



## CROSS-COUNTRY FIRM-BANK EXPOSURES: WHAT CAN WE LEARN FROM PUBLIC DATA?

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9th Biennial IFC Conference "Are post-crisis statistical initiatives  
completed?"

Bank for International Settlements



*The views expressed are those of the author and do not necessarily reflect those of the BIS or the IFC.*



## INTRODUCTION. POST-GFC DATA NEEDS

- Post-GFC data needs on bank-firm interlinkages -the GFC was a major banking crisis transmitted worldwide.
- Data availability has improved thanks to DGI: IDH –top 30 banks, highly confidential, credit and liability exposures, I-A.
- Besides central banks have mobilized their country-level data; limits to data sharing often prevent pooling them
- However some data needs persist: cross-country (I-I) bank-firm exposures, needed for policy evaluation/risk assessment.



## INTRODUCTION. POST-GFC DATA NEEDS

- Research question: can we define (I-I) bank-firm exposures from public loan data (ie large loans reported by banks, and disseminated by commercial data providers)?
- Our paper: use lenders and borrowers' common identifiers to match loans to firm/bank-level datasets ; use maturity date to define:
  - Lending-relationships: **exist if there is an outstanding loan**
  - Credit exposures: **size of the exposure (US mn)**
- Main conclusion: bank-firm lending relationships seem reliable; credit exposures require further adjustments –work ahead.



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# OUTLINE

1. Introduction
2. Measuring cross-country firm-bank exposures
3. Data
4. Main results
5. Conclusions



## MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES.

- **Key figures:** 282,912 loans (not only syndicated), 1983-2018:
  - Average loan is 300 USD mn (median 50 USD mn); USD loans account for 60% of the total
  - Type liability: 50% are term loans; 40% are credit lines; the remaining are project finance, bridge loans.
- **Borrowers:** 78,443 issuers, with significant dispersion; 60,020 at consolidated level, based in 119 countries; top 5 are US, JP, UK, CA, AU (44%, 13%, 7%, 3%, 2%). Focus on NFC.
- **Lenders:** 16,107 lenders (any role in the deal), with remarkable concentration among banks; 549 account for 75% of all deals, ie 1,3 mn lending relationships.



# MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES.

- **What we do?** We compute outstanding loans of bank  $i$  to firm  $j$  at time  $t$ , using the original maturity of the loan; then we define:
  - Lending relationships: exists if there is an outstanding loan.
  - Credit exposures: size of the exposure (US mn).
- **How we do it?** We match borrowers/lenders to firm/bank level data using their common identifiers (eg LEI); this has benefits:
  - Efficient
  - Credible
  - Economic meaning
  - Cross-border



## MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. LIMITATIONS

1. No liability-side exposures (eg corporate deposits on banks);
2. No information on important asset classes, such as small loans, trade finance, derivatives, guarantees.
3. Sample of firms is biased towards large companies.
4. We do not adjust for secondary market transactions; we assume a bullet payment, and no amendments. No information on credit hedges.

Bottom-line: public data will never be as good as supervisory data; but allows measuring cross-country, cross-border, exposures



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# MAIN RESULTS

## 1. Lending relationships

- Bank\*Firm relationships over time
- Loan portfolio risk analysis

## 2. Credit exposures, term loans:

- Top 10 bank-firm exposures, end-2017
- Banks' exposures to distressed firms –eg Toys "R" Us '17





## MAIN RESULTS (I). LENDING RELATIONSHIPS

- A lending relationship from bank  $i$  to firm  $j$  at year  $t$  exists when there is an outstanding loan.

Lending relationships based on syndicated loans data

Table 1

	Bank*Firm	# Banks	Av.# firms per Bank	# Firms	Av. # banks per firm
2000	12,634	55	230	2158	10
2004	18,476	61	303	3533	10
2008	24,468	63	388	4956	13
2012	30,153	63	479	5750	12
2016	36,811	63	584	7031	10

<sup>1</sup> Lending relationships defined treating banks/firms on a consolidated basis.

Sources: own elaboration, DealScan, Thompson Reuters.

- Exposures of top 100 banks according to total assets sep-18. Some might be large subsidiaries. Large number of lenders per firm (reflecting loans are syndicated).

