of 42 trn USD in our datasets, 12%)
  - Down from 13% in 2007
- Firms controlled by foreign entities worth 4.2 trn (out of 17.6 trn controlled, 24%)
  - Up from 23% in 2007
- International trade:
  - International merchandise trade: 18.3 trn
  - International services trade: 4.3 trn
- **Cross-border corporate control is a sizeable facet of globalization**

Implications

- International transmission
  - Business cycle, productivity shocks
- Public finance & taxation
  - Extensive use of tax havens, tax planning
- International diversification
  - Large part of portfolios
- Financial integration
  - European Union, investment treaties

Some Questions

- What is the mapping of cross-border corporate control?
- Which countries are more "financially" open?
- What makes countries more open to cross-border ownership and control?
- What is the role of tax havens?
- What drives bilateral links between countries?
- Do shared history and institutional arrangements matter?
- How do these compare to other features of the global economy?

Contribution (1): Mapping

- **Map** the internationalization of control of public companies in 2012
  - Bilateral cross-country-pair dataset using worldwide data on 26,249 public companies in 85 countries

Contribution (2): Characterization

- Establish **stylized facts** on cross-border control
  - Smaller are more open
  - Richer are less open
  - Correlated with trade
  - Larger where corporate tax rates low

Contribution (3): Tax Havens

- Study the use of **tax havens** to control corporations
  - Map where corporations are controlled by offshore entities, or through them
  - 8 havens in top 8 bilateral control links

Contribution (4): Internationalization. Gravity

- Examine the drivers of **bilateral** control and ownership
  - Distance and size explain much less than in trade
  - Historical links matter

Literature

International corporate finance

- **Control and ownership**: Berle and Means (1932), La Porta et al. (1999a), Claessens et al. (2000), Faccio and Lang (2002), Lins (2003), Franks et al. (2014), Franks and Mayer (2015), Aminadav and Papaioannou (2019), Morck et al. (2005).
- **M&A**: Rossi and Volpin (2004), di Giovanni (2005), Erel et al. (2012), Kalemli-Özcan et al. (2013), Ahern et al. (2015)

International economics

- **Trade**: Anderson and van Wincoop (2003), Redding and Venables (2004), Helpman et al. (2008), Head and Mayer (2014), Costinot and Rodríguez-Clare (2014)
- **Financial flows**: Wei (2000), Portes et al. (2001), Portes and Rey (2005), Buch (2005), Papaioannou (2009), Lane and Milesi-Ferretti (2018), Coppola et al. (2019)
- **Deep roots**: Guiso et al. (2009), Spolaore and Wacziarg (2009)
- **Tax havens**: Zucman (2015) Alstadsæter et al. (2018), Tørsløv et al. (2018), Davies et al. (2018)

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Main dataset

Ownership & control data: Aminadav and Papaioannou (2019)

- Bureau Van Dijk's ORBIS and OSIRIS databases
- Ownership and accounting data for 42,720 public companies between 2004 and 2012, 134 countries
- Matched with Datastream and Compustat
- Use BvD to identify ultimate controller
  (a) Controlled if major stakeholder with 20% stake (e.g. La Porta et al., 1999a);
  (b) Alternatively, if Shapley and Shubik (1954) index above 0.75 ‣ Details
- Aminadav and Papaioannou (2019) extended dataset for 7k private firms with manual checks when BvD not enough to identify controller ‣ Details

This paper: **further extends control data for almost 6k private firms**

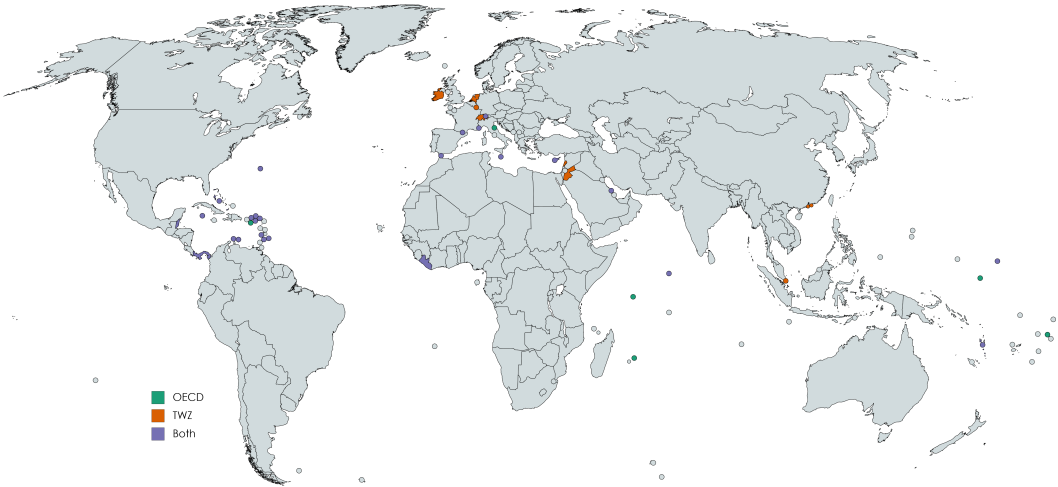
Coverage (2012)

- Results for 2012: 27,317 companies in 120 countries
- We drop all:
  - Mkt cap $<$ 1mn USD
  - Companies from countries with 10 or fewer
- 26,249 companies in 85 countries
- Reflects around 89% of total market equity in Datastream, 83% in World Bank
- Shareholders or controllers from 143 countries

Additional data

- **Bilateral trade in goods**: BACI (UN COMTRADE harmonized by Gaulier and Zignago (2010))
- **Bilateral trade in services**: OECD-WTO Balanced Trade in Services Statistics
- **National accounts**: United Nations, World Bank
- **Bilateral data** for gravity equations: Head et al. (2010)
- **Legal origins**: La Porta et al. (1999b)
- **Genetic distance**: Spolaore and Wacziarg (2018)
- **Tax havens**: Tørsløv, Wier, and Zucman (2018), OECD (2000)
- **Corp. tax rates**: Deloitte; Tørsløv, Wier, and Zucman (2018)
- **Offshore wealth**: Alstadsæter, Johannesen, and Zucman (2018)
- **World migration**: Putterman and Weil (2010)

Tax havens



Tax haven classification

Tørsløv, Wier, and Zucman (2018) and OECD (2000)

- **Both lists**: Andorra, Anguilla, Antigua and Barbuda, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Cyprus, Gibraltar, Liberia, Liechtenstein, Maldives, Malta, Marshall Islands, Monaco, Netherlands Antilles, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Vanuatu
- **Tørsløv et al. only**: Hong Kong, Ireland, Jordan, Lebanon, Luxembourg, Macao, Netherlands, Singapore, Switzerland (, Belgium)
- **OECD only**: Mauritius, Nauru, Samoa, San Marino, Seychelles, United States Virgin Islands

Links between pairs of countries

- **Ownership stakes**:
  - Value of direct stakes owned by source in public companies of destination
- **Controlled firms**:
  - Market cap of firms controlled by source in destination
- Measured in:
  - 2012 USD
  - Number of companies
  - Share in totals

Categories

- Nationality of **ultimate** controlling entity (individual, family, bank, state, PE/HF/VC, other listed private firms):
  - Domestic
  - Foreign tax haven
  - Foreign non-tax haven

- Nationality of **immediate** controlling entity
  - Domestic
  - Foreign tax haven
  - Foreign non-tax haven

Fine categories

- Domestic control direct or through domestic intermediary
- Domestic control through foreign tax haven intermediary
- Domestic control through foreign non-tax haven intermediary

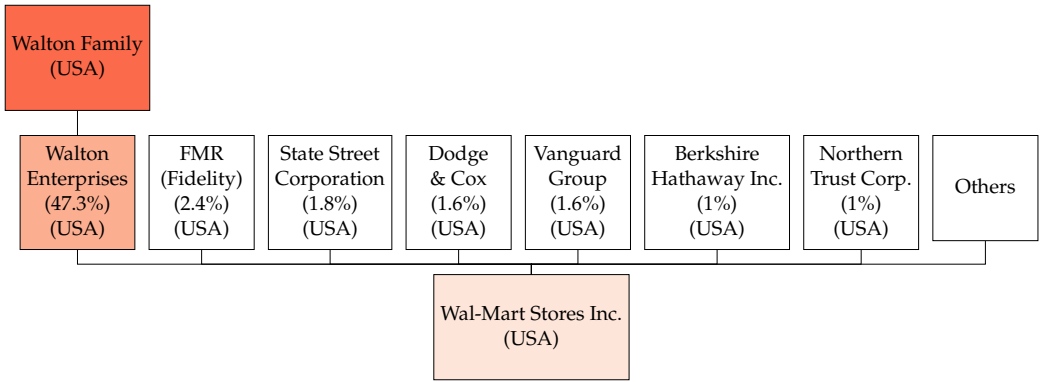
- Foreign tax-haven control through domestic intermediary
- Foreign tax-haven control direct or through foreign tax haven intermediary
- Foreign tax-haven control through foreign non-tax haven

- Foreign non-tax haven control through domestic intermediary
- Foreign non-tax haven control through foreign tax haven intermediary
- Foreign non-tax haven control direct or through foreign non-tax haven intermediary

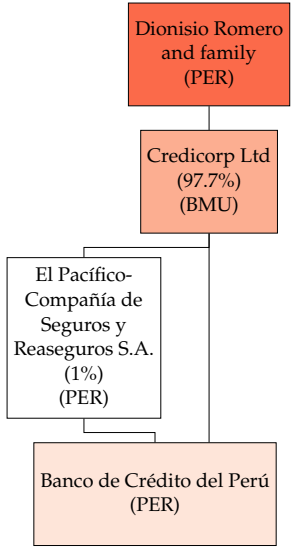
Examples

- Companies (9 categories)
- Country (as source and destination)
- Country-pair

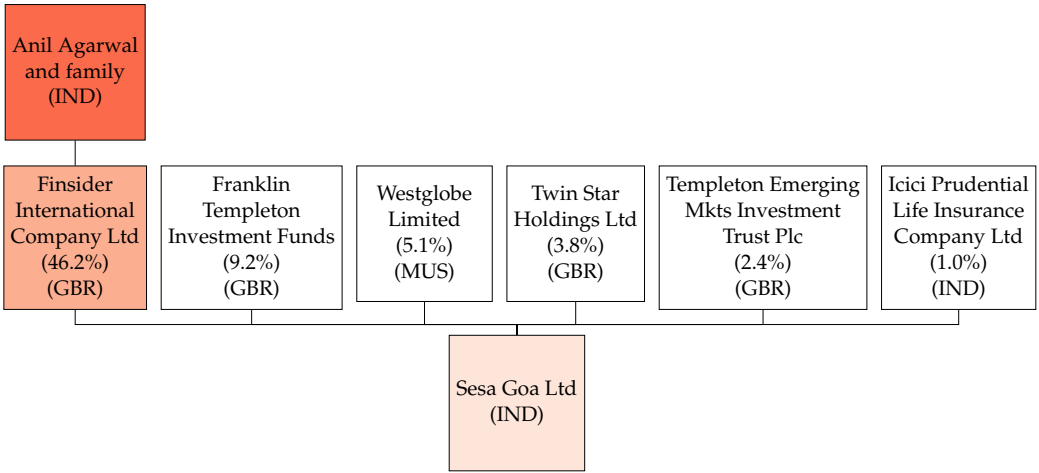
Example 1: Domestic control through domestic



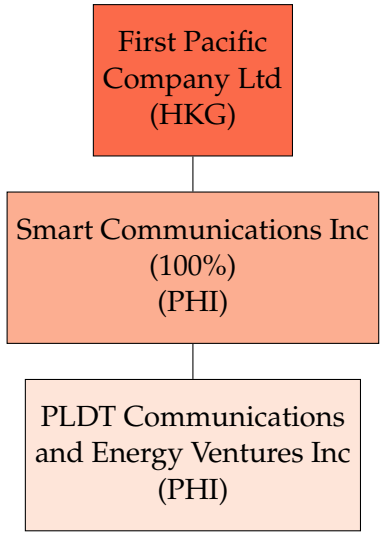
Example 2: Domestic control through foreign tax haven



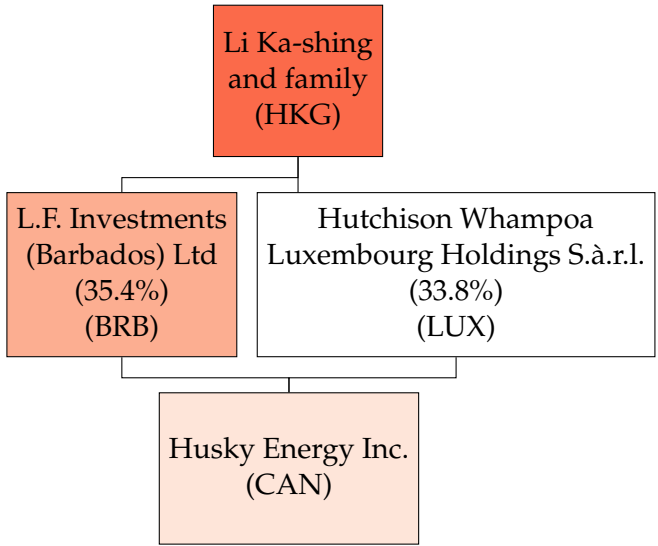
Example 3: Domestic control through foreign non-tax haven



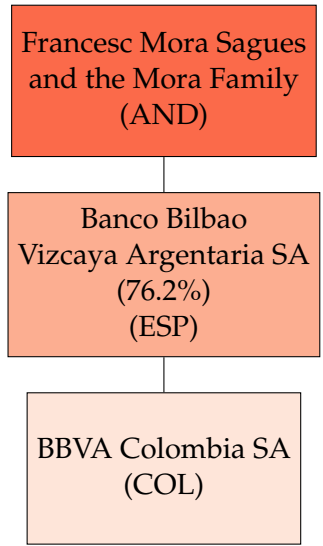
Example 4: Foreign tax haven control through domestic



Example 5: Foreign tax haven control through foreign tax haven



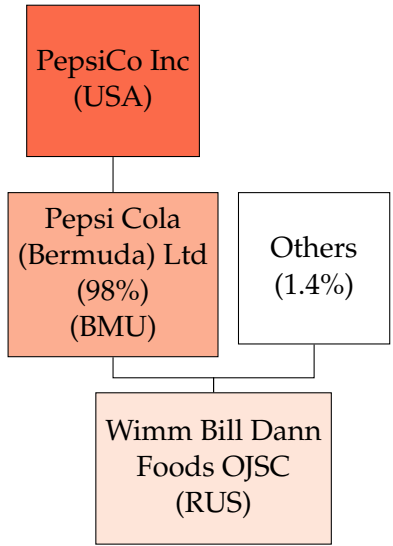
Example 6: Foreign tax haven control through foreign non-tax haven



