Global Capital Allocation Project

Matteo Maggiori
Stanford

Carlo Alberto Medal Lecture

June 8th 2021

Global Capital Allocation

The basic question of how capital is allocated globally

Who gets it? Who provides it? Which risks are shared? Which new risks are created?

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- Benefits:
  - Transfer capital from savers to productive users
  - Share risks, diversify
  - Equilibrate exchange rates, safe interest rates, cost of capital

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- Benefits:
  - Transfer capital from savers to productive users
  - Share risks, diversify
  - Equilibrate exchange rates, safe interest rates, cost of capital
- Problems:
  - Capital flights, crises, and endogenous amplification of risks
  - Unequal access to capital: global capital markets not a level playing field
  - System can be gamed: multinationals and tax havens

Global Capital Allocation Project

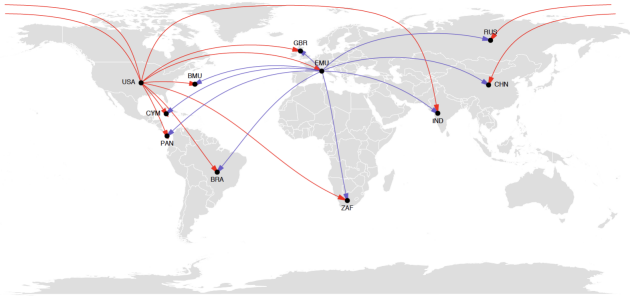
- Last 15 years dominated by severe crises and policy interventions in capital markets
- Realization that "*who owns which assets*" is an important macro question
- GCAP is a research effort to shed light on how capital moves around the world and design better policies to improve outcomes

Global Capital Allocation Project

- Last 15 years dominated by severe crises and policy interventions in capital markets
- Realization that "*who owns which assets*" is an important macro question
- GCAP is a research effort to shed light on how capital moves around the world and design better policies to improve outcomes
- Today we'll focus on:
  - The importance of currency in shaping capital allocations
  - The role of international currencies
  - Tax havens and offshore financial centers

THE GLOBAL CAPITAL ALLOCATION PROJECT

OUR AIM IS TO SHED LIGHT ON HOW CAPITAL MOVES AROUND THE WORLD TO IMPROVE INTERNATIONAL ECONOMIC POLICY



UPDATES

Jesse Schreger Named 2021 Sloan Research Fellow

Feb 17, 2021

Jesse Schreger was one of eight economists to receive a Sloan Fellowship in 2021.

Read More →

Matteo Maggiori Receives the 2021 Fischer Black Prize

Dec 5, 2020

"Matteo Maggiori has been selected by the American Finance Association to receive the 2021 Fischer Black Prize for an outstanding financial economist under age 40."

Read More →

Jesse Schreger Receives LBS/AQR Young Researcher Award

May 5, 2020

"For their outstanding contributions to academic research, we recognise Sabrina T. Howell […] and Jesse Schreger […] as the top Young Researchers for 2020. Howell is noted for her work on entrepreneurship and Schreger is noted for his contributions to international macroeconomics."

Read More →

IN THE NEWS

NBER Reporter: "The Global Capital Allocation Project"

Mar 31, 2021

"In recent decades, global flows of assets and goods have grown rapidly relative to GDP and have shifted aggressively during crises such as the global financial crisis and the current pandemic. Corporations and governments increasingly borrow from foreign investors, who face more options for allocating their capital in terms of asset class, currency, and geography. A sense of "who owns what" around the world, and why, is required to understand what these trends mean for the global economy. Our research aims to expand this understanding and explores the key elements driving global capital allocation."

Bloomberg: "Treasury Has $541 Billion of Dirty Little Secrets"

Sep 21, 2020

"Government data may tell you there's little at risk — Americans hold only $154 billion of Chinese shares in 2017, according to the Treasury Department. This is a gross underestimation, Harvard University's Antonio Coppola and his colleagues conclude. In a recent paper, the academics put exposure at $695 billion by 2017, or 4.5 times the official figure."

NBER Digest: "Tax Haven Financing Skews Cross-Border Investment Statistics"

Jul 1, 2020

"Official statistics on foreign investment show that investors from the United States, the economic and other large

A Group Effort

FOUNDERS AND CO-DIRECTORS

MATTEO MAGGIORI

Matteo Maggiori is an Assistant Professor of Economics and the Henry and Lucy Moses Associate Professor of Economics at Columbia University. He received his PhD in Economics from Harvard University in 2014, his MA in Economics from Columbia, his Master's in Economics from the University of Oxford, his Bachelor's in Economics from Bocconi University, and his Licenciatura in Economics from the Universidad de Buenos Aires. His research is in International Economics and Finance. He is currently a Research Associate at the National Bureau of Economic Research, a Research Affiliate at the Centre for Economic Policy Research, the recipient of the Sloan Research Fellowship, and the recipient of the 2017 Fischer Black Prize for the best finance economist under age 39. A Guggenheim Fellowship, a Sloan Research Fellowship (2018-2020), and the Jerry Hausman Award for the best theory paper (with Emmanuel Farhi) are his.

Maggiori is from the Mar del Plata, Argentina, a beautiful city at the beach.

BRENT NEIMAN

Brent Neiman is the Charles P. Kindleberger Professor of International Economics at the University of Chicago Booth School of Business and a Research Associate of the National Bureau of Economic Research. He is also a co-director of the Initiative on International Economics at the Becker Friedman Institute, a Research Associate of the National Bureau of Economic Research, and a Research Fellow at the Centre for Economic Policy Research. He received his PhD in Economics from Harvard University in 2010, his MA in Economics from Yale University, his Master's in Economics from the University of Cambridge, and his BA in Economics from Princeton University in 2004.

JESSE SCHREGER

Jesse Schreger is the Theo and Edith Wertheimer Professor of Finance at the Columbia University Graduate School of Business. He received his PhD in Economics from Columbia University, his MA in Economics from the University of Cambridge, and his BA in Economics and Mathematics from the University of Pennsylvania. He is a Research Associate at the National Bureau of Economic Research, a co-director of the Initiative on International Economics at the Becker Friedman Institute, and a Research Fellow at the Centre for Economic Policy Research.

COLLABORATORS

ANTONIO COPPOLA

Antonio Coppola is a PhD candidate in Economics at Harvard University. His research is in international macroeconomics and finance. He received a Bachelor of Arts in Applied Mathematics, summa cum laude, from Harvard University in 2016. He is from Ancona, in the Marche Region of Italy.

ANDREW LILLEY

Andrew Lilley is a PhD candidate in Economics at Harvard University. His research is in international macroeconomics and finance. He received a Bachelor of Arts in Economics, summa cum laude, from Harvard University in 2016. He is from Sydney, Australia.