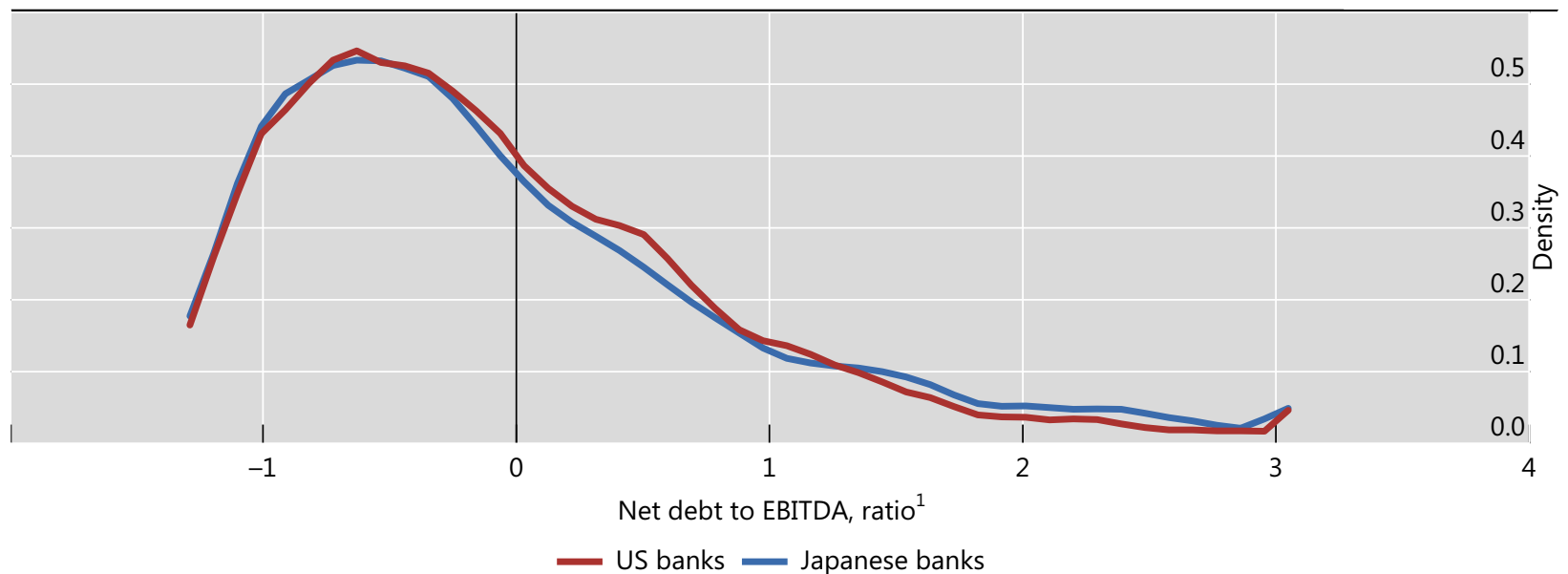


# MAIN RESULTS (I). LENDING RELATIONSHIPS. LOAN PORTFOLIO RISK ANALYSIS. US vs JAPANESE BANKS

- Loan portfolio US banks: 8 banks have 10,493 loans to 3,534 firms. US banks seem to have riskier portfolio -measured with firms' net debt to EBITDA.

Credit risk of US and JP banks; portfolio of loans to NFC<sup>1</sup>

Graph 1



<sup>1</sup> For firms with an outstanding loan as of Dec 2017.

Sources: DealScan; authors' calculations.



## MAIN RESULTS (II). CREDIT EXPOSURES. TOP 10 IN 2017, TERM LOANS.

- Credit exposures: size of bank *i* exposure to firm *j* at time *t*; as before we can analyse cross-border credit exposures

Credit exposures based on syndicated loans data

Table 3 A

	Bank*Firm	# Banks	# Firms	Total exposures, US bn
2000	12,863	53	2,155	995
2004	18,524	58	3,532	1,844
2008	24,327	58	4,939	3,726
2012	29,951	58	5,721	4,508
2016	35,925	58	6,975	6,711

<sup>1</sup> Lending relationships defined treating banks/firms on a consolidated basis.

Sources: own elaboration, DealScan, Thompson Reuters.

Cross-border credit exposures based on syndicated loans data

Table 3 B

	Bank*Firm	# Banks	# Firms	Total exposures, US bn
2000	9,359	51	1,767	634
2004	11,491	58	2,220	1,088
2008	14,426	58	2,949	2,279
2012	17,304	58	3,586	2,294
2016	20,440	58	4,281	3,103

<sup>1</sup> Lending relationships defined treating banks/firms on a consolidated basis.

Sources: own elaboration, DealScan, Thompson Reuters.