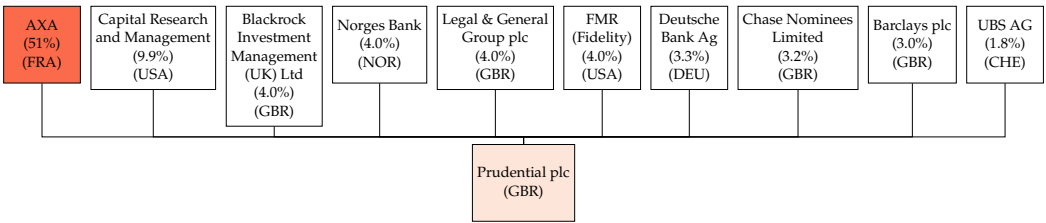
Example 7: Foreign non-tax haven control through domestic



Example 8: Foreign non-tax haven control through foreign tax haven



Example 9: Foreign non-tax haven control through foreign non-tax haven



Example: Greece as destination (2012)

- 229 companies, 33bn USD
- 175 controlled, 19bn
- 158 controlled by domestic entity, 15.5bn
  - 152 with immediate domestic controller, 12.5bn
  - 3 with immediate tax haven controller, 2bn
  - 3 with immediate non-tax haven controller, 1bn
- 5 controlled by foreign tax haven, 0.5bn
  - 1 with immediate domestic controller, $<$0.1bn
  - 4 with immediate tax haven controller, 0.5bn
  - 0 with immediate non tax-haven controller
- 12 controlled by foreign non-tax haven, 3bn USD
  - 2 with immediate domestic controller, $<$0.1bn
  - 2 with immediate tax haven controller, $<$0.1bn
  - 8 with immediate non-tax haven controller, 3bn

- In total, at least 10, 2.6bn, controlled through tax haven. Either:
  - Ultimate controller is entity in tax haven
  - Immediate controller is entity in tax haven

Example: Greece as source

- Greek entities control 167 companies worth 20bn USD
- 158 are domestic, 15.5bn
  - 152 with immediate domestic controller, 12.5bn
  - 3 with immediate tax haven controller, 2bn
  - 3 with immediate non-tax haven controller, 1bn
- 5 are in a foreign tax haven, 3.5bn
  - 3 with immediate domestic controller, 2bn
  - 2 with immediate tax haven controller, 1.5bn
  - 0 with immediate non-tax haven controller
- 4 are in a foreign non-tax haven, 1bn
  - 3 with immediate domestic controller, 1bn
  - 0 with immediate tax haven controller
  - 1 with immediate non-tax haven controller, <0.1
- In total, at least 8, 5.5bn, linked with tax haven. Either:
  - Public firm is entity in tax haven
  - Immediate controller is entity in tax haven

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Data

Country patterns
- Categories
- Tax havens
- Openness

Bilateral patterns

Gravity

Tax Havens

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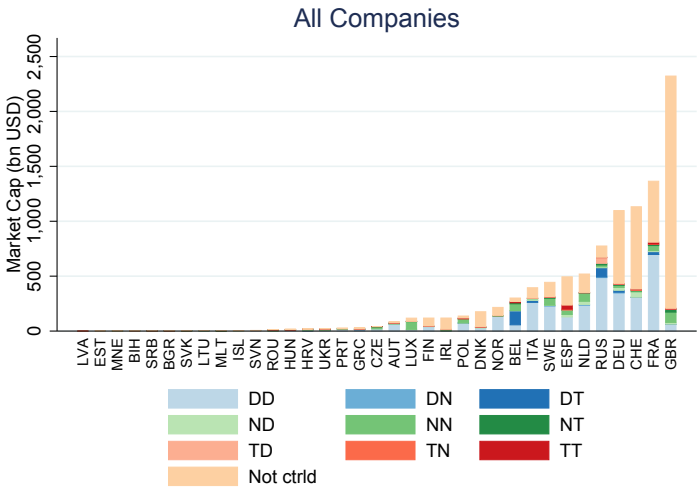
Tax Havens

Categories - Description

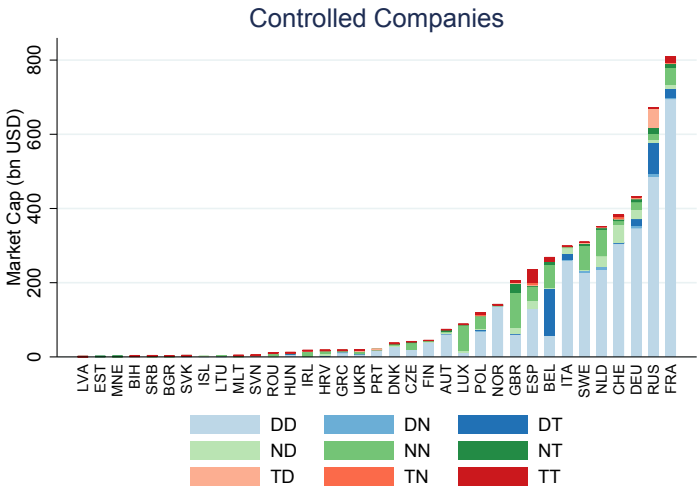


- Blue: Domestic controller
  - DD: Domestic controller, Domestic main shareholder
  - DN: Domestic controller, Foreign non-tax haven main shareholder
  - DT: Domestic controller, Foreign tax haven shareholder
- Green: Foreign non-tax haven controller
  - ND: Foreign non-tax haven controller, Domestic main shareholder
  - NN: Foreign non-tax haven controller, Foreign non-tax haven main shareholder
  - NT: Foreign non-tax haven controller, Foreign tax haven shareholder
- Red: Foreign tax haven controller
  - TD: Foreign tax haven controller, Domestic main shareholder
  - TN: Foreign tax haven controller, Foreign non-tax haven main shareholder
  - TT: Foreign tax haven controller, Foreign tax haven shareholder
- Beige: Not controlled

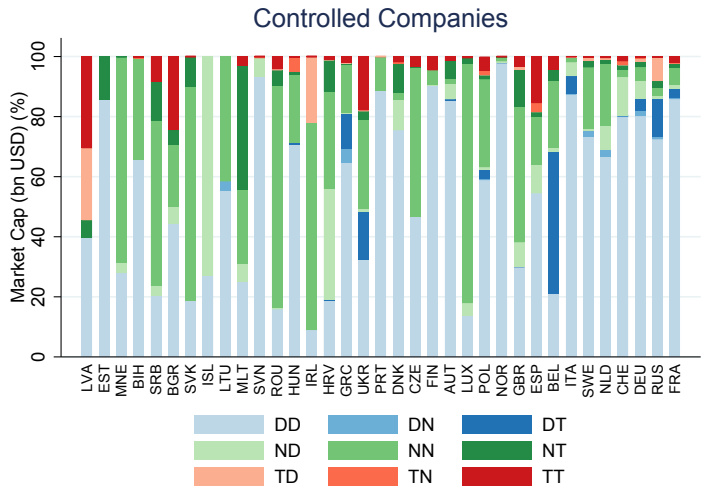
Categories - Europe



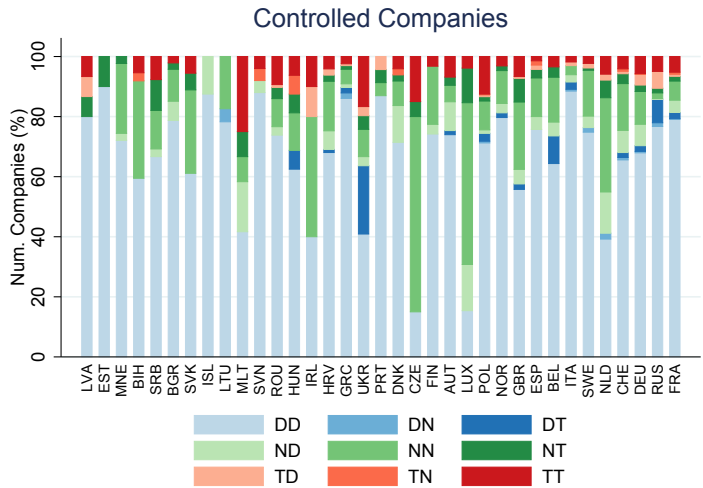
Categories - Europe



Categories - Europe



Categories - Europe



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Intro

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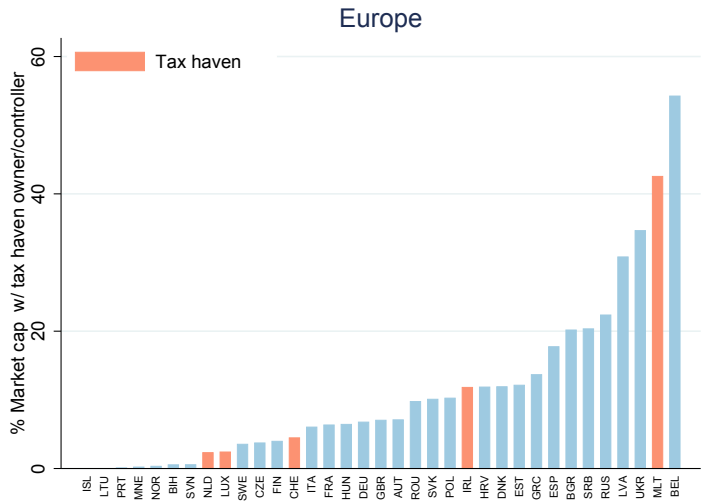
Country patterns
- Categories
- Tax havens
- Openness

Bilateral patterns

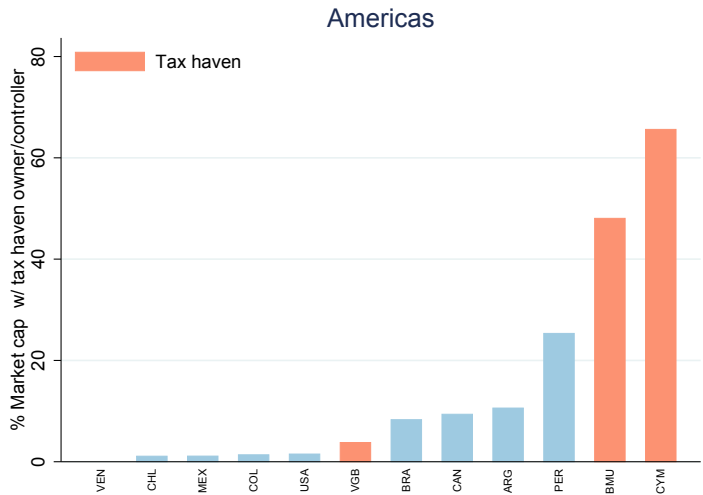
Gravity

Tax Havens

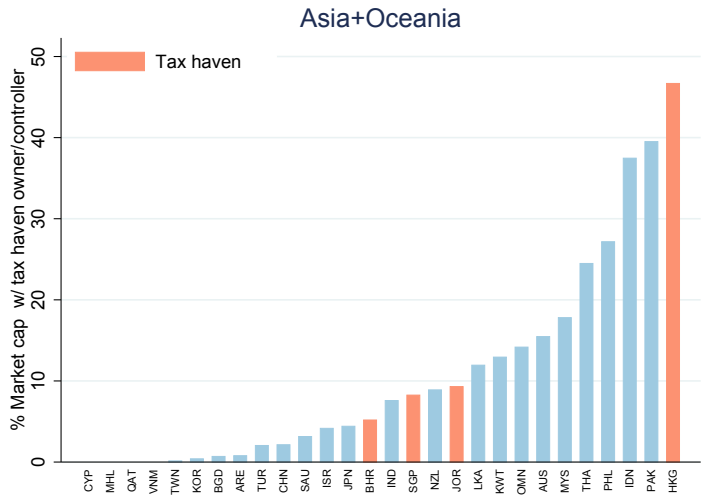
The use of foreign tax havens - as destination



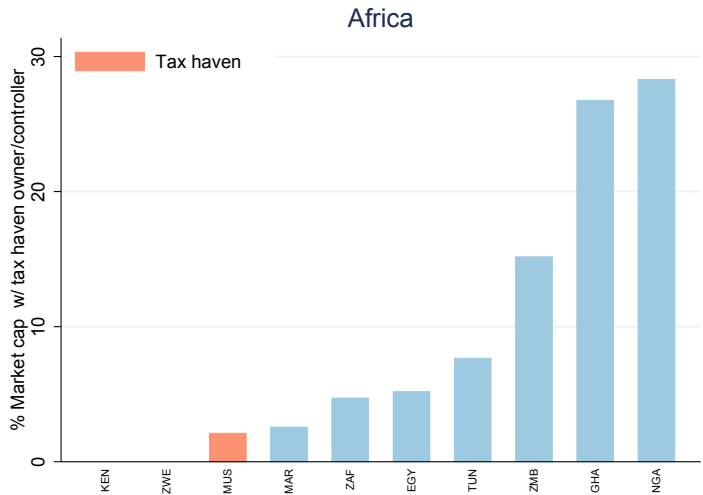
The use of foreign tax havens - as destination



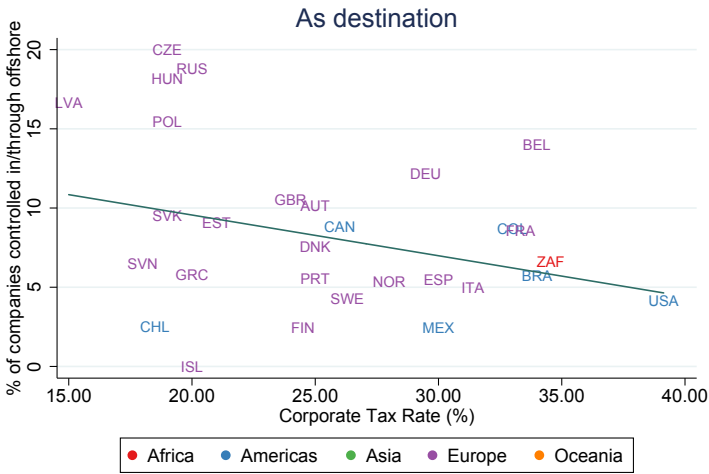
The use of foreign tax havens - as destination



The use of foreign tax havens - as destination

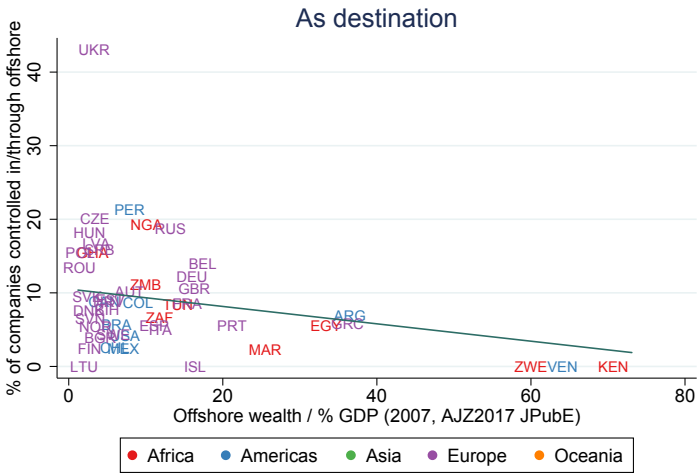


The use of foreign tax havens - as destination



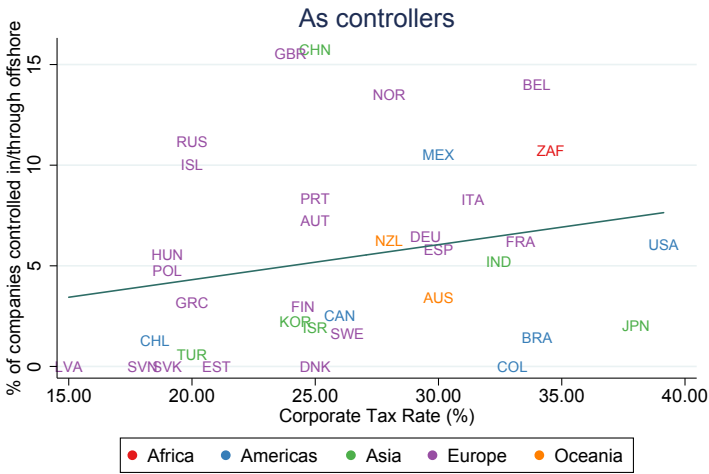
Correlation coefficient: -0.29. Countries with fewer than 10 companies are dropped.