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Zhengyi Hu
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Shirley Lin
Master Student, Columbia University

Mikkel Plagborg-Moller
Harvard, Economics

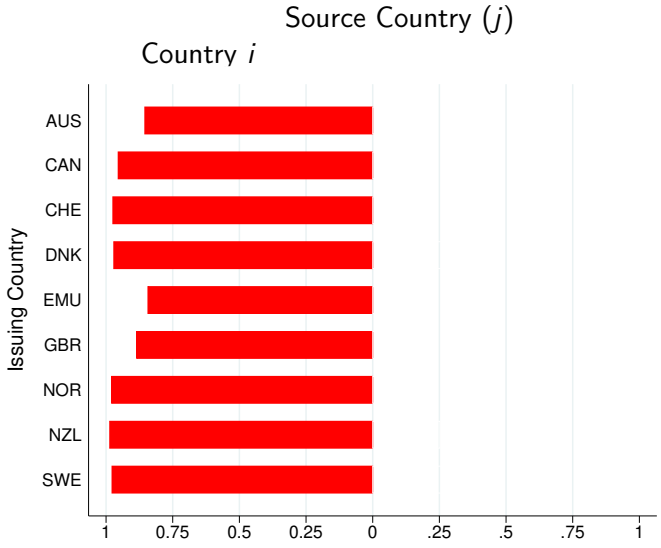
Basic Stylized Facts: Home Country and Currency Bias

- Home bias: investors overweight domestic securities
- Use micro-data to dig deeper
  - Establish importance of currency in shaping global portfolios
  - "Home currency bias"

Morningstar Holding Data

- $37 trillion (in 2017) of worldwide mutual fund and ETF positions from Morningstar
- Position-level: unique CUSIP
- We focus on 10 developed markets
- Long time series: USA since 1995, RoW since 2003
- We harmonize the data and merge it with security and firm information

Share of Investment in Country i's Corporate Debt in i's Currency, 2017



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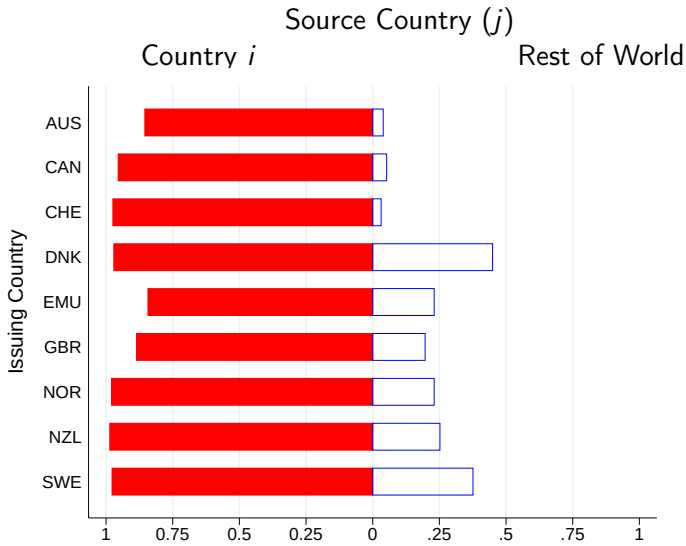

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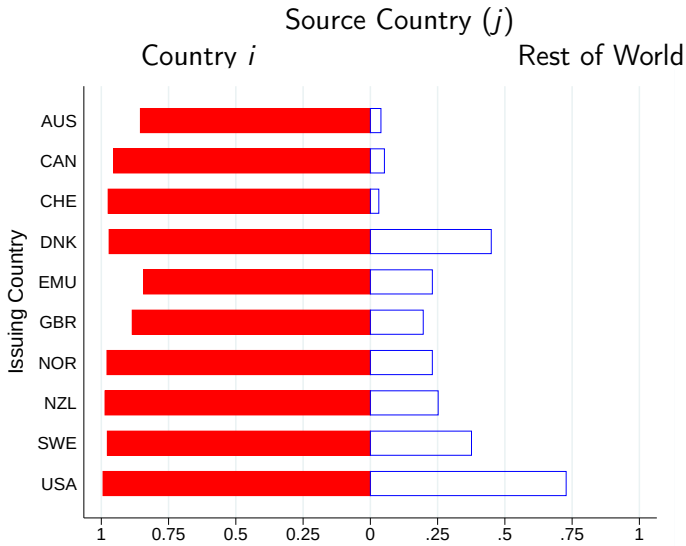


Identifying the Importance of Currency: Micro Data

- Run security-level regressions to study how investors in different countries buy the debt of the *same* firm in *different* currencies:

$$s_{j,p,c} = \alpha_j + \delta_{j,p} + \beta_j \mathbf{1}_{\{\text{Currency}_c = LC_j\}} + \textit{Controls} + \epsilon_{j,p,c}$$

  - $s_{j,p,c}$ is share of security c issued by firm p that is held by country j
  - Home currency dummy: $\mathbf{1}_{\{\text{Currency}_c = LC_j\}}$
  - $\delta_{j,p}$ is a firm (ultimate parent) fixed effect
  - Controls included for maturity and coupon

Within-Firm Variation, All Issuers

$$s_{j,p,c} = \alpha_j + \delta_{j,p} + \beta_j \mathbf{1}_{\{\text{Currency}_c = LC_j\}} + \textit{Controls} + \epsilon_{j,p,c}$$

j	**CAN**	**EMU**	**GBR**	**USA**
Currency	0.899***	0.559***	0.446***	0.626***
	(0.013)	(0.012)	(0.022)	(0.013)
Obs.	36,229	36,229	36,229	36,229
# of Firms	7,802	7,802	7,802	7,802
R^2	0.958	0.848	0.800	0.892
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Estimates for year 2017, weighted least squares, SE clustered at firm level

Home-Country Bias and Home-Currency Bias?

- Similar regression framework, but now consider three specifications:
  1. Home country dummy: $\mathbf{1}_{\{\text{Country}_p = j\}}$
  2. Home currency dummy: $\mathbf{1}_{\{\text{Currency}_c = LC_j\}}$
  3. Home country and home currency dummies

$$s_{i_p,j,p,c} = \alpha_j + \phi_j \mathbf{1}_{\{\text{Country}_p = j\}} + \beta_j \mathbf{1}_{\{\text{Currency}_c = LC_j\}} + \textit{Controls} + \epsilon_{i_p,j,p,c}$$

- No firm fixed effects to allow for country variation

Bond Home-Country Bias and Home-Currency Bias

$$s_{i_p,j,p,c} = \alpha_j + \phi_j \mathbf{1}_{\{\text{Country}_p = j\}} + \textit{Controls} + \epsilon_{i_p,j,p,c}$$

	Only Country Indicators			
	ϕ	R^2		
CAN	0.492	0.403		
CHE	0.371	0.240		
EMU	0.419	0.270		
GBR	0.221	0.135		
SWE	0.545	0.522		
USA	0.482	0.400		

Bond Home-Country Bias and Home-Currency Bias

$$s_{i_p,j,p,c} = \alpha_j + \beta_j \mathbf{1}_{\{\text{Currency}_c = LC_j\}} + \textit{Controls} + \epsilon_{i_p,j,p,c}$$

	Only Country Indicators		Only Currency Indicators		
	ϕ	R^2	β	R^2	
CAN	0.492	0.403	0.941	0.919	
CHE	0.371	0.240	0.825	0.884	
EMU	0.419	0.270	0.682	0.692	
GBR	0.221	0.135	0.551	0.658	
SWE	0.545	0.522	0.810	0.920	
USA	0.482	0.400	0.677	0.777	