## MAIN RESULTS (II). DRILLING DOWN INTO CREDIT EXPOSURES. BANKS' EXPOSURES TO DISTRESSED FIRMS

- Toys "R" Us filed for bankruptcy in sep 17, owned by private equity firms (Bain-KKR-Vornado). Top 10 exposures:

Top creditors of Toys R US Inc -September 2017. All loans Table 5

Bank	Exposure	Country	LEI	Tier1 Capital Pct	Net Loans YoY %	Assets
Bank of America Corp	1,405	US	9DJT3UXIJZJI4WXO774	13.2	2.40	22,812
JPMorgan Chase & Co	1,402	US	8I5DZWZKVSZI1NUHU748	14.4	4.16	25,336
Goldman Sachs Group Inc	792	US	784F5XWPLTWKTBV3E584	12.7	.	9,168
Citigroup Inc	728	US	6SHGI4ZSSLCXXQSBB395	14.5	6.92	18,425
Deutsche Bank AG	449	DE	7LTWFZYICNSX8D621K86	15.4	-1.76	17,691
Barclays PLC	415	UK	213800LBQA1Y9L22JB70	13.3	-6.93	15,313
Wells Fargo & Co	237	US	PBLD0EJDB5FWOLXP3B76	14.1	-1.09	19,518
HSBC Holdings PLC	76	UK	MLU0ZO3ML4LN2LL2TL39	17.3	11.78	25,218
U.S. Bancorp	62	US	N1GZ7BBF3NP8GI976H15	10.8	2.64	4,620
Toronto-Dominion Bank	62	CA	PT3QB789TSUIDF371261	12.3	4.60	9,927

- However: banks might have renegotiated debt/sold them (Irani, Iyer, Meisenzahl and Peydro, 2018).



## CONCLUSIONS

- We construct (I-I) bank-firm exposures using public loan data: lending relationships and credit exposures.
- Our main contribution is to use lenders/borrowers common identifiers; we gain accuracy and do not lose data.
- Not easy to check the quality of results. Our guess is that:
  - Results on lending relationships are good enough for economic analysis.
  - The assumptions required to estimate credit exposures are too strong (ie no risk transfers/risk mitigation).
- Potential work ahead: further refine credit exposures adjusting for secondary market sales or loan contract amendments.



Irving Fisher Committee on  
Central Bank Statistics



BANK FOR INTERNATIONAL SETTLEMENTS

THANK YOU FOR YOUR ATTENTION



## MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. RELATED WORK (I)

- Gadanez, B, and K. von Kleist (2002), "Do syndicated credits anticipate BIS consolidated banking data?" *BIS Quarterly Review, March 2002* [Loan data vs BIS IBS]
- Gadanez, B., K. Tsatsaronis and Y. Altunbaş (2006), "External support and bank behaviour in the international syndicated loan market", *BIS Working Papers No 265* [Loan retention shares]
- Bruche, M., F. Malherbe, and R. Meisenzahl, "Pipeline Risk in Leveraged Loan Syndication" FEDS Working Paper No. 2017-48 [Loan retention shares]



## MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. RELATED WORK MATCHING LOAN-FIRM DATA (II)

- Kalemli-Ozcan, S., L. Laeven, and D. Moreno (2018), "Debt overhang, rollover risks, and corporate investment: Evidence from the European Crisis", *NBER WP 24555 April 2018*
- Gropp, H., T. Mosk, S. Ongena, and C. Wix (2018), "Bank Response to Higher Capital Requirements: Evidence from a Quasi-Natural Experiment", *forthcoming Review of Financial Studies*
- Hale, G., T. Kapan, and C. Minoiu (2016). "Shock transmission through cross-border bank lending: credit and real effect" *Working Paper Series 2016-1, Federal Reserve Bank of San Francisco.*
- Ivashina, V. and D. Scharfstein (2010), "Loan Syndication and Credit Cycles" *American Economic Review: P & P 100 May 2010*