The use of foreign tax havens - as destination



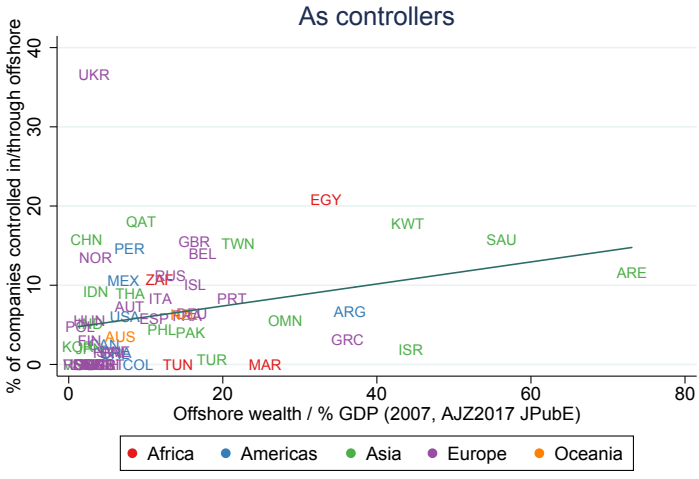
Correlation coefficient: -0.27. Countries with fewer than 10 companies are dropped.

The use of foreign tax havens - as source



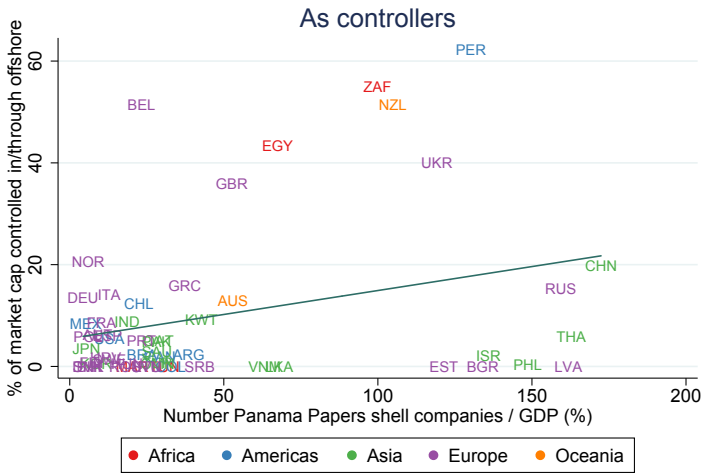
Correlation coefficient: 0.23. Countries with fewer than 10 companies are dropped.

The use of foreign tax havens - as source



Correlation coefficient: 0.29. Countries with fewer than 10 companies are dropped.

The use of foreign tax havens - as source



Correlation coefficient: 0.30. Countries with fewer than 10 companies are dropped.

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Country patterns
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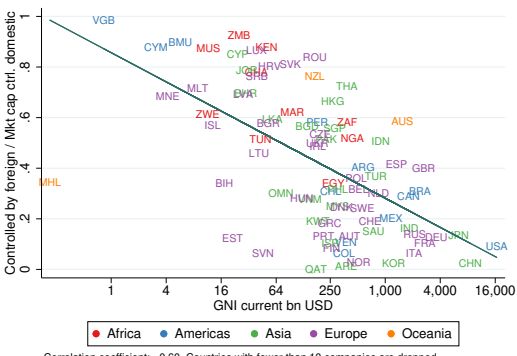
Openness to foreign/abroad control

- **Descriptive patterns**:
  - Destination (domestic companies)
  - Source (controlled companies)

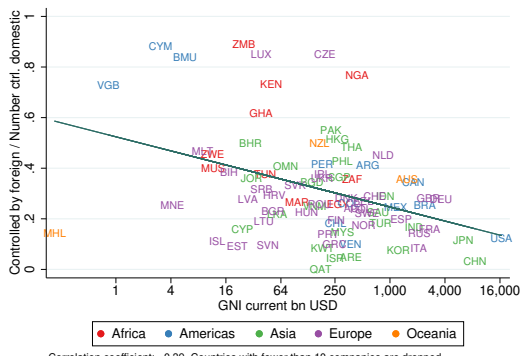
- **Aspects**:
  - Size (GNI)
  - Income (GNI per capita)
  - Trade openness (Trade / GDP)
  - Tax rates (Top statutory corporate tax rates)

Correlations - Destination. Size

Sample: Controlled domestic companies



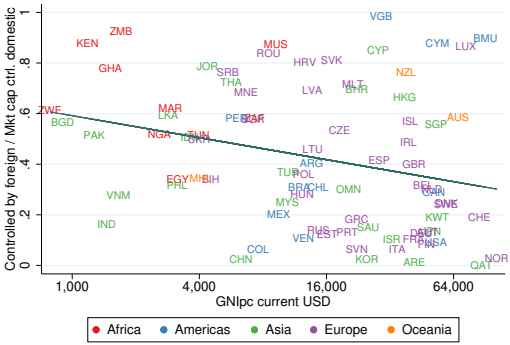
Correlation coefficient: −0.60. Countries with fewer than 10 companies are dropped.



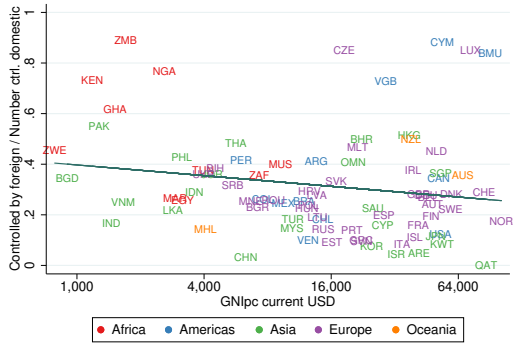
Correlation coefficient: −0.39. Countries with fewer than 10 companies are dropped.

Correlations - Destination. Income per capita

Sample: Controlled domestic companies



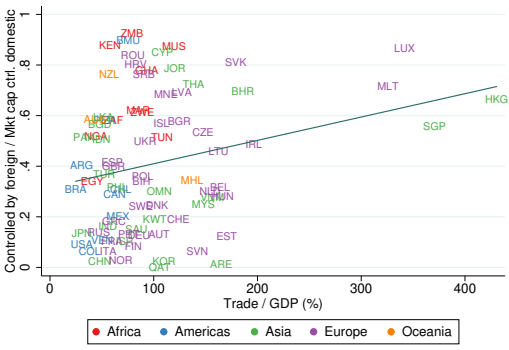
Correlation coefficient: −0.28. Countries with fewer than 10 companies are dropped.



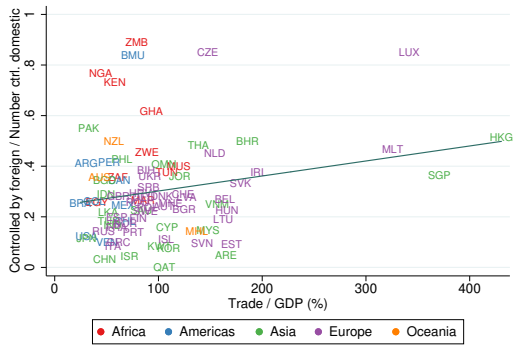
Correlation coefficient: −0.18. Countries with fewer than 10 companies are dropped.

Correlations - Destination. Trade

Sample: Controlled domestic companies



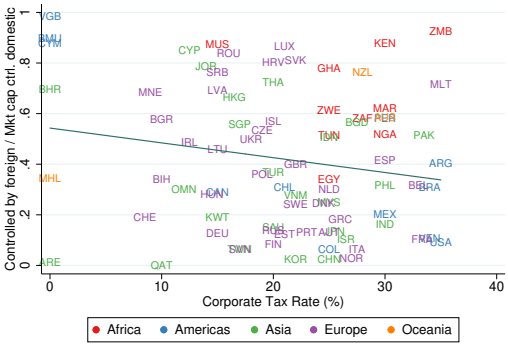
Correlation coefficient: 0.25. Countries with fewer than 10 companies are dropped.



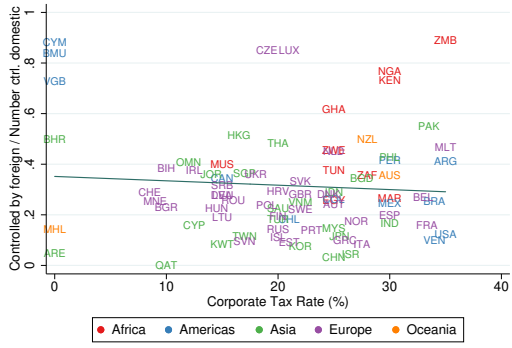
Correlation coefficient: 0.22. Countries with fewer than 10 companies are dropped.

Correlations - Destination. Tax rates

Sample: Controlled domestic companies

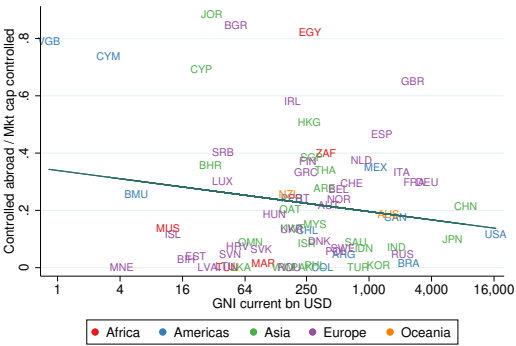


Correlation coefficient: −0.19. Countries with fewer than 10 companies are dropped.

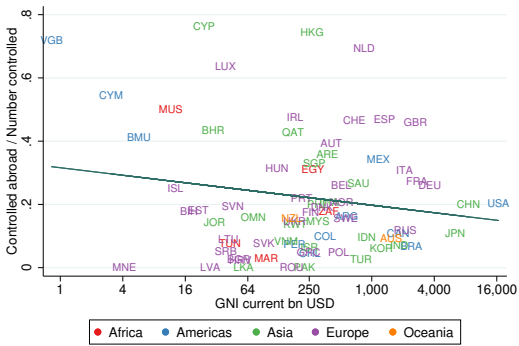


Correlation coefficient: −0.07. Countries with fewer than 10 companies are dropped.

Correlations - Source. Size

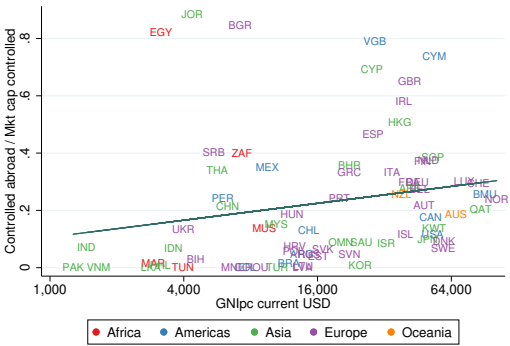


Correlation coefficient: −0.17. Countries with fewer than 10 companies are dropped.

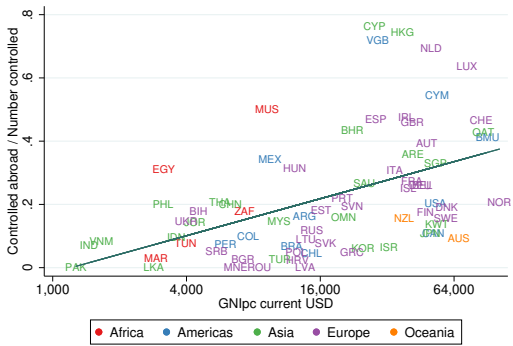


Correlation coefficient: −0.17. Countries with fewer than 10 companies are dropped.

Correlations - Source. Income per capita

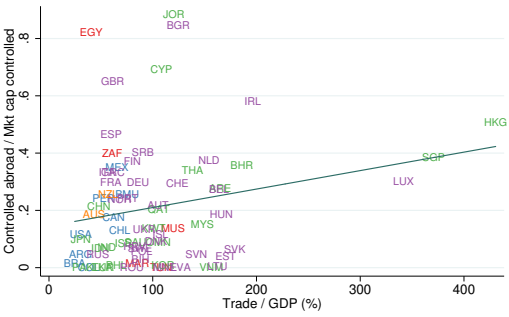


Correlation coefficient: 0.21. Countries with fewer than 10 companies are dropped.

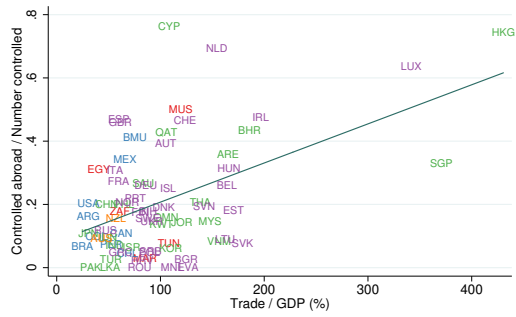


Correlation coefficient: 0.48. Countries with fewer than 10 companies are dropped.