Bond Home-Country Bias and Home-Currency Bias

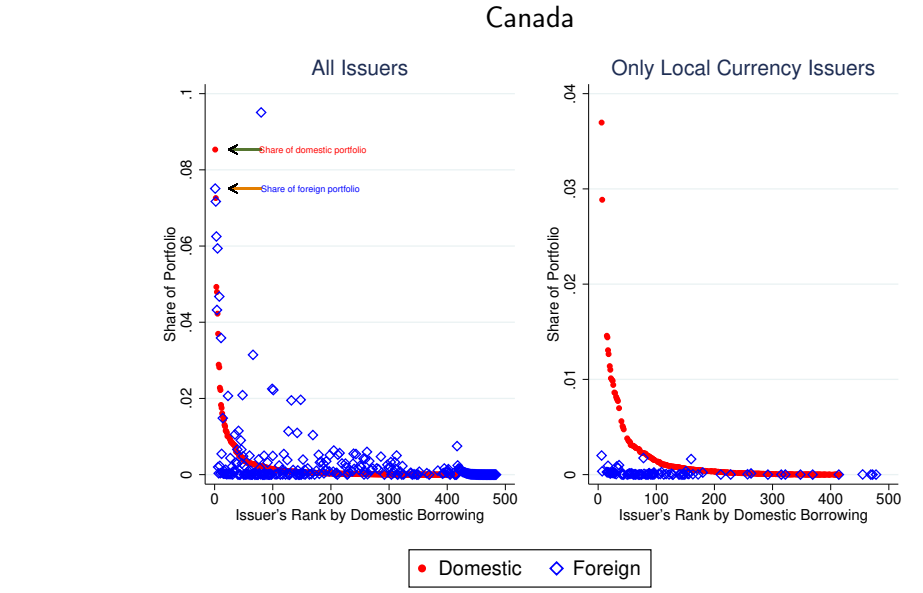
$$s_{i_p,j,p,c} = \alpha_j + \phi_j \mathbf{1}_{\{\text{Country}_p = j\}} + \beta_j \mathbf{1}_{\{\text{Currency}_c = LC_j\}} + \textit{Controls} + \epsilon_{i_p,j,p,c}$$

	Only Country Indicators		Only Currency Indicators		Country and Currency Indicators		
	ϕ	R^2	β	R^2	ϕ	β	R^2
CAN	0.492	0.403	0.941	0.919	0.034	0.914	0.921
CHE	0.371	0.240	0.825	0.884	0.067	0.791	0.890
EMU	0.419	0.270	0.682	0.692	0.085	0.636	0.700
GBR	0.221	0.135	0.551	0.658	0.031	0.537	0.660
SWE	0.545	0.522	0.810	0.920	0.040	0.778	0.921
USA	0.482	0.400	0.677	0.777	0.089	0.620	0.785

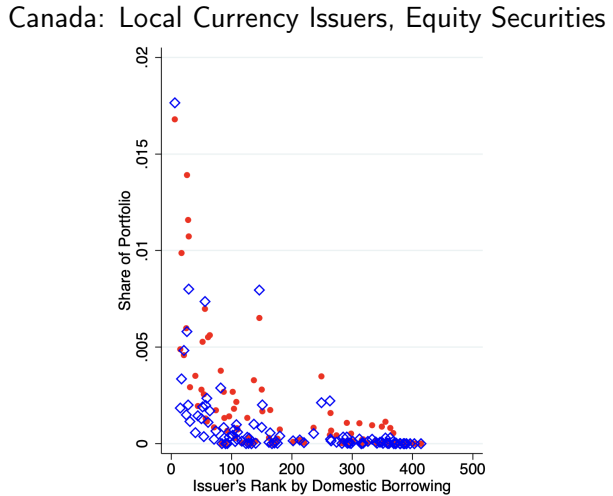
Currency Bias and Foreign Capital Allocation

- Investors buy bonds in their own currency or in USD
- How does this affect the allocation of capital to firms within and across countries?

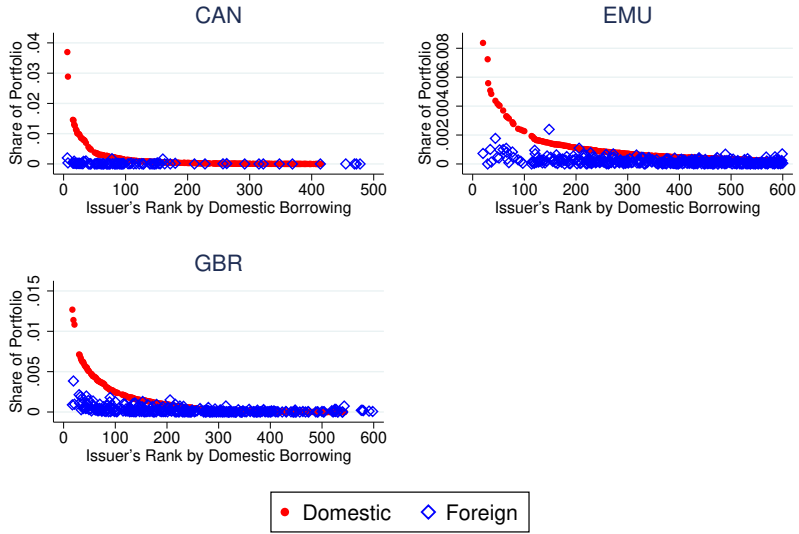
Foreigners Avoid Local Currency Issuers



Foreigners Avoid LC Issuers Debt, Not Their Shares



Local Currency Only Issuers



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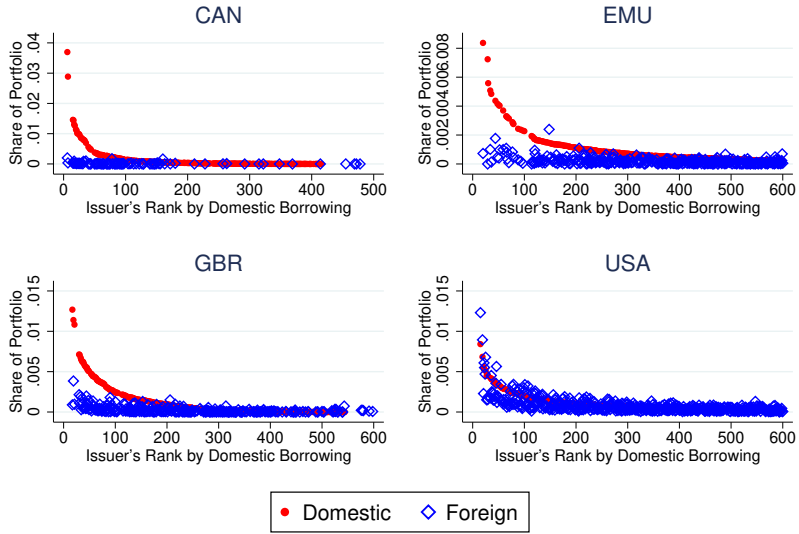
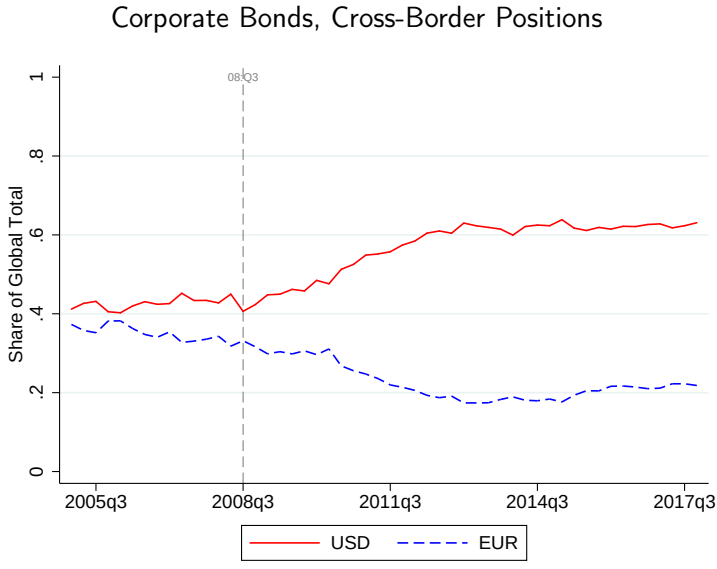


International Currencies

- International currency issuance affects capital allocation
- Novel benefits of issuing an international currency: akin to opening capital account for LC-only borrowers
- How has this status changed over time?