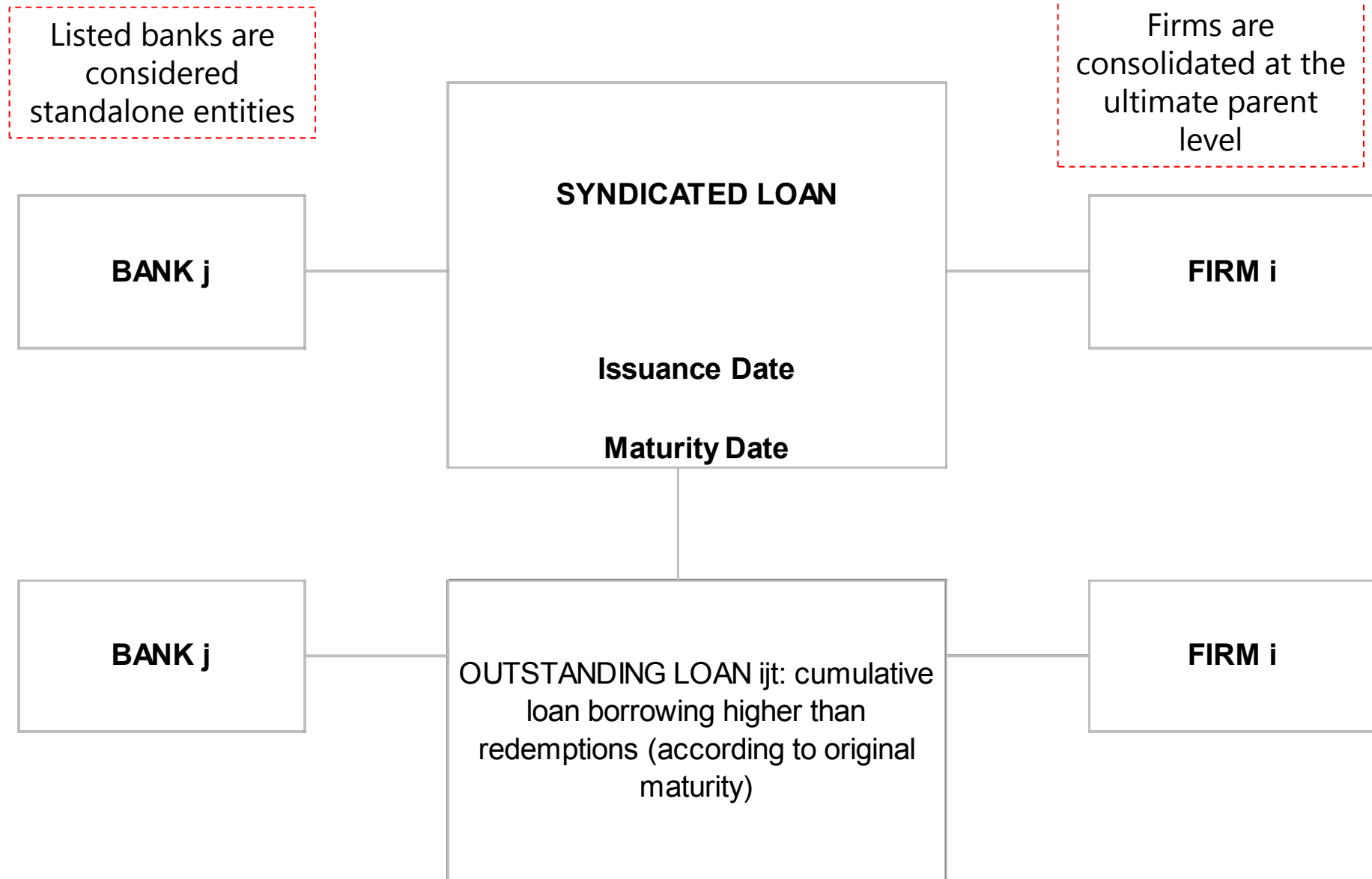
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## MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. RELATED WORK ON COMMON IDENTIFIERS (III)

- Buch, C. (2017), "Keynote Speech. Data needs and statistics compilation for macroprudential analysis" in *ICF Bulletin No 46*
- GLEI-SWIFT (2018), "BIC to LEI mapping table. Factsheet"
- IAG (2017), "Update on the Data Gaps Initiative and the Outcome of the Workshop on Data Sharing" *March 2017*



# MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. ESTIMATE POSITIONS USING ORIGINAL MATURITY



**How we do it?** Matching loans to firm-level data using borrowers' names is costly, inaccurate, and not meaningful.

Ultimate parent company
<b>Wilmar International Ltd</b>
ISIN: SG1T56930848
SEDOL: B17KC69
LEI: 549300H2EAI4YRLWBB20

Borrower
<b>Wii Pte Ltd</b>
ISIN: .
SEDOL:.
LEI:549300ZZI8LH8D8RPL28

SYNDICATED LOAN
Announcement: 10.07.2013
Amount: 365
Currency: US Dollar
Type: Near Investment