Correlations - Source. Trade

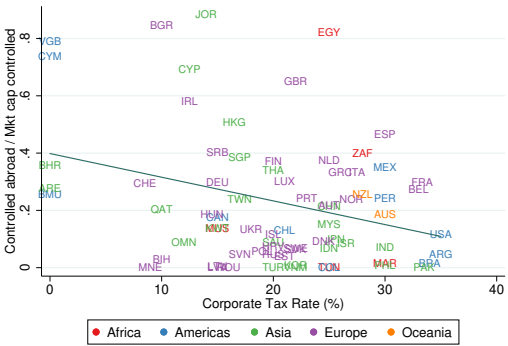


Correlation coefficient: 0.22. Countries with fewer than 10 companies are dropped.

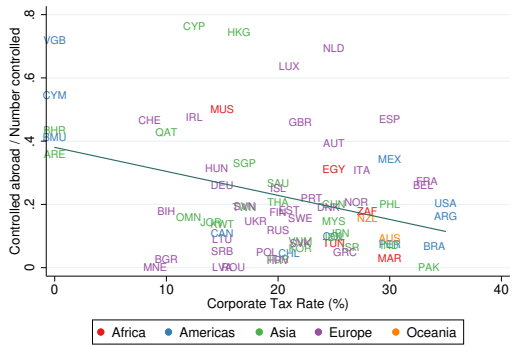


Correlation coefficient: 0.49. Countries with fewer than 10 companies are dropped.

Correlations - Source. Tax rates



Correlation coefficient: −0.32. Countries with fewer than 10 companies are dropped.



Correlation coefficient: −0.34. Countries with fewer than 10 companies are dropped.

Summary

- Correlates of openness:
  - Smaller size (strong)
  - Lower income (modest)
  - Openness to trade (modest)
  - Lower corporate tax rates (modest)

▸ Regressions

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Largest links (bn. USD)

Ownership			Control			Goods Trade			Services Trade		
D	**S**	Stakes	**D**	**S**	Mkt cap	**D**	**S**	Flows	**D**	**S**	Flows
HKG	VGB	304	HKG	CHN	466	USA	CHN	400	CAN	USA	63
GBR	USA	217	BMU	GBR	86	USA	CAN	310	USA	GBR	57
USA	FRA	199	JPN	FRA	83	USA	MEX	268	JPN	USA	50
USA	ZAF	155	SGP	EGY	80	HKG	CHN	237	GBR	USA	49
CYM	VGB	123	CYM	CHN	77	CAN	USA	219	CHN	HKG	45
CHE	USA	114	BMU	HKG	69	MEX	USA	180	USA	CAN	40
CHN	HKG	110	ZAF	GBR	67	JPN	CHN	175	USA	DEU	35
RUS	CYP	96	CYM	HKG	66	CHN	JPN	148	CHN	USA	35
CAN	USA	82	GBR	FRA	64	USA	JPN	143	DEU	USA	34
DEU	USA	69	BEL	FRA	61	CHN	KOR	132	HKG	CHN	34

An example: Hong Kong - China

- 182 companies in Hong Kong, worth 951bn USD
- 106 controlled, worth 800bn USD
- 35 controlled by Chinese entity, worth 460bn USD
  - At least 16, worth 371bn USD, controlled through foreign tax haven, mostly British Virgin Islands

Top links: United States as destination

- Units: Market cap in bn USD (Number of companies)
- **Aggregates**
  - Domestic companies: 14 439 (4 578)
  - Domestically-controlled companies: 1 455 (726)
  - Foreign-controlled firms: 204 (174)
- **Top foreign controllers of domestic companies**:
  - Japan: 56 (9)
  - Canada: 37 (27)
  - UK: 32 (15)
  - Mexico: 27 (2)
  - Germany: 20 (5)

Top links: United States as source

- Units: Market cap in bn USD (Number of companies)
- **Aggregates**
  - Controlled companies: 1 791 (1 025)
  - Domestic controlled companies: 1 583 (861)
  - Foreign controlled firms: 181 (137)
- **Top location of controlled companies abroad**:
  - Netherlands: 45 (8)
  - Australia: 31 (15)
  - Indonesia: 27 (4)
  - Canada: 25 (55)
  - India: 21 (24)

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Gravity equations

- **Poisson Pseudo Maximum Likelihood** (Santos Silva and Tenreyro, 2006).
- Specification without fixed effects:

$$X_{d,s} = \exp[\beta_d \mathbf{X}_d + \beta_s \mathbf{X}_s + \beta_{d,s} \mathbf{D}_{d,s} + \eta_{d,s}], \tag{1}$$

- Specification with fixed effects:

$$X_{d,s} = \exp[\beta_{d,s} \mathbf{D}_{d,s} + \phi_d + \theta_s + \eta_{d,s}], \tag{2}$$

  - $X_{d,s}$: amount in USD of link between destination d and source s:
    - Ownership stakes
    - Market cap of controlled firms
    - Trade flows in goods
    - Trade flows in services
  - $\mathbf{X}_s, \mathbf{X}_s$: characteristics of d and s
  - $\mathbf{D}_{d,s}$: measures of distance (geographical, historical)
  - ϕ_d, θ_s: destination and source country fixed effects
  - Coefficients can be interpreted as marginal impact in logs: $exp(\beta) - 1$ times larger; for small β, similar to a % increase

Baseline gravity

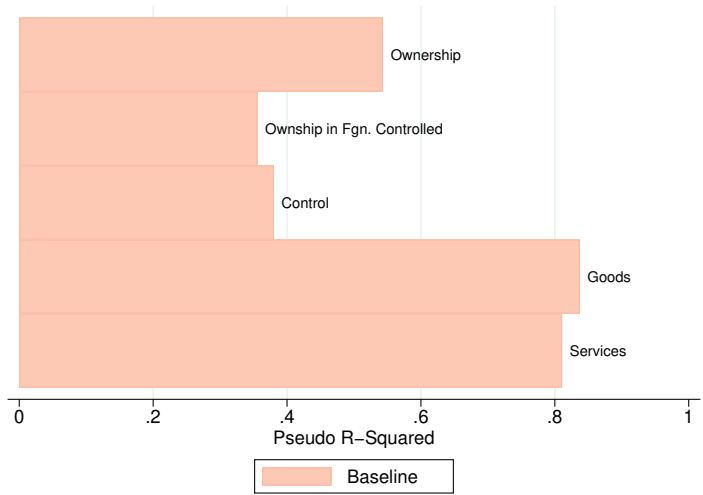
	(1) Ownshp	(2) in Fgn Ctrld	(3) Control	(4) Goods	(5) Services	(6) Ownshp	(7) in Fgn Ctrld	(8) Control	(9) Goods	(10) Services
Log Pop-Wght distance	-0.334***	-0.352*	-0.539**	-0.838***	-0.651***	-0.576***	-0.664***	-0.875***	-0.953***	-0.821***
	(0.107)	(0.180)	(0.249)	(0.056)	(0.070)	(0.185)	(0.207)	(0.255)	(0.080)	(0.059)
D Log GNI per cap.	0.963***	0.467***	0.599***	0.816***	0.991***					
	(0.129)	(0.091)	(0.105)	(0.060)	(0.053)					
D Log Pop.	0.725***	0.406**	0.358*	0.856***	0.747***					
	(0.096)	(0.163)	(0.184)	(0.052)	(0.048)					
S Log GNI per cap.	1.506***	1.278***	1.003***	0.778***	1.089***					
	(0.245)	(0.162)	(0.158)	(0.043)	(0.101)					
S Log Pop.	0.699***	0.565***	0.874***	0.881***	0.700***					
	(0.151)	(0.081)	(0.152)	(0.055)	(0.080)					
Obs. total	10094	10094	10094	10094	10094	10094	10094	10094	10094	10094
Obs. used	10094	10094	10094	10094	10094	9626	6962	7016	10094	10094
Num. countries (D/S)	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129
Pseudo-R^2	0.543	0.356	0.380	0.837	0.811	0.791	0.623	0.667	0.910	0.930
Fixed Effects	None	None	None	None	None	S & D	S & D	S & D	S & D	S & D

Standard errors in parentheses

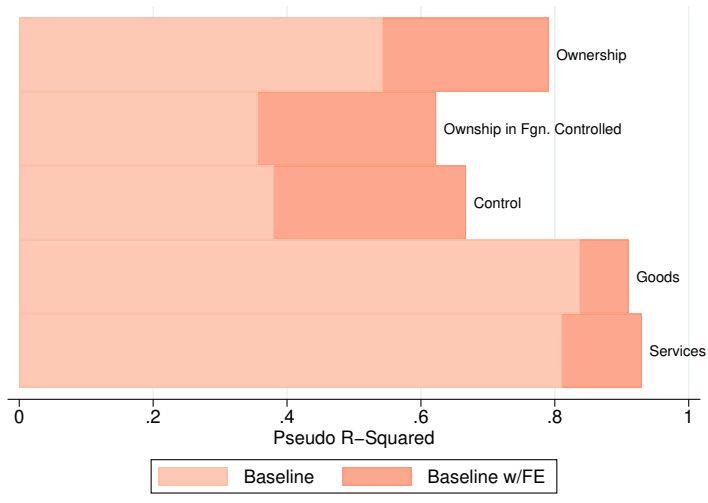
Clustered at source, destination, and country-pair level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

R^2 Gravity


Ownership
Ownship in Fgn. Controlled
Control
Goods
Services
0
.2
.4
.6
.8
1
Pseudo R–Squared
Baseline

R^2 Gravity


Ownership
Ownship in Fgn. Controlled
Control
Goods
Services
0
.2
.4
.6
.8
1
Pseudo R–Squared
Baseline
Baseline w/FE

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Tax havens

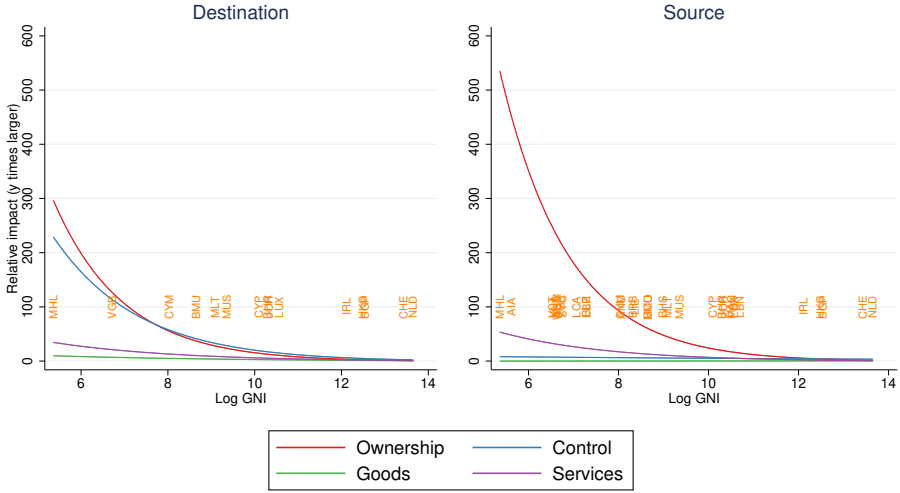
	(1) Ownshp	(2) in Fgn Ctrld	(3) Control	(4) Goods	(5) Services	(6) Ownshp	(7) in Fgn Ctrld	(8) Control	(9) Goods	(10) Services
D is tax haven	1.049***	0.971***	1.687***	0.676**	0.922***	9.046***	6.989**	8.197***	3.568**	5.438***
	(0.196)	(0.300)	(0.572)	(0.302)	(0.243)	(3.041)	(3.383)	(2.512)	(1.654)	(1.252)
D Log GNI * tax haven						-0.625**	-0.491*	-0.515**	-0.222*	-0.349***
						(0.244)	(0.287)	(0.212)	(0.121)	(0.097)
S is tax haven	1.238***	1.214***	1.594***	0.290	0.885***	9.825***	5.180***	2.670	-0.242	6.232***
	(0.364)	(0.294)	(0.420)	(0.197)	(0.290)	(2.794)	(1.460)	(2.289)	(1.276)	(1.353)
S Log GNI * tax haven						-0.660***	-0.308***	-0.085	0.040	-0.417***
						(0.199)	(0.116)	(0.155)	(0.092)	(0.107)
Both tax haven	-0.142	0.066	-0.501	0.003	0.204	-0.219	0.018	-0.515	0.002	0.157
	(0.423)	(0.630)	(0.893)	(0.149)	(0.260)	(0.492)	(0.633)	(0.889)	(0.159)	(0.259)
Obs. total	10094	10094	10094	10094	10094	10094	10094	10094	10094	10094
Obs. used	10094	10094	10094	10094	10094	10094	10094	10094	10094	10094
Num. countries (D/S)	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129
Pseudo-R^2	0.572	0.390	0.439	0.844	0.843	0.604	0.407	0.455	0.845	0.858
Fixed Effects	None	None	None	None	None	None	None	None	None	None

Standard errors in parentheses

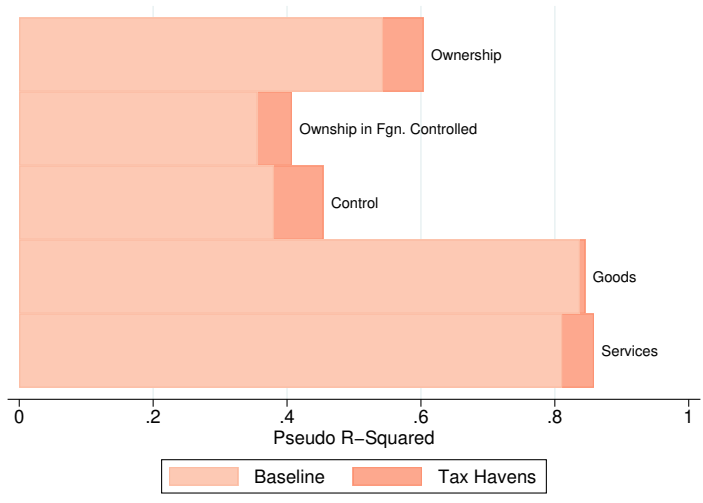
Clustered at source, destination, and country-pair level. Includes distance, GNI per cap., pop. as controls.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Tax havens


Destination
Source
Relative impact (y times larger)
0
100
200
300
400
500
600
6
8
10
12
14
Log GNI
MHL
VGB
CYM
BMU
MLT
MUS
CYP
LUX
IRL
CHE
NLD
AIA
Ownership
Control
Goods
Services

R^2 Gravity


Ownership
Ownship in Fgn. Controlled
Control
Goods
Services
0
.2
.4
.6
.8
1
Pseudo R–Squared
Baseline
Tax Havens