Changes in International Use of Currency

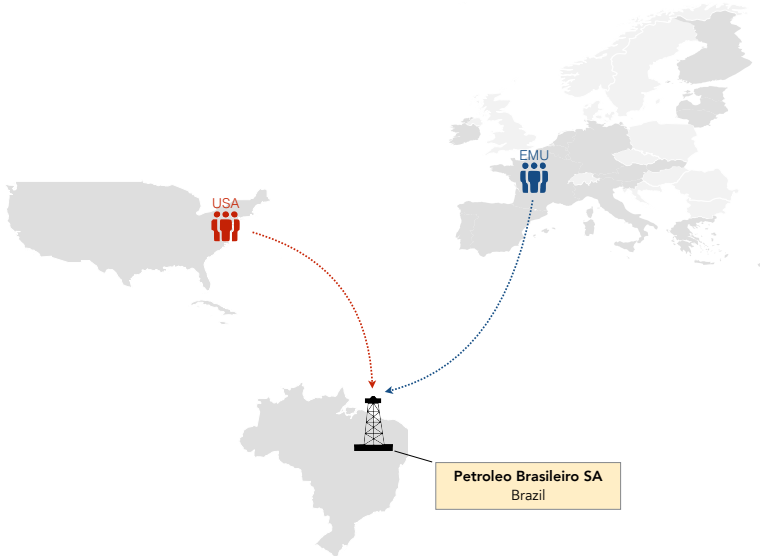


Many Open Questions

- What frictions prevent some firms from borrowing in foreign currency?
- What determines investor currency preferences?
- What are the real effects of changes in international currency use?
- What are the benefits and risks of dollar hegemony?

The Importance of Tax Havens and Offshore Centers

How Petrobras Raises Capital From Developed Countries



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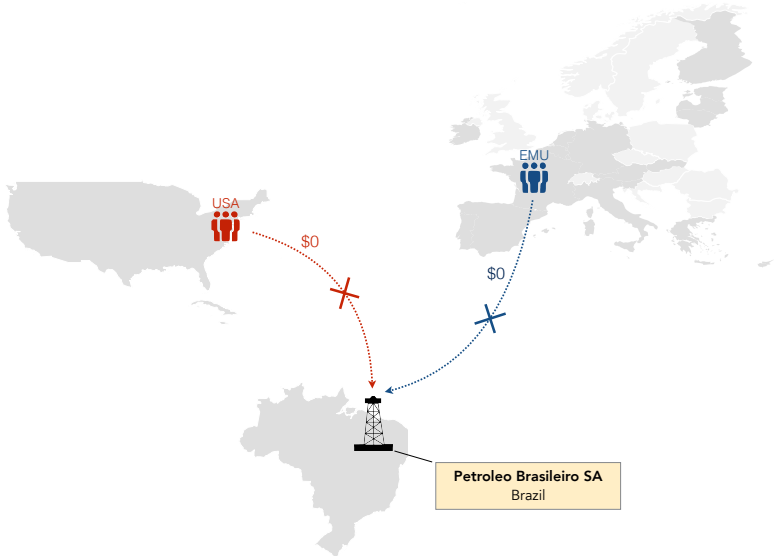

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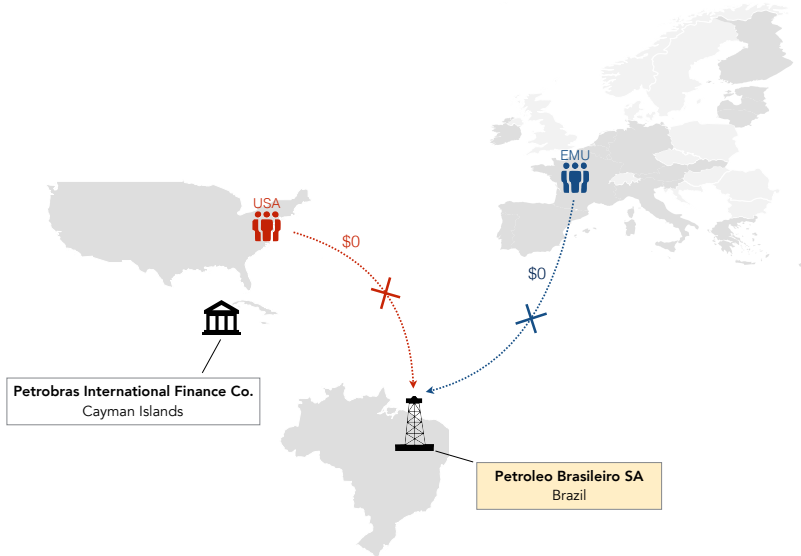

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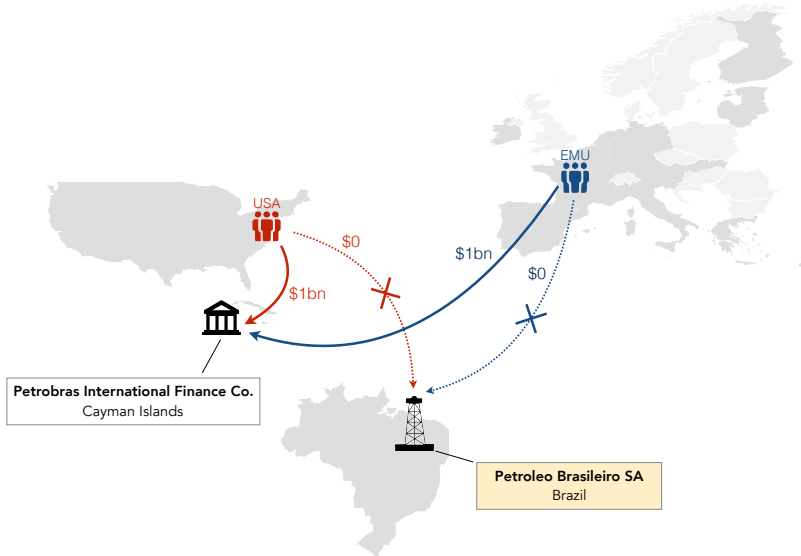