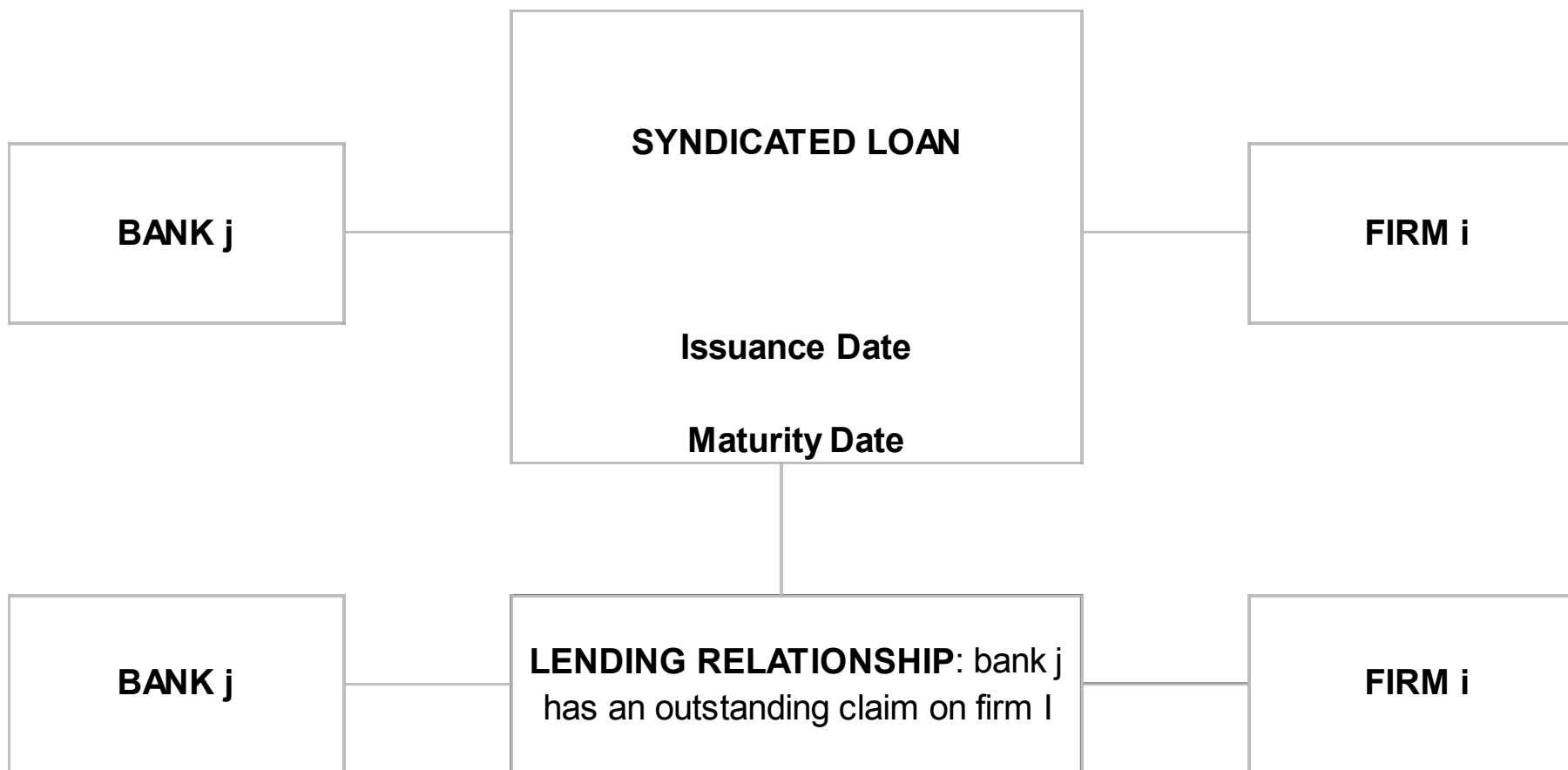
Syndicate
National Australia Bank
Westpac Banking
Hang Seng Bank Ltd (Hong Kong)
National Bank of Kuwait (Sing)
Bank of China Ltd
First Commercial Bank (Taiwan)
Agricultural Bank of China(SG)
Bank of East Asia (Singapore)
JA Mitsui Leasing Ltd
Sumitomo Mitsui Trust Bank Ltd
Land Bank of Taiwan
Metropolitan Bank & Trust
Mega Intl Coml Bank Co Ltd
Commonwealth Bank of Australia
Hongkong & Shanghai Bank (HK)
United Overseas Bank Ltd
DBS Bank Ltd
Bank of Tokyo-Mitsubishi UFJ
CIMB Bank Bhd
Bank of Philippine Islands
Bank of Communications Co Ltd
Aozora Bank Ltd
Sumitomo Mitsui Banking Corp
Hua Nan Financial Holdings
ABN AMRO Bank
Industrial & Comm Bank China
Habib Bank Ltd
Taiwan Cooperative Bank
E Sun Commercial Bank Ltd
Banco De Oro Unibank Inc

## MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. METHODOLOGICAL CHOICES

1. Borrowers are consolidated at the ultimate parent level [as long it is a non-financial firm]: **consolidation of SPVs is not controversial; but some affiliates could be financially independent.**
2. Lenders are consolidated up to the level of the first listed entity: **since we assume that listed banks are standalone.**
3. The definition of a “cross-border exposure” differs from BIS IBS (which is based on issuers/lenders location) as a result of [1] and [2] .
4. Loan allocation rule between arrangers and others is ad-hoc and reflects lack of data. Further work could be done.