Tax havens and corporate tax rates

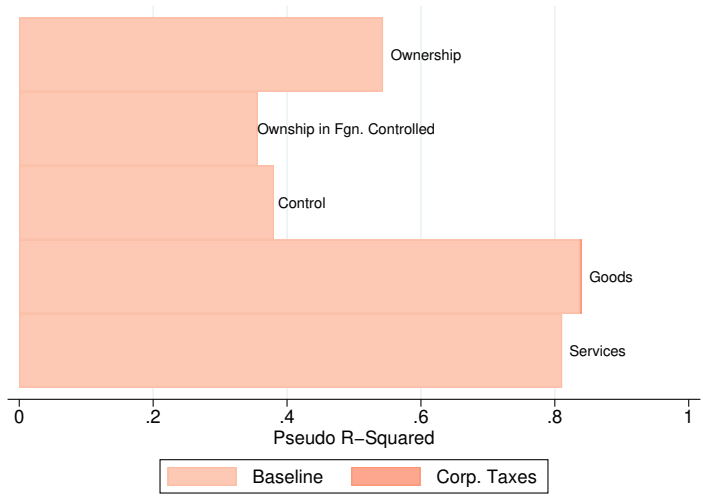
	(1) Ownshp	(2) in Fgn Ctrld	(3) Control	(4) Goods	(5) Services	(6) Ownshp	(7) in Fgn Ctrld	(8) Control	(9) Goods	(10) Services
D is tax haven						9.156***	6.965*	8.080***	3.553**	5.485***
						(3.097)	(3.560)	(2.602)	(1.647)	(1.229)
D Log GNI * tax haven						-0.636***	-0.488	-0.512**	-0.220*	-0.352***
						(0.246)	(0.298)	(0.218)	(0.119)	(0.094)
S is tax haven						8.659***	5.033***	2.281	-0.743	6.145***
						(2.727)	(1.515)	(2.116)	(1.368)	(1.367)
S Log GNI * tax haven						-0.558***	-0.293**	-0.070	0.072	-0.406***
						(0.202)	(0.120)	(0.148)	(0.101)	(0.108)
D Corp. Tax Rate (%, 2014)	-0.012	-0.008	-0.020	-0.002	-0.015**	-0.002	0.001	-0.002	0.003	-0.006
	(0.018)	(0.021)	(0.020)	(0.009)	(0.007)	(0.015)	(0.020)	(0.019)	(0.008)	(0.006)
S Corp. Tax Rate (%, 2014)	0.038*	-0.004	-0.023	-0.023***	-0.000	0.045**	0.009	-0.010	-0.021***	0.008
	(0.021)	(0.018)	(0.019)	(0.006)	(0.011)	(0.020)	(0.018)	(0.019)	(0.005)	(0.009)
Obs. total	9223	9223	9223	9223	9223	9223	9223	9223	9223	9223
Obs. used	9223	9223	9223	9223	9223	9223	9223	9223	9223	9223
Num. countries (D/S)	79/119	79/119	79/119	79/119	79/119	79/119	79/119	79/119	79/119	79/119
Pseudo-R^2	0.543	0.344	0.375	0.840	0.810	0.607	0.396	0.446	0.848	0.857
Fixed Effects	None	None	None	None	None	None	None	None	None	None

Standard errors in parentheses

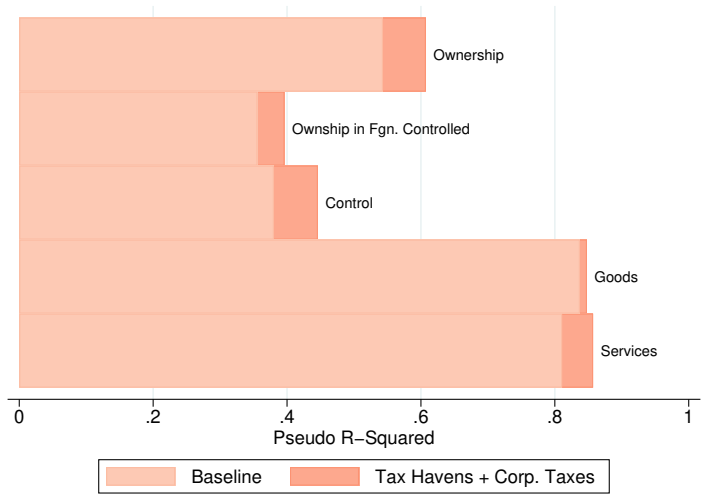
Clustered at source, destination, and country-pair level. Includes distance, GNI per cap., pop. as controls.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

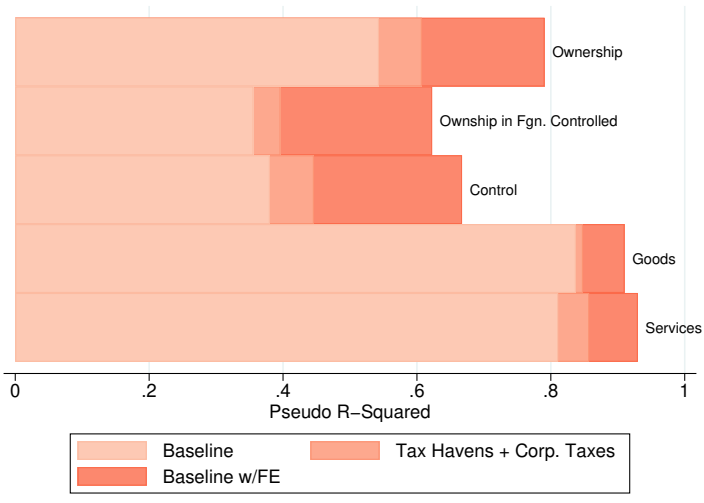
R^2 Gravity


Ownership
Ownship in Fgn. Controlled
Control
Goods
Services
0
.2
.4
.6
.8
1
Pseudo R–Squared
Baseline
Corp. Taxes

R^2 Gravity


Ownership
Ownship in Fgn. Controlled
Control
Goods
Services
0
.2
.4
.6
.8
1
Pseudo R–Squared
Baseline
Tax Havens + Corp. Taxes

R^2 Gravity


Ownership
Ownship in Fgn. Controlled
Control
Goods
Services
0
.2
.4
.6
.8
1
Pseudo R−Squared
Baseline
Baseline w/FE
Tax Havens + Corp. Taxes

Outline

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Bilateral patterns

Gravity

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Historical, linguistic and religious ties

	(1) Ownshp	(2) in Fgn Ctrld	(3) Control	(4) Goods	(5) Services	(6) Ownshp	(7) in Fgn Ctrld	(8) Control	(9) Goods	(10) Services
Log Pop-Wght distance	-0.770***	-0.717***	-0.922***	-0.906***	-0.795***	-0.417***	-0.447**	-0.624***	-0.946***	-0.742***
	(0.163)	(0.198)	(0.259)	(0.067)	(0.058)	(0.142)	(0.198)	(0.190)	(0.079)	(0.051)
Colonial relationship ever	0.909***	1.221***	0.906***	0.153	0.350*					
	(0.226)	(0.358)	(0.350)	(0.237)	(0.180)					
Colonies of same empire	-0.430	0.323	0.004	0.414***	0.245**					
	(0.360)	(0.437)	(0.569)	(0.131)	(0.122)					
Same off/prim lang.						0.713**	1.288***	0.996***	0.222**	0.458***
						(0.322)	(0.320)	(0.377)	(0.107)	(0.108)
Same religion						2.054***	1.619**	1.739**	-0.233	0.381***
						(0.686)	(0.676)	(0.676)	(0.195)	(0.144)
Obs. total	9826	9826	9826	9826	9826	9765	9765	9765	9765	9765
Obs. used	9363	6805	6858	9826	9826	9302	6805	6858	9765	9765
Num. countries (D/S)	79/127	79/127	79/127	79/127	79/127	79/126	79/126	79/126	79/126	79/126
Pseudo-R^2	0.804	0.640	0.674	0.911	0.931	0.807	0.661	0.690	0.910	0.934
Fixed Effects	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D

Standard errors in parentheses

Clustered at source, destination, and country-pair level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Legal origins

	(1) Ownshp	(2) in Fgn Ctrld	(3) Control	(4) Goods	(5) Services	(6) Ownshp	(7) in Fgn Ctrld	(8) Control	(9) Goods	(10) Services
Log Pop-Wght distance	-0.556***	-0.610***	-0.860***	-0.939***	-0.794***	-0.562***	-0.610***	-0.850***	-0.941***	-0.795***
	(0.187)	(0.204)	(0.258)	(0.074)	(0.058)	(0.185)	(0.205)	(0.249)	(0.073)	(0.058)
Same legal origin	0.335*	0.707***	0.353	0.104	0.227***					
	(0.196)	(0.213)	(0.289)	(0.109)	(0.080)					
Same common law legal or.						-0.099	0.866	-0.012	0.323***	0.189
						(0.328)	(0.575)	(0.732)	(0.118)	(0.122)
Same civil law legal or.						0.724***	0.590*	0.638	-0.012	0.254***
						(0.237)	(0.339)	(0.418)	(0.151)	(0.087)
Obs. total	10094	10094	10094	10094	10094	10094	10094	10094	10094	10094
Obs. used	9626	6962	7016	10094	10094	9626	6962	7016	10094	10094
Num. countries (D/S)	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129	80/129
Pseudo-R^2	0.793	0.638	0.670	0.911	0.932	0.794	0.638	0.671	0.911	0.932
Fixed Effects	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D

Standard errors in parentheses

Clustered at source, destination, and country-pair level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Deep linkages

	(1) Ownshp	(2) in Fgn Ctrld	(3) Control	(4) Goods	(5) Services	(6) Ownshp	(7) in Fgn Ctrld	(8) Control	(9) Goods	(10) Services
Log Pop-Wght distance	-0.647***	-0.772***	-0.767***	-0.949***	-0.814***	-0.652***	-0.838***	-0.890***	-1.129***	-0.874***
	(0.143)	(0.198)	(0.144)	(0.083)	(0.054)	(0.168)	(0.251)	(0.249)	(0.085)	(0.069)
% D Pop. w/ 1500 S acenstry	0.027**	0.039***	0.043***	0.002	0.016***	0.027**	0.041***	0.046***	0.007***	0.018***
	(0.012)	(0.011)	(0.005)	(0.003)	(0.002)	(0.013)	(0.011)	(0.007)	(0.002)	(0.002)
% S Pop. w/ 1500 D acenstry	0.038***	0.035***	0.000	0.004	0.009***	0.038***	0.038***	0.004	0.009***	0.011***
	(0.005)	(0.006)	(0.004)	(0.003)	(0.002)	(0.005)	(0.006)	(0.007)	(0.003)	(0.002)
Stdz. Genet. dist. (weigh)						0.018	0.178	0.262	0.327***	0.126**
						(0.204)	(0.268)	(0.294)	(0.098)	(0.056)
Obs. total	8149	8149	8149	8149	8149	7745	7745	7745	7745	7745
Obs. used	7777	5841	6072	8149	8149	7378	5330	5699	7745	7745
Num. countries (D/S)	75/110	75/110	75/110	75/110	75/110	74/106	74/106	74/106	74/106	74/106
Pseudo-R^2	0.819	0.666	0.711	0.906	0.939	0.817	0.659	0.708	0.910	0.939
Fixed Effects	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D	S & D

Standard errors in parentheses

Clustered at source, destination, and country-pair level

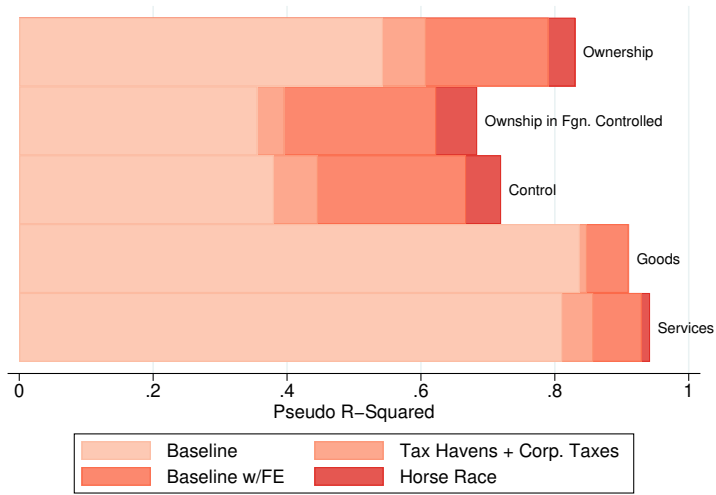
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Horse Race

	(1) Ownshp	(2) in Fgn Ctrld	(3) Control	(4) Goods	(5) Services
Log Pop-Wght distance	-0.685***	-0.739***	-0.740***	-1.052***	-0.802***
	(0.159)	(0.226)	(0.214)	(0.078)	(0.058)
Colonial relationship ever	0.484*	0.077	0.127	0.121	0.141
	(0.257)	(0.289)	(0.323)	(0.187)	(0.164)
Colonies of same empire	-0.313	-0.589*	0.285	0.298**	0.203
	(0.283)	(0.326)	(0.460)	(0.134)	(0.126)
Same off/prim lang.	0.403	0.855***	0.259	-0.057	0.134
	(0.345)	(0.328)	(0.261)	(0.142)	(0.112)
Same religion	1.639**	1.258**	1.740***	-0.156	0.288**
	(0.667)	(0.606)	(0.543)	(0.168)	(0.131)
Same common law legal or.	-0.462	0.256	-0.368	0.247**	-0.029
	(0.357)	(0.428)	(0.578)	(0.124)	(0.099)
Same civil law legal or.	0.467**	0.311	0.313	0.044	0.230***
	(0.208)	(0.303)	(0.290)	(0.120)	(0.065)
% D Pop. w/ 1500 S acenstry	0.013	0.022***	0.041***	0.008***	0.017***
	(0.009)	(0.006)	(0.009)	(0.003)	(0.003)
% S Pop. w/ 1500 D acenstry	0.028***	0.019	-0.001	0.011***	0.011***
	(0.008)	(0.013)	(0.012)	(0.003)	(0.002)
Stdz. Genet. dist. (plurality)	0.098	0.130	0.310	0.298***	0.136**
	(0.159)	(0.185)	(0.260)	(0.101)	(0.059)
Obs. total	7745	7745	7745	7745	7745
Obs. used	7378	5330	5699	7745	7745
Num. countries (D/S)	74/106	74/106	74/106	74/106	74/106
Pseudo-R^2	0.831	0.684	0.720	0.911	0.942
Fixed Effects	S & D	S & D	S & D	S & D	S & D

Standard errors in parentheses
Clustered at source, destination, and country-pair level
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