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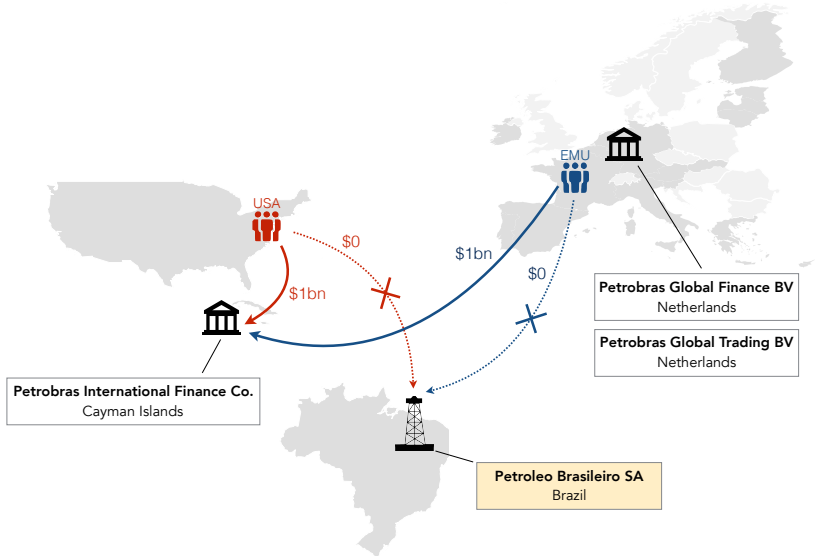

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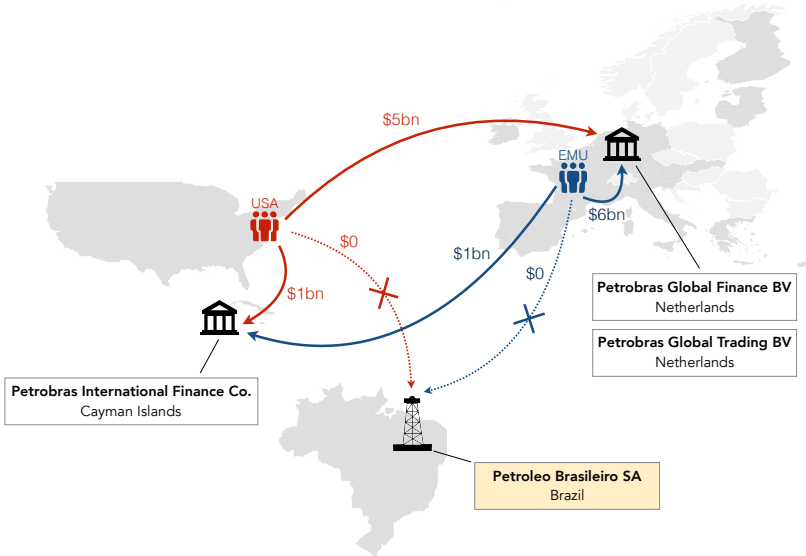

How Big A Deal is This?

- Tax Haven's (TH's) account for $> 10\%$ of all cross-border portfolio positions. 15% of US foreign portfolio holdings are in Cayman Islands!
- TH issuances account for $\approx 10\%$ of all corporate financing, and nearly 50% of all cross-border issuances
- For some emerging markets, *nearly all* of corporate sector's bond financing from developed markets flows through THs
- Rapid growth since at least 2005

Residency-based vs. Nationality-based Statistics

- What is meant by Residency and Nationality?
- Cases where Residency = Nationality:
  - Non-US governments issue USD bonds in New York (Brazil)
- Cases where Nationality $\overset{?}{\succ\prec}$ Residency :
  - Issue through foreign operating subsidiary (Toyota Motors NA)
- Cases where Nationality $\succ$ Residency :
  - Issue in THs through foreign shell-company (Petrobras)
  - Tax inversions to THs (Medtronic)

Aggregate Each Security to Ultimate Parent Company

- Use info from CGS, Morningstar, Factset, Dealogic, SDC, Capital IQ, and Orbis to map 27m securities from issuer (Residency) to ultimate parent (Nationality).

Issuer	Residency	Parent	Nationality	Value ($B)
A. Corporate bonds				
Petrobras Intl. Finance Co.	CYM	Petroleo Brasileiro SA	BRA	12.8
Gaz Capital SA	LUX	Gazprom PJSC	RUS	29.7
B. Equities				
Alibaba Group Holding Ltd.	CYM	Alibaba Group Holding Ltd.	CHN	441.6
Medtronic Plc	IRL	Medtronic Plc	USA	85.7

Restating Official Statistics with Reallocation Matrices

- Merge mapping with Morningstar data on mutual fund and ETF + US Insurance companies + Norwegian SWF *positions*
- Key assumption: Within each year, asset class, and bilateral country pair, fund holdings are representative of the universe of portfolio investment
  - Verify assumption with US insurance and Norwegian SWF

Reallocation Matrices

What share of investments in each country on residency basis go to others when on a nationality basis? (*rows sum to 100%*):

	Share Reallocated To:						
Destination	**BRA**	**CHN**	**CYM**	**GBR**	**LUX**	**USA**	**RoW**
BRA	100.0						
CHN		99.2		0.8			
CYM	20.1	33.0	1.4	3.5		13.3	28.7
GBR	0.2			86.5		4.0	9.3
LUX	4.7	0.1		1.5	4.4	44.8	44.5
USA	0.3	0.1		1.3		92.3	6.0

Reallocation Matrix for US Corporate Bond Investments

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Reallocation Matrix for US Corporate Bond Investments

Restating TIC for the US: Corporate Bonds

		Tax Haven Only		Full Nationality	
Destination	**TIC**	**Position**	**Δ**	**Position**	**Δ**
Brazil	8	50	42	68	59
Bermuda	30	0	-30	0	-30
Cayman Islands	80	1	-79	1	-79
China	3	47	44	55	52
Hong Kong	8	7	-1	9	0
India	6	6	1	21	15
Ireland	63	24	-39	40	-23
Luxembourg	72	3	-69	3	-69
Russia	0	12	12	12	12

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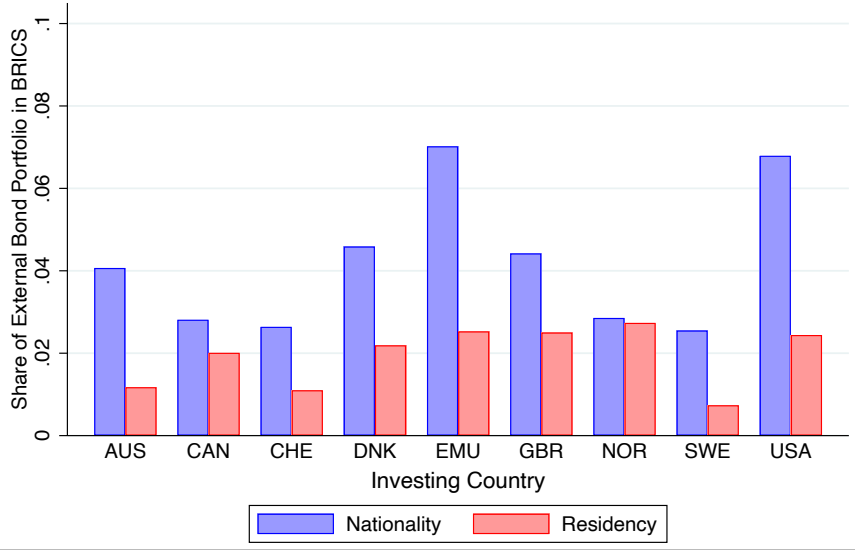
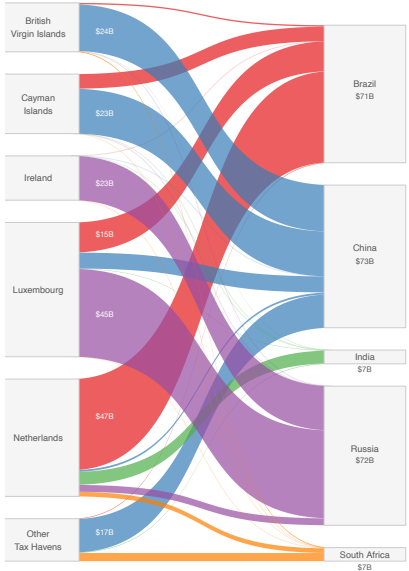
Developed Market Investment in BRICS Bonds