# MAIN RESULTS (I). LENDING RELATIONSHIPS

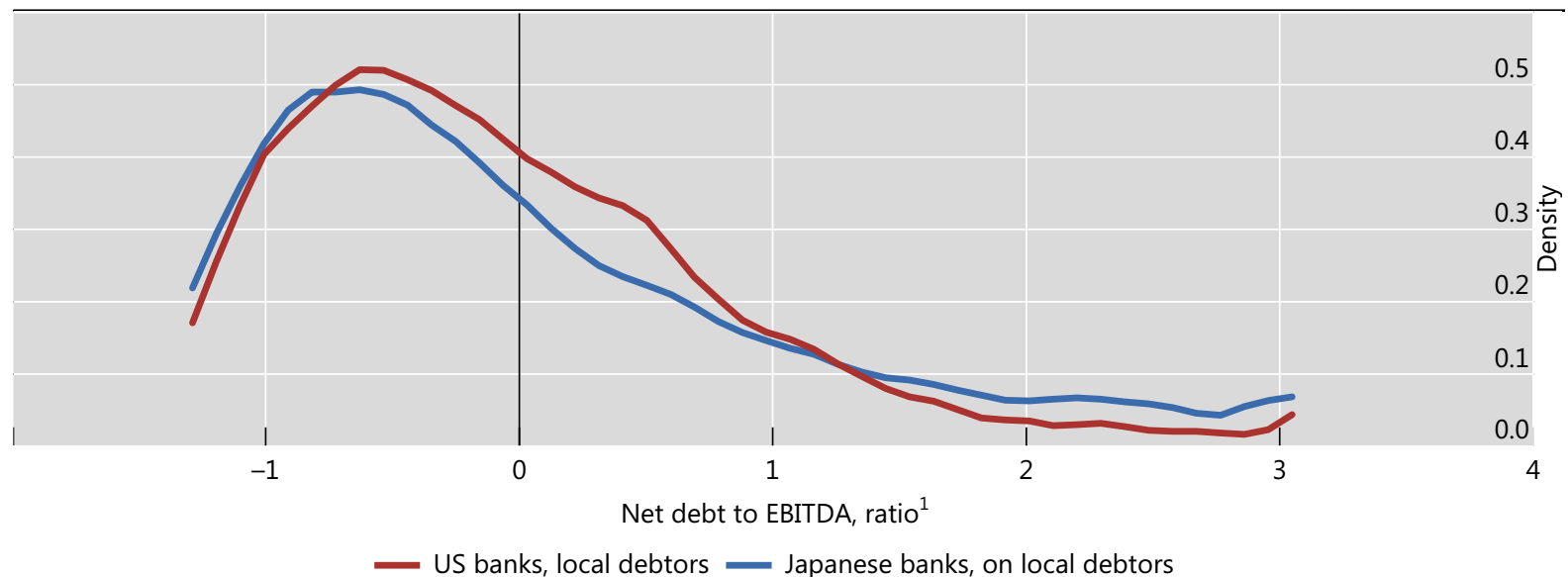


# MAIN RESULTS (I). LENDING RELATIONSHIPS. LOAN PORTFOLIO RISK ANALYSIS. US vs JAPANESE BANKS

- Domestic loan portfolio US banks: **US safer than Japanese banks' portfolio.**

Credit risk of US and Japanese banks' portfolio of local loans to NFC<sup>1</sup>

Graph 3



<sup>1</sup> For firms with an outstanding loan vs US and Japanese banks as of Dec 2017.

Sources: DealScan; authors' calculations.



## MAIN RESULTS (I). CREDIT EXPOSURES. TOP 10 IN 2017, TERM LOANS.

- Top 10 credit exposures, term loans: 4 out the 10 top 10 credit exposures are cross-border; in three instances European banks.