R^2 Gravity


Ownership
Ownship in Fgn. Controlled
Control
Goods
Services
0
.2
.4
.6
.8
1
Pseudo R–Squared
Baseline
Baseline w/FE
Tax Havens + Corp. Taxes
Horse Race

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Conclusion

Globalization of Corporate Control

- Mapping
  - Descriptive Patterns
- Correlates (Gravity Framework)
  - Financial Off-shore Centers
  - Proximity. Cultural and Historical Ties

Next Steps

- Mapping and Data
  - Further expand firm coverage
- Correlates
  - Heterogeneity by investor type
  - Senstivity analysis (e.g. corporate taxation)
  - Cultural ties (Bilateral trust)
  - Role of investment treaties and other international agreements

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Main dataset

Control data from Aminadav and Papaioannou (2019)

- BvD ownership data often not enough to identify ultimate owner
- Low coverage of private entities

Aminadav and Papaioannou (2019) extend dataset for 13k companies using:

- Financial data providers (e.g. Bloomberg, Dun & Bradstreet, Forbes)
- Government publications
- Reports from regulatory agencies
- Country-specific news websites and company reports

Key challenge regards private firms holding equity stakes in publicly-traded firms

- Necessary when controlling shareholder could not be traced from BvD
- Opaque and complex ownership structures often using tax havens
- Often owned by separate family members; voting rights are aggregated (64k individuals to 20k unique families)

Controlled if Shapley and Shubik (1954) index above 0.75 ▸ Details ▸ Back

Main dataset

How we identify control (Aminadav et al. (2011), Aminadav and Papaioannou (2019))

- We calculate the Shapley and Shubik (1954) index for each shareholder
- With n shareholders, $n!$ orderings are possible
- For each ordering, define as pivotal the shareholder that turns a coalition into a majority
- Define piv_s as the number of orderings where s is pivotal
- Shapley-Shubik power index: $SSI_s = \frac{piv_s}{n!} \in [0,1]$; $\sum_s SSI_s = 1$
- Threshold of 0.5 guarantees uniqueness (not existence); we pick 0.75
- Advantages compared to typical measures in the literature
- When identifying control, we aggregate voting rights of entities controlled by common ultimate owner
- This requires iterative process

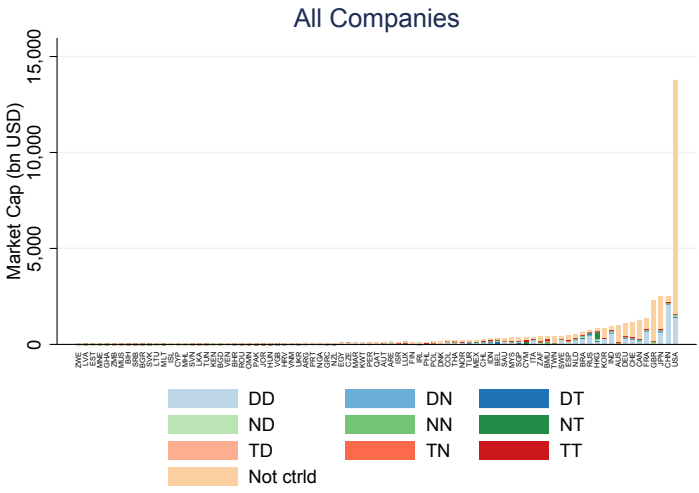
Back

Genetic distance data

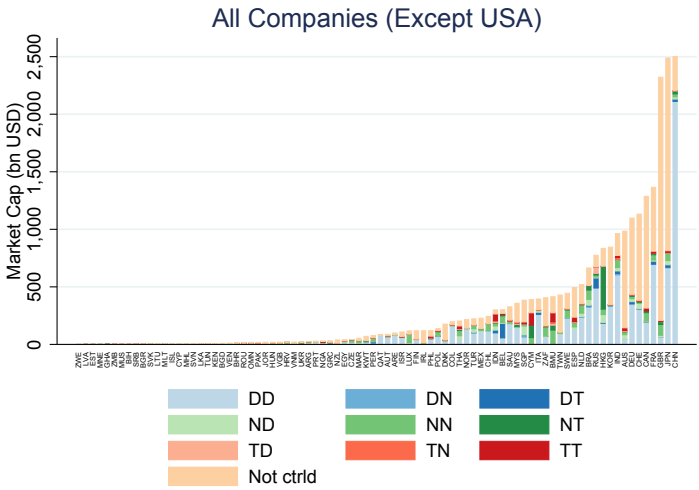
- Spolaore and Wacziarg (2018) obtain genetic distance data at the population level from Pemberton et al. (2013)
- They match populations to countries, using ethnic composition data by country from Alesina et al. (2003) listing 1,120 country-ethnic group categories
- Each ethnic group is matched to a genetic group from Pemberton et al. (2013)
- The genetic plurality distance is the distance between the plurality groups of each country in a pair, defined as the groups with the largest shares of each country's population

Back

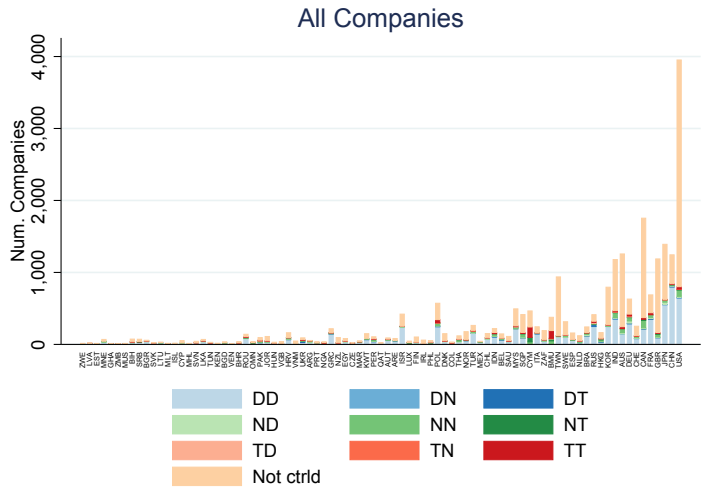
Categories


All Companies
Market Cap (bn USD)
0
5,000
10,000
15,000
DD
DN
DT
ND
NN
NT
TD
TN
TT
Not ctrld

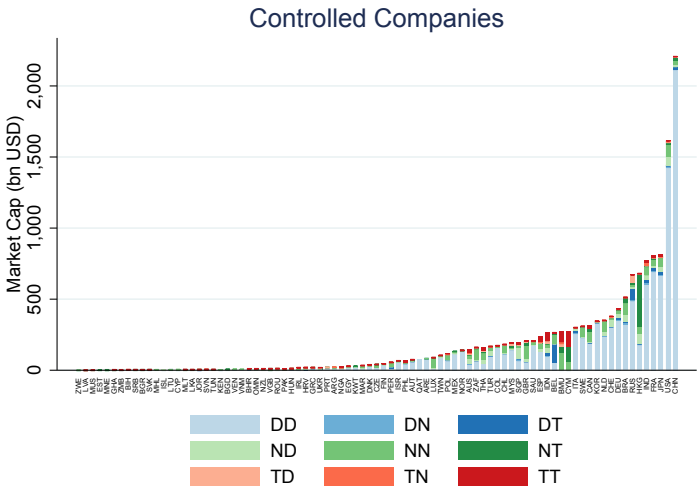
Categories


All Companies (Except USA)
Market Cap (bn USD)
0
500
1,000
1,500
2,000
2,500
DD
DN
DT
ND
NN
NT
TD
TN
TT
Not ctrld

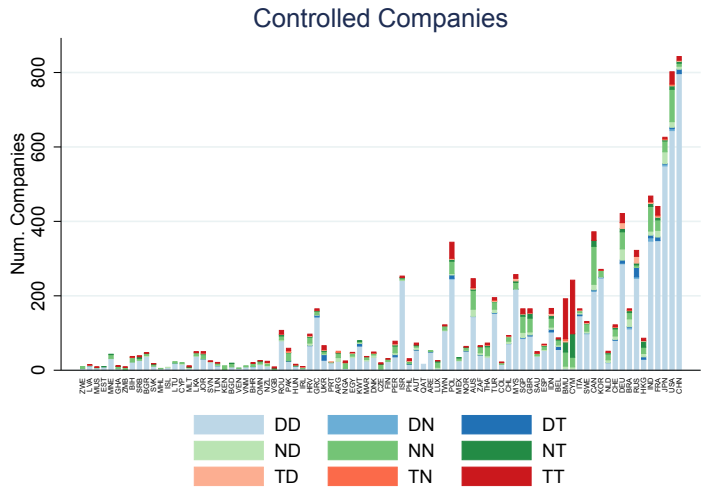
Categories


All Companies
Num. Companies
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2,000
3,000
4,000
DD
DN
DT
ND
NN
NT
TD
TN
TT
Not ctrld

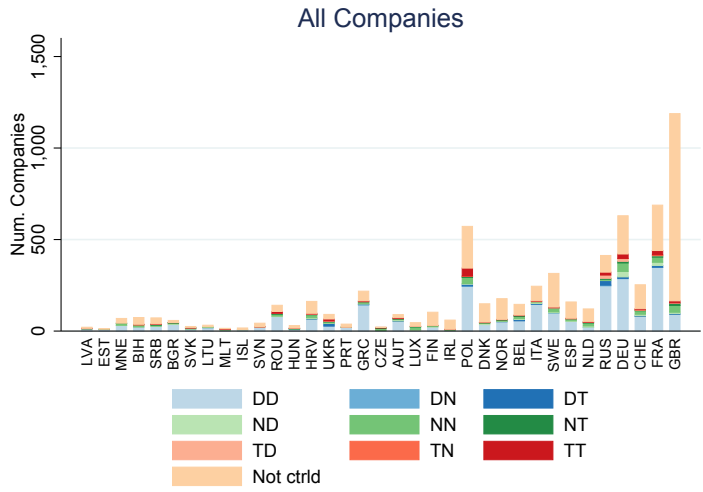
Categories


Controlled Companies
Market Cap (bn USD)
0
500
1,000
1,500
2,000
ZWE LVA LUX EST CHE GHA ISR BIH BGR SVK MNE SVN LTU CYP MLT HRV SRB DOM TUN KEN BGD SAU VNM OMN ARE VEN PAK HUN ISL GRC PRT POL NGA EGY KWT DNK CHL FIN IRN AUS ZAF AUT TWN MEX KOR NOR CAN FRA TUR CHE GBR DEU SWE BEL ESP ITA NLD JPN HKG IND RUS CHN
DD
DN
DT
ND
NN
NT
TD
TN
TT

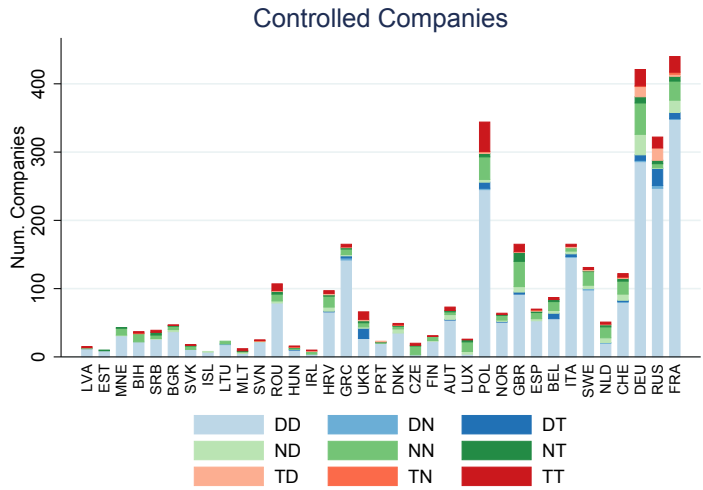
Categories


Controlled Companies
Num. Companies
0
200
400
600
800
ZWE LVA LUX EST GRC CHL BIH BGR NZL IRL LTU CYP MLT SVK DOM BGD SVN VNM ROU OMN VEN PAK HUN IRL ARG GRC PRT PER NGA KWT CZE DNK ZAF ISR ARE QAT TWN MEX KOR AUS TUR FRA CHE CAN GBR ESP SWE BEL DEU AUT FIN HKG NLD IND JPN RUS CHN
DD
DN
DT
ND
NN
NT
TD
TN
TT