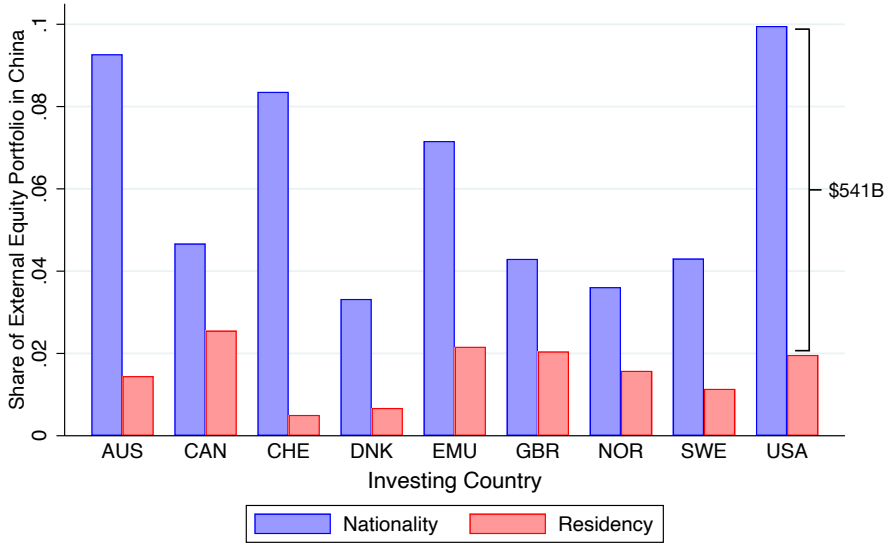
The Ins and Outs of Capital Allocation: Eurozone Bond Investments



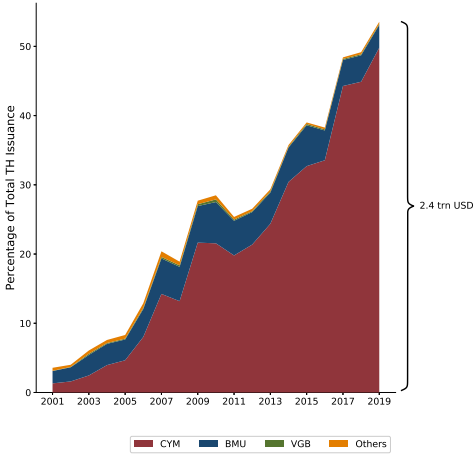
Restating TIC for the US: Equity

		Tax Haven Only		Full Nationality	
Destination	**TIC**	**Position**	**Δ**	**Position**	**Δ**
Brazil	119	120	1	107	-13
Bermuda	**195**	**1**	**-194**	1	-194
Cayman Islands	**547**	**0**	**-547**	0	-547
China	**154**	**695**	**541**	695	541
Hong Kong	147	134	-13	134	-12
India	179	181	2	173	-6
Ireland	**385**	**71**	**-315**	71	-314
Luxembourg	33	4	-29	4	-29
Russia	55	62	7	61	7

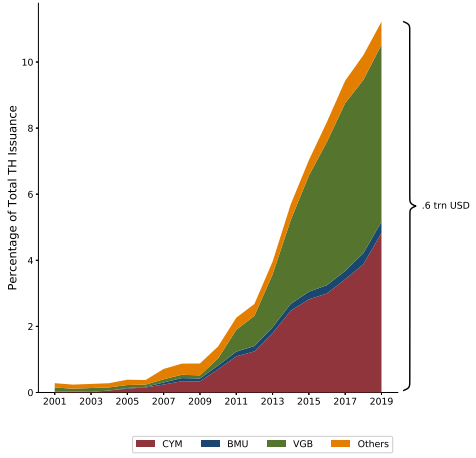
Developed Market Investment in Chinese Equity