Credit exposures as of end-2017, term loans

Table 4

Bank	Firm	Exposure	Bank country	Firm country	Firm assets
Bank of America Corp	Broadcom Inc	11,940	US	US	544,180
Societe Generale SA	Cheniere Energy Inc	10,985	FR	US	279,060
Bank of America Corp	Charter Communications Inc	9,201	US	US	1,466,230
JPMorgan Chase & Co	Western Digital Corp	9,141	US	US	298,600
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Bank of America Corp	HCA Healthcare Inc	7,081	US	US	365,930
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## MAIN RESULTS (II). DRILLING DOWN INTO CREDIT EXPOSURES. BANKS' EXPOSURES TO DISTRESSED FIRMS

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Toronto-Dominion Bank	62	CA	PT3QB789TSUIDF371261	12.3	4.60	9,927

- Not easy to check the quality of results, since banks might have renegotiated debt; and some loans matured in 2018.





## MAIN RESULTS (II). DRILLING DOWN INTO CREDIT EXPOSURES. FIRMS' EXPOSURES TO DISTRESSED BANKS

- Firms can lose access to credit when banks default. We compute top 10 exposures to Lehman Brothers, 2008:

Top outstanding corporate loans of Lehman Brothers -September 2008

Table 7

A. Term loans			B. Credit lines		
Firm	Exposure	Country	Firm	Exposure	Country
Suitcase One Ltd	3,154	UK	Pfizer Inc	1,500	US
Vale SA	2,778	BR	Imperial Brands PLC	1,264	UK
Riverdeep Group Plc	1,088	US	AT&T Inc	1,000	US
Las Vegas Sands Corp	1,053	US	America Movil SAB de CV	1,000	MX
America Movil SAB de CV	1,000	MX	Cox Enterprises Inc	917	US
Fidelity National Information Services Inc	875	US	Kimberly-Clark Corp	844	US
Prysmian SpA	823	IT	HP Inc	750	US
Imperial Brands PLC	711	UK	Encana Corp	600	CA
Zimmer Biomet Holdings Inc	629	US	Nextera Energy Inc	500	US
NXP Semiconductors NV	542	NE	Walmart Inc	495	US

- Subject to the important caveats mentioned: **implicit assumption of no risk transfers after origination; lending is often and "original-to-distribute" business (Ivashina and Scharfstein, 2010).**



## MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. RELATED WORK

- **Methodological contributions:** comparison with aggregate data, Gadanez and von Kleist (2002); loan retention shares, Gadanez, Tsatsaronis and Y. Altunbaş (2006), and Bruche, Malherbe, and Meisenzahl (2017).
- **Construction bank-firm exposures:** Kalemli-Ozcan, Laeven, and Moreno (2018); Gropp, Mosk, Ongena, and Wix (2018); Hale, Kapan, and Minoiu (2016); Ivashina and Scharfstein (2010),
- **Discussion common identifiers:** Buch. (2017), GLEI-SWIFT (2018), IAG (2017)