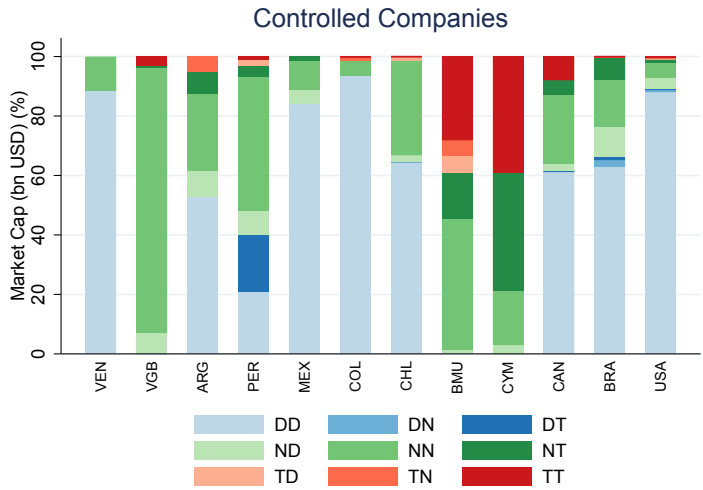
Categories - Europe



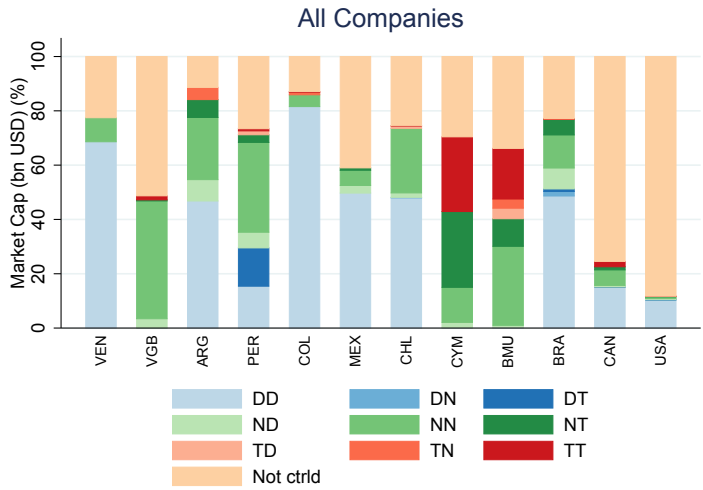
Categories - Europe



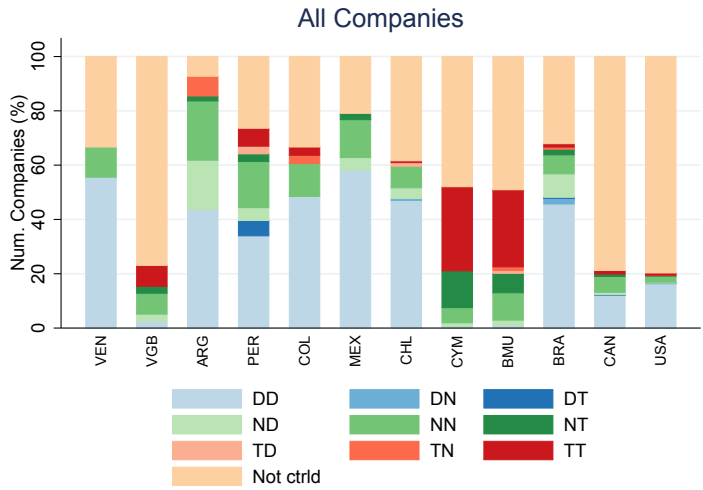
Categories - Americas



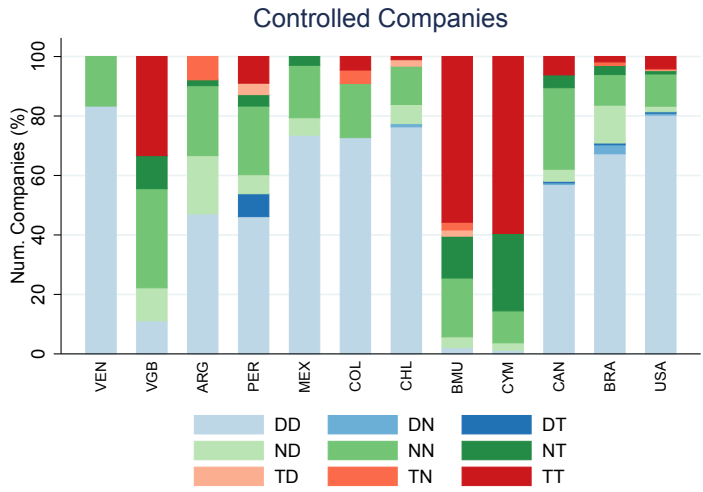
Categories - Americas



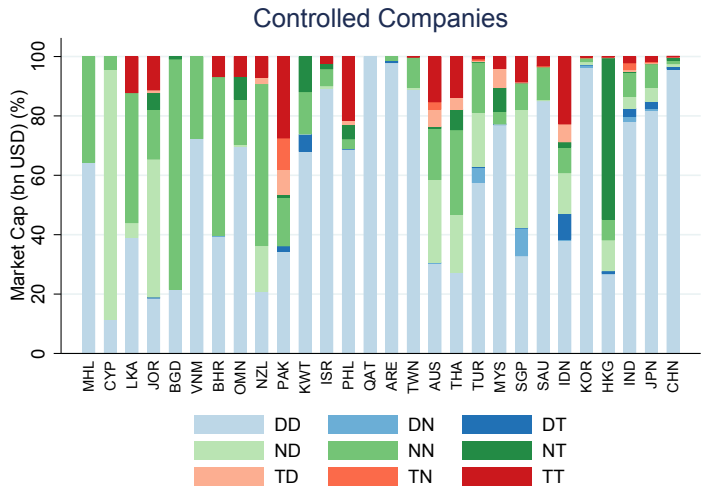
Categories - Americas



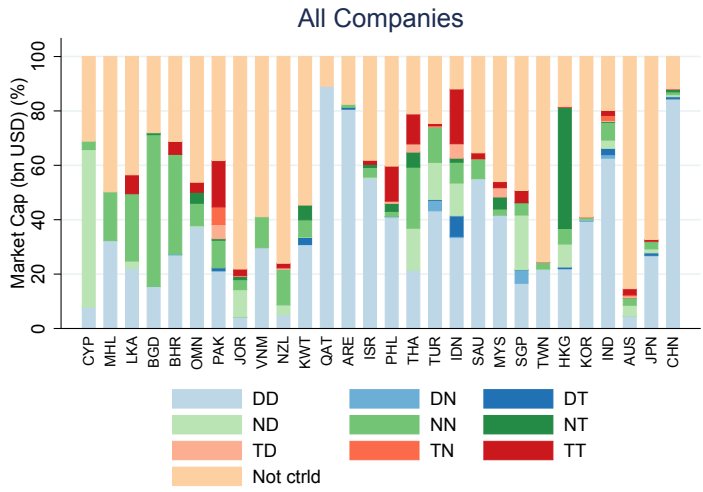
Categories - Americas



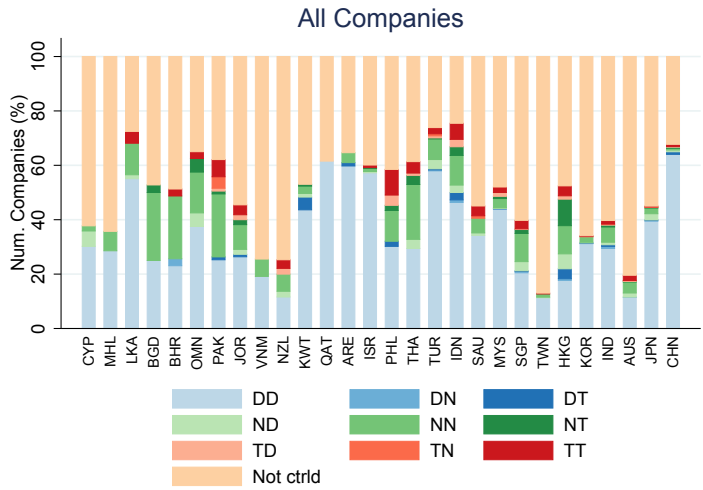
Categories - Asia & Oceania



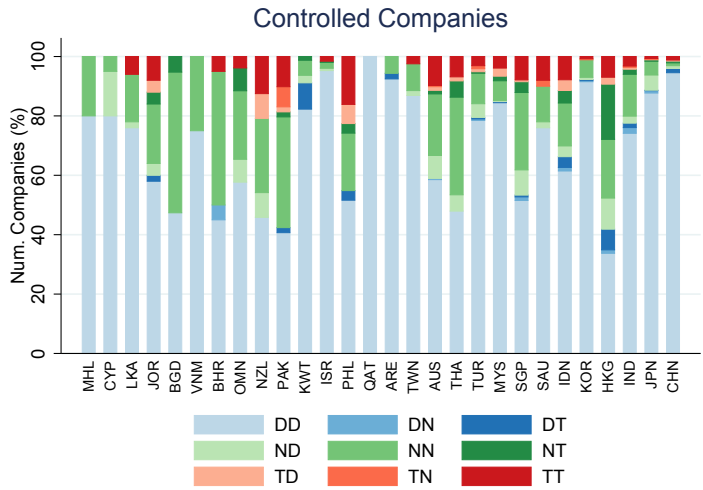
Categories - Asia & Oceania



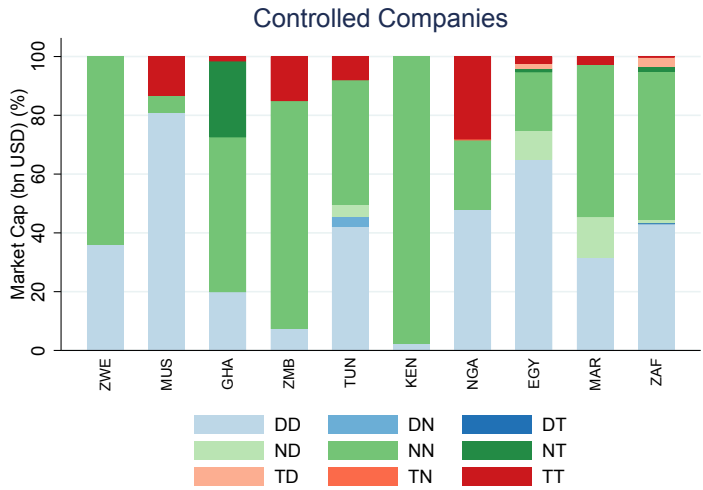
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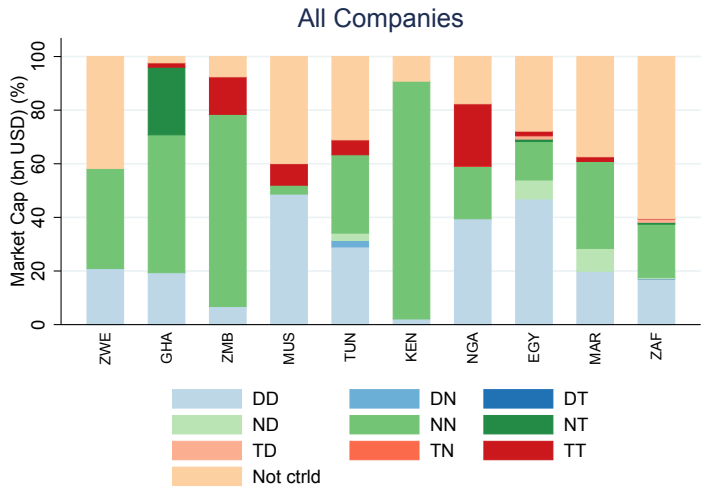
Categories - Asia & Oceania



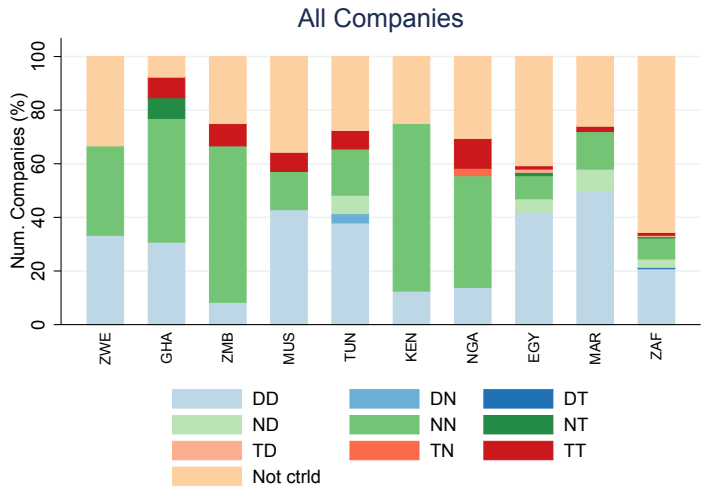
Categories - Africa



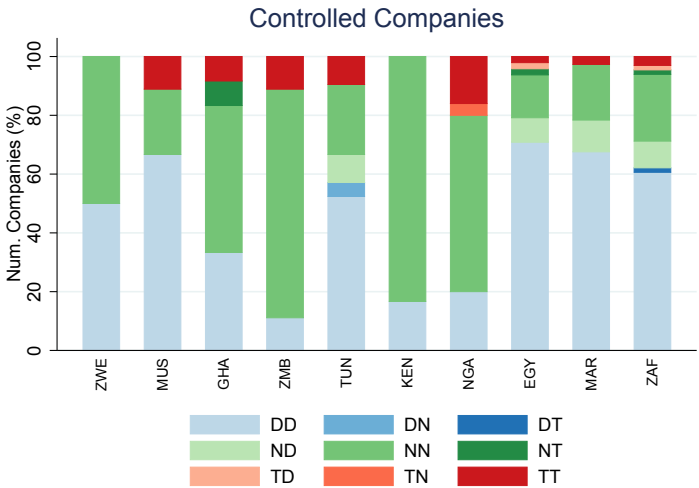
Categories - Africa



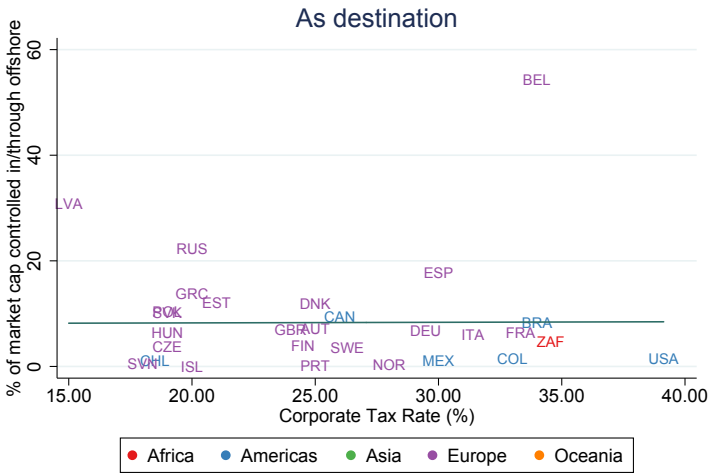
Categories - Africa



Categories - Africa

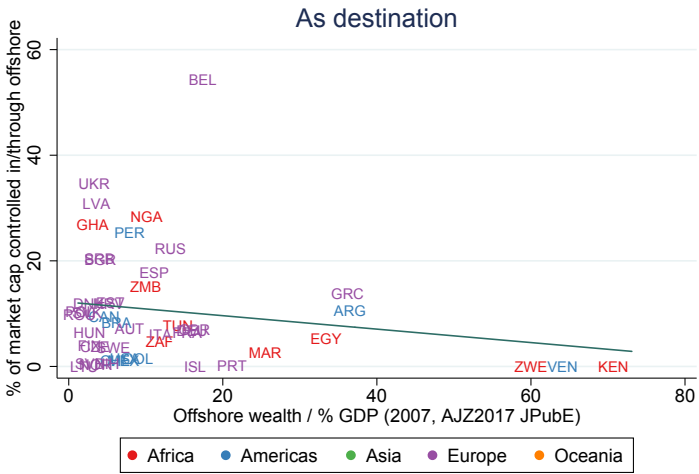


The use of foreign tax havens - as destination



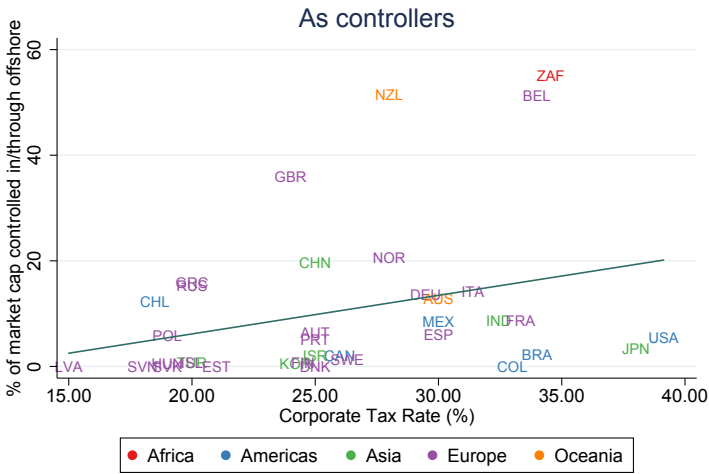
Correlation coefficient: 0.01. Countries with fewer than 10 companies are dropped.