The Rise of China in Tax Havens

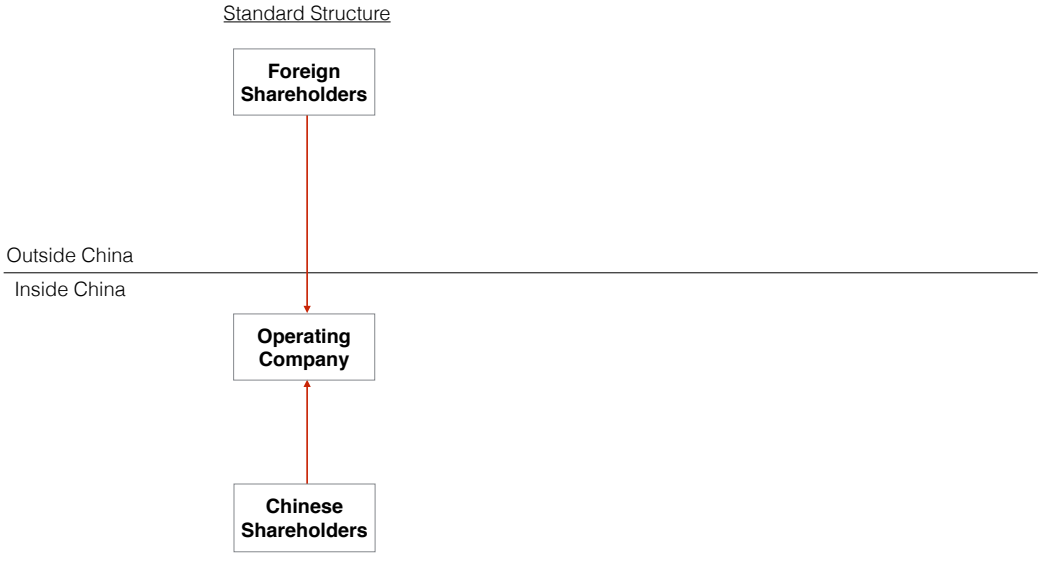


(a) Equities



(b) Bonds

Standard vs. VIE Structure



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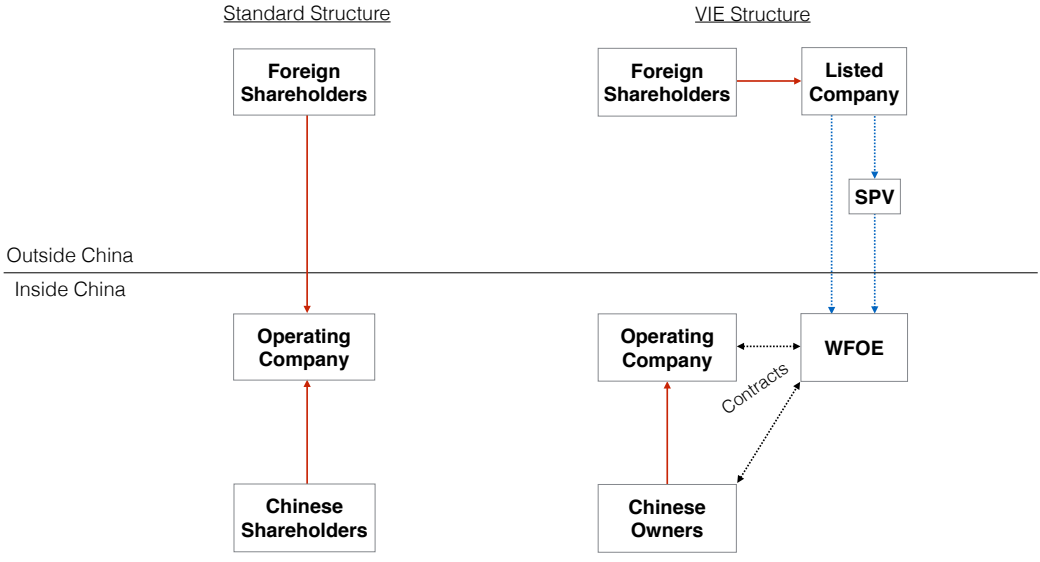


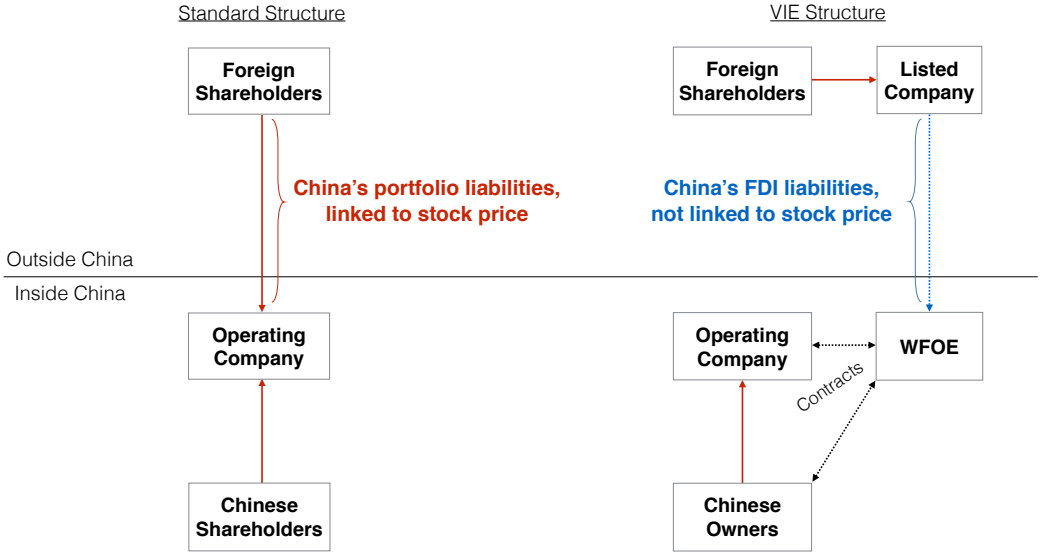
Implications for China's Net Foreign Assets (NFA)

- Net Foreign Asset Position (NFA) captures net claims on RoW:

$$\begin{aligned} NFA &= A - L \\ \Delta NFA &= CA + \text{Valuation Changes} \end{aligned}$$

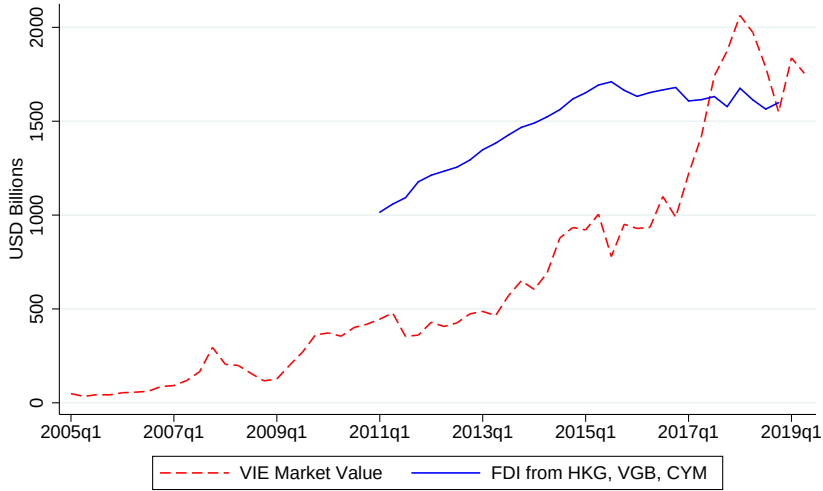
- VIE structure causes understatement of L
  - Missing valuation changes

Implications for China's Net Foreign Assets (NFA)



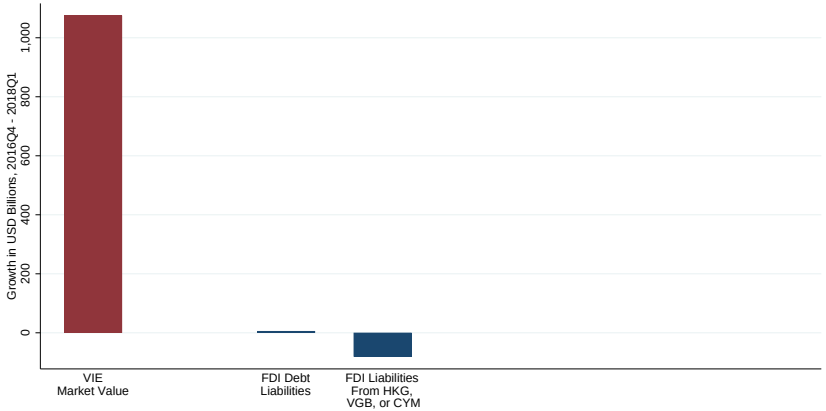
Does VIE Structure Result in Mismeasurement of NFA?

- Unclear exactly how positions associated with VIEs are booked. But they do not appear linked to listed company market values.



Might the VIEs Be in Other Liabilities Categories?