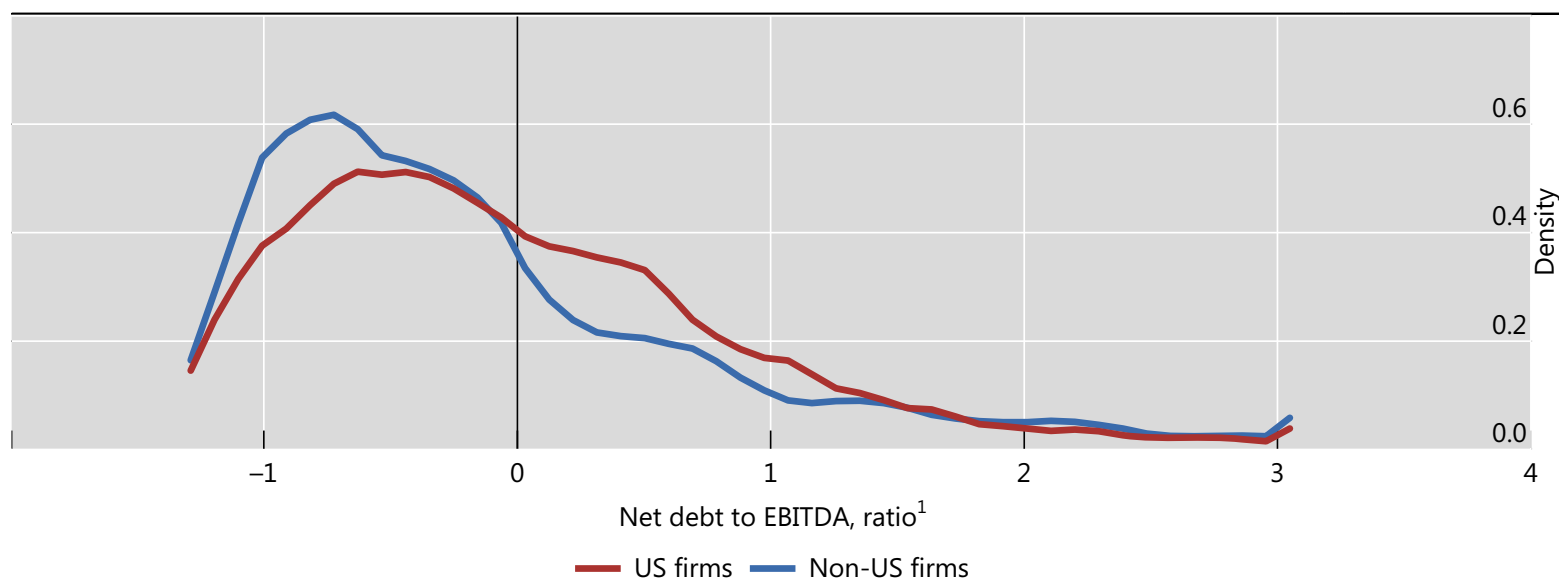


# MAIN RESULTS (I). LENDING RELATIONSHIPS. LOAN PORTFOLIO RISK ANALYSIS. US vs JAPANESE BANKS

- US borrowers have higher net debt to EBITDA ratios. This explains the riskiness of US banks loan portfolio.

Credit risk of US and non-US firms with outstanding loans as of Dec 2017<sup>1</sup>

Graph 4



<sup>1</sup> For firms with an outstanding loan as of Dec 2017. All lenders.

Sources: DealScan; authors' calculations.

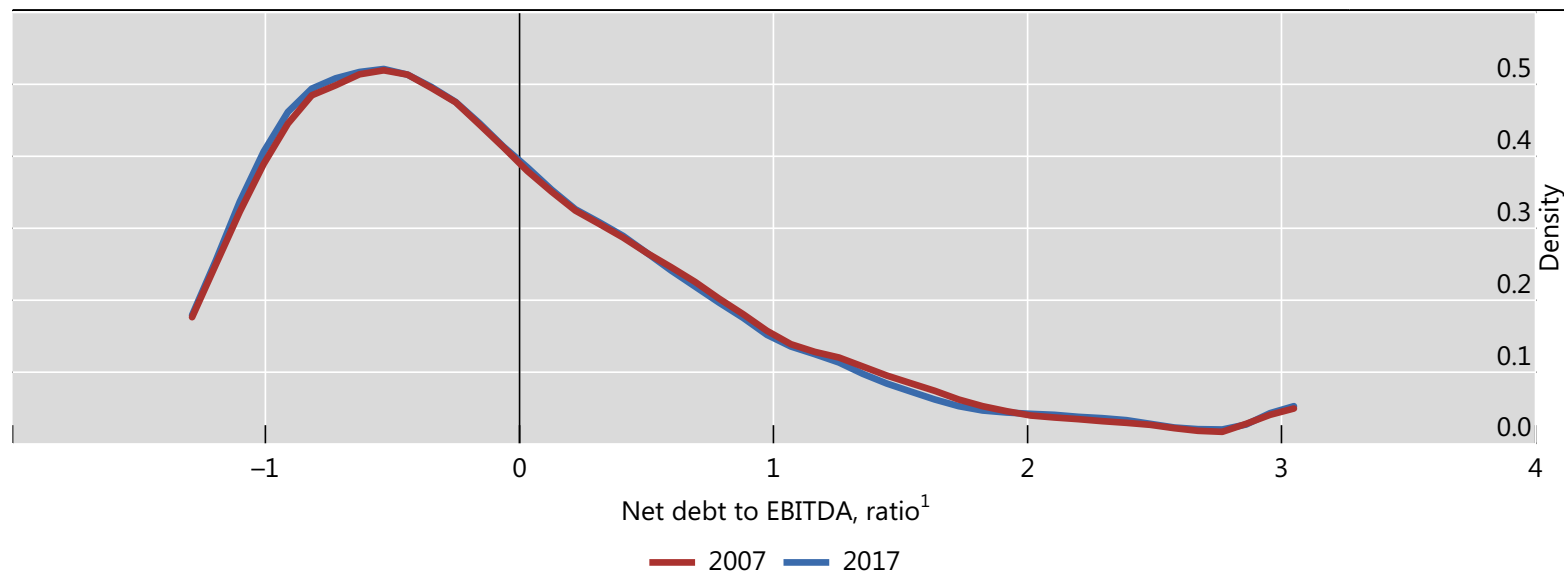


## MAIN RESULTS