The use of foreign tax havens - as destination



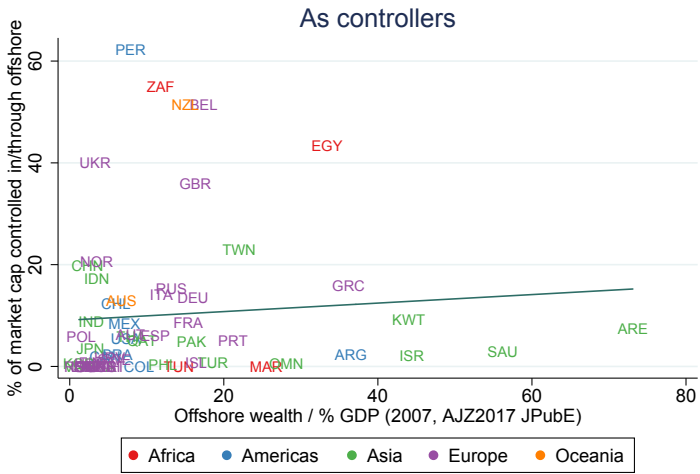
Correlation coefficient: -0.19. Countries with fewer than 10 companies are dropped.

The use of foreign tax havens - as source



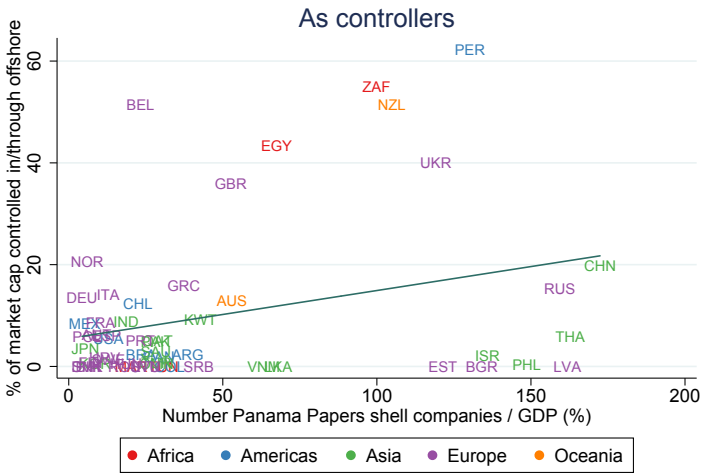
Correlation coefficient: 0.30. Countries with fewer than 10 companies are dropped.

The use of foreign tax havens - as source



Correlation coefficient: 0.08. Countries with fewer than 10 companies are dropped.

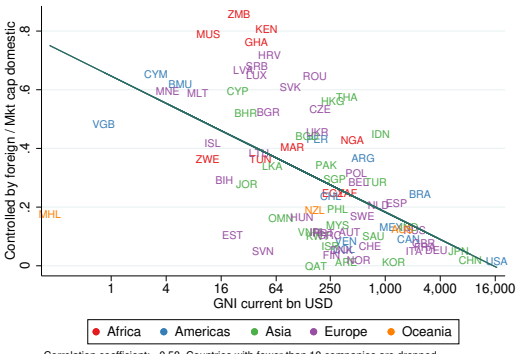
The use of foreign tax havens - as source



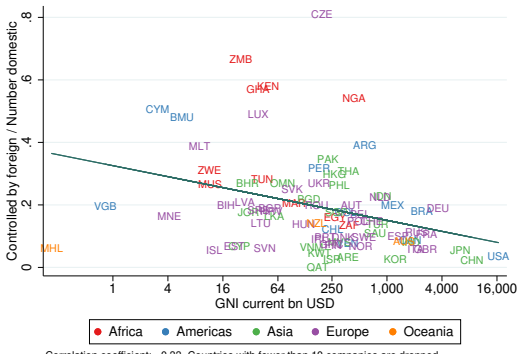
Correlation coefficient: 0.30. Countries with fewer than 10 companies are dropped.

Correlations - Destination. Size

Sample: All domestic companies



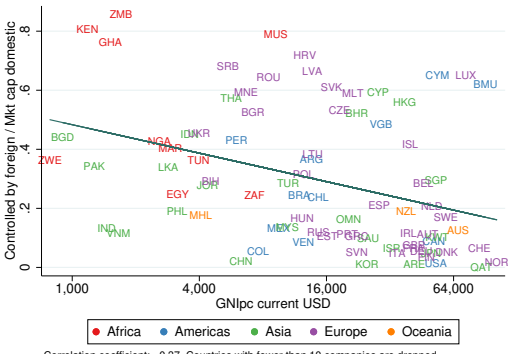
Correlation coefficient: −0.58. Countries with fewer than 10 companies are dropped.



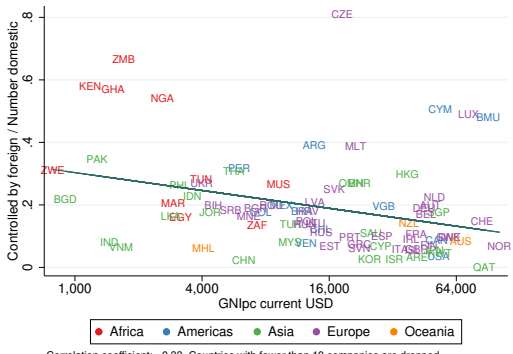
Correlation coefficient: −0.33. Countries with fewer than 10 companies are dropped.

Correlations - Destination. Income per capita

Sample: All domestic companies



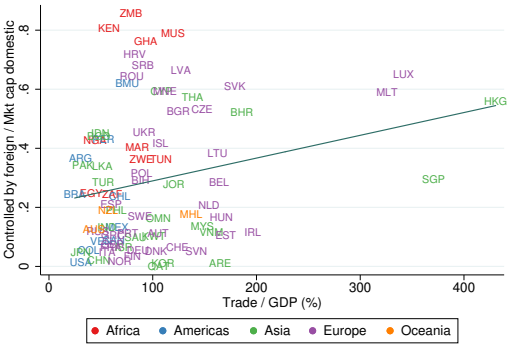
Correlation coefficient: −0.37. Countries with fewer than 10 companies are dropped.



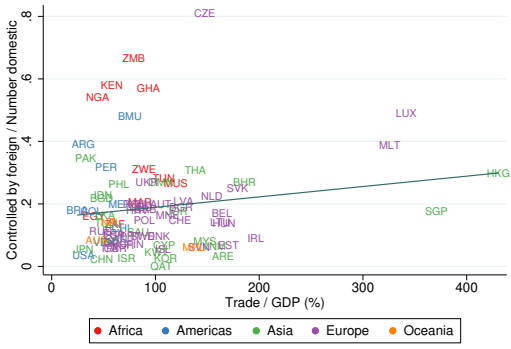
Correlation coefficient: −0.33. Countries with fewer than 10 companies are dropped.

Correlations - Destination. Trade

Sample: All domestic companies



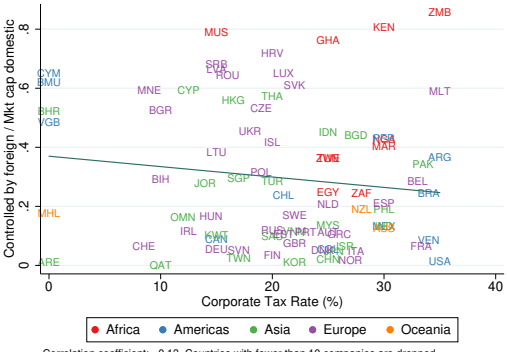
Correlation coefficient: 0.24. Countries with fewer than 10 companies are dropped.



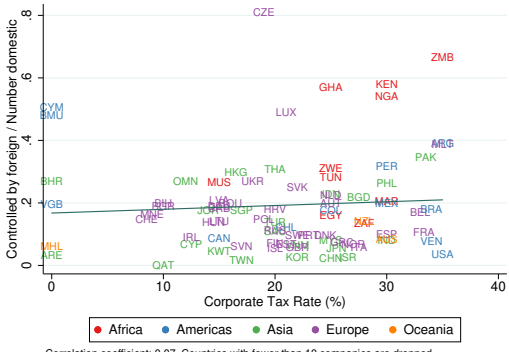
Correlation coefficient: 0.16. Countries with fewer than 10 companies are dropped.

Correlations - Destination. Tax rates

Sample: All domestic companies



Correlation coefficient: −0.13. Countries with fewer than 10 companies are dropped.



Correlation coefficient: 0.07. Countries with fewer than 10 companies are dropped.

Regressions - Destination

Dependent variable: Firms controlled by foreign / Domestic firms (in p.p.)

Measured in market cap or number of firms

VARIABLES	(1) Mkt Cap	(2) Mkt Cap	(3) Mkt Cap	(4) Mkt Cap	(5) Mkt Cap	(6) Mkt Cap
Tax haven	32.067***					21.123**
	(6.842)					(9.084)
Log GNI curr. USD per cap.		-0.045				-0.052*
		(0.028)				(0.028)
Log GNI curr. USD			-0.077***			-0.048**
			(0.012)			(0.020)
Trade / GDP				0.121***		0.035
				(0.039)		(0.047)
Top statutory corp. tax rates					-0.896***	0.321
					(0.323)	(0.378)
Observations	85	84	84	82	84	81
R-squared	0.314	0.147	0.413	0.241	0.207	0.455
Companies	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Fixed Effects	Region	Region	Region	Region	Region	Region

▸ Back to summary

Regressions - Destination

Dependent variable: Firms controlled by foreign / Domestic firms (in p.p.)

Measured in market cap or number of firms

VARIABLES	(1) Num Firm	(2) Num Firm	(3) Num Firm	(4) Num Firm	(5) Num Firm	(6) Num Firm
Tax haven	22.062***					15.187**
	(5.050)					(7.279)
Log GNI curr. USD per cap.		-0.009				-0.037
		(0.021)				(0.023)
Log GNI curr. USD			-0.034***			-0.003
			(0.010)			(0.016)
Trade / GDP				0.093***		0.059
				(0.028)		(0.037)
Top statutory corp. tax rates					-0.428*	0.241
					(0.242)	(0.303)
Observations	85	84	84	82	84	81
R-squared	0.337	0.174	0.273	0.276	0.206	0.347
Companies	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Fixed Effects	Region	Region	Region	Region	Region	Region

Back to summary

Regressions - Source

Dependent variable: Firms controlled by foreign / Domestic firms (in p.p.)

Measured in market cap or number of firms

VARIABLES	(1) Mkt Cap	(2) Mkt Cap	(3) Mkt Cap	(4) Mkt Cap	(5) Mkt Cap	(6) Mkt Cap
Tax haven	31.710***					30.237***
	(7.093)					(8.773)
Log GNI curr. USD per cap.		0.053**				-0.011
		(0.024)				(0.028)
Log GNI curr. USD			-0.020			0.033*
			(0.018)			(0.020)
Trade / GDP				0.066***		-0.015
				(0.023)		(0.044)
Top statutory corp. tax rates					-0.898***	-0.399
					(0.305)	(0.409)
Observations	75	74	74	72	74	71
R-squared	0.285	0.063	0.035	0.064	0.119	0.261
Fixed Effects	Region	Region	Region	Region	Region	Region

Back to summary

Regressions - Source

Dependent variable: Firms controlled by foreign / Domestic firms (in p.p.)

Measured in market cap or number of firms

VARIABLES	(1) Num Firm	(2) Num Firm	(3) Num Firm	(4) Num Firm	(5) Num Firm	(6) Num Firm
Tax haven	37.348***					30.341***
	(5.145)					(5.358)
Log GNI curr. USD per cap.		0.105***				0.051***
		(0.018)				(0.017)
Log GNI curr. USD			-0.017			0.016
			(0.014)			(0.012)
Trade / GDP				0.129***		0.027
				(0.027)		(0.027)
Top statutory corp. tax rates					-0.765***	0.114
					(0.236)	(0.250)
Observations	75	74	74	72	74	71
R-squared	0.548	0.304	0.037	0.249	0.125	0.622
Fixed Effects	Region	Region	Region	Region	Region	Region

Back to summary

PPML

- Heterosk. in gravity equation leads to biased estimates with OLS
- Take a gravity equation:

$$T_{ij} = \alpha_0 Y_i^{\alpha_1} Y_j^{\alpha_2} D_{ij}^{\alpha_3} \eta_{ij} \tag{3}$$

where η_{ij} is an error term independent of regressors w/ $E(\eta_{ij}|Y_i, Y_j, D_{ij}) = 1$

- Take logs, combine Y_i, Y_j and D_{ij} into $\mathbf{Z_{ij}}$; $\mathbf{z_{ij}} = \ln \mathbf{Z_{ij}}$ and obtain:

$$\ln T_{ij} = \mathbf{z_{ij}}'\alpha + \ln \eta_{ij} \tag{4}$$

- Unbiased estimation by OLS requires $E(\mathbf{z_{ij}}' \ln \eta_{ij}) = 0$
- Suppose heteroskedasticity: $\sigma_{ij}^2 = f(\mathbf{Z_{ij}})$
- Jensen's inequality: $E(\ln \eta_{ij}) \neq \ln E(\eta_{ij})$
- $E(\ln \eta_{ij})$ depends on higher order moments, like variance
- Variance is not independent of regressors; $E(\ln \eta_{ij})$ will then also not be
- Biased estimates; cannot deal with $T_{ij} = 0$ after taking logs

Back

PPML

- Heteroskedasticity is expected in trade flows: e.g. for very small flows, measurement error should be close to 0; not the case for large flows
- Non-linear estimation as an alternative: $y_i = \exp(z_i\beta) + \epsilon_i$
- Non-linear least squares estimator: $\hat{\beta} = \arg\min_b \sum_{i=1}^{n} [y_i - \exp(x_i b)]^2$, yielding FOC: $\sum_{i=1}^{n} [y_i - \exp(x_i\hat{\beta})] \exp(x_i\hat{\beta}) x_i = 0$
- Santos Silva and Tenreyro (2006) argue $\exp(x_i\hat{\beta})$ term gives larger weight to noisier observations, leading to inefficiency
- The heteroskedasticity pattern is unknown; assume conditional variance proportional to mean: $\exp(x_i\beta) \propto V[y_i|x]$
- This leads to FOC: $\sum_{i=1}^{n} [y_i - \exp(x_i\hat{\beta})] x_i = 0$
- Equivalent to the Poisson Pseudo Maximum Likelihood estimator

Back