- Focusing on surge in value of VIEs from 2016:Q4 to 2018:Q1:



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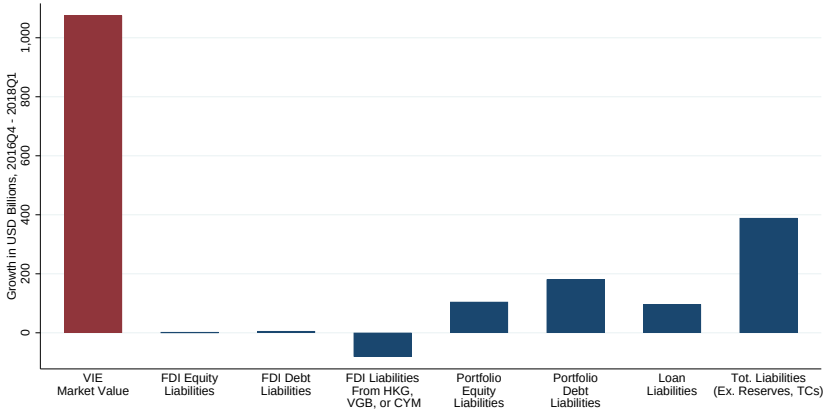
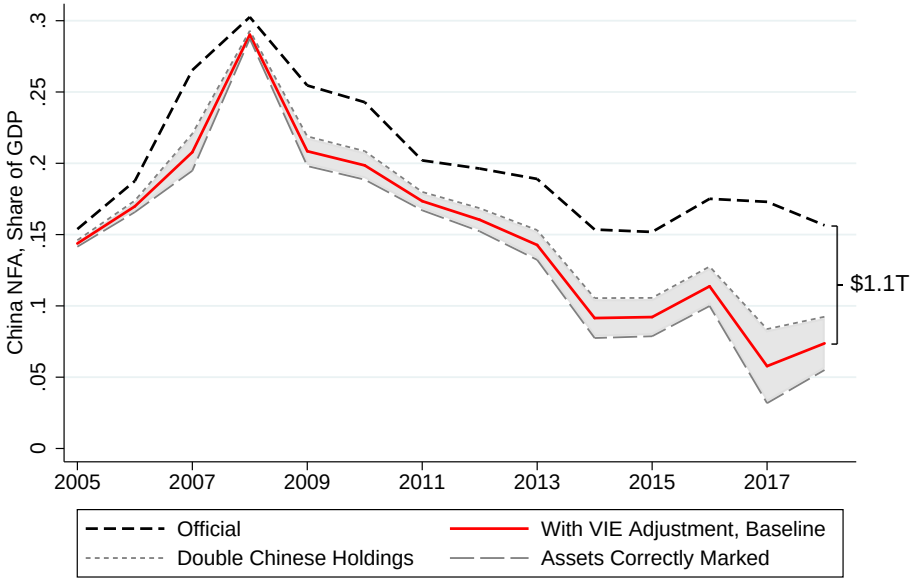


NFA Mismeasurement is Large

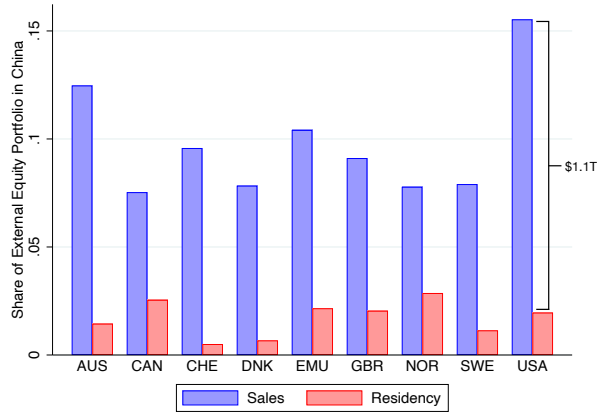


Much More in Paper and Online

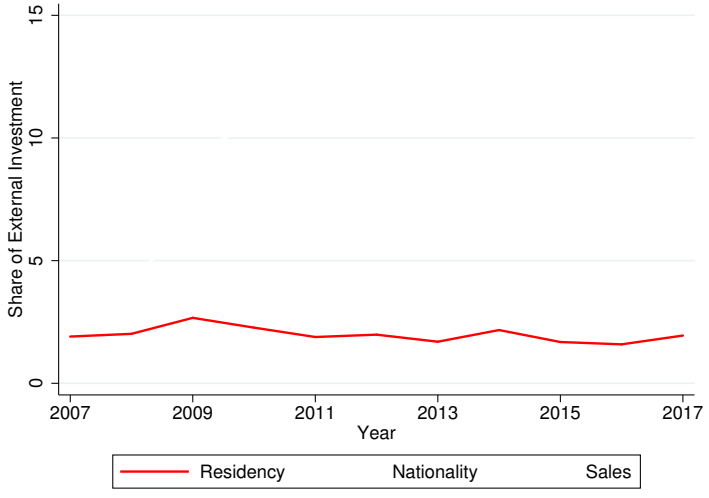
- Alternate reallocation methodologies (e.g. sales)
- Full reallocation and issuance matrices by country, year, asset class
- Disaggregated bilateral investment data (currency, industry, by asset class)
- Results based on global issuance distribution matrix for many more countries

Sales-Based Reallocation

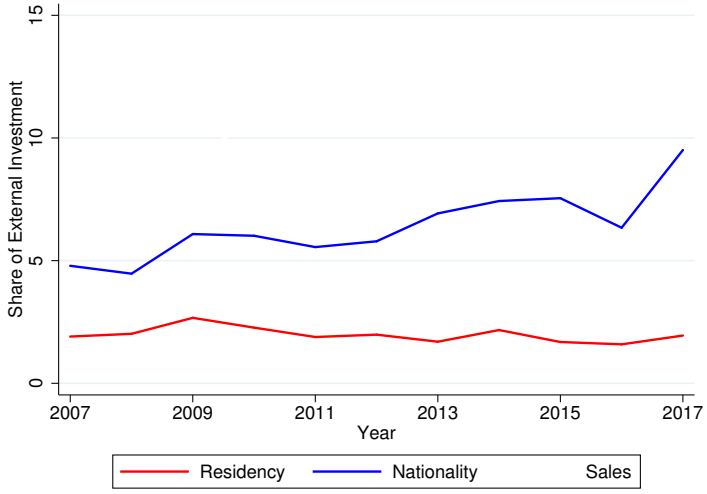
- Assign firms to *multiple* countries according to geographic distribution of sales
- China exposure becomes even larger than under nationality



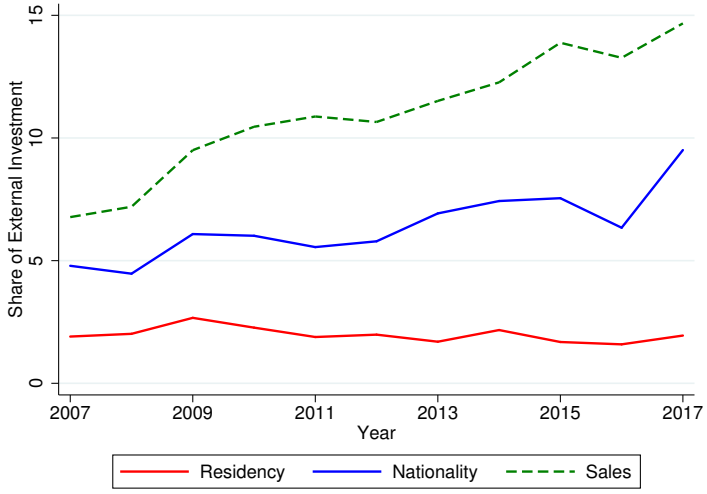
The Rise of China in the US External Portfolio



The Rise of China in the US External Portfolio



The Rise of China in the US External Portfolio



Conclusion

- Novel view of Global Capital Allocations
- Methodology:
  - Pierce veil of THs and restate bilateral investments
- Takeaways:
  - Importance of currency
  - Large and growing dollar role
  - DM exposure to large EMs much bigger than in official data
  - Drives huge NFA mismeasurement in China (elsewhere?)
- Follow Global Capital Allocation Project, download estimates and codes: www.globalcapitalallocation.com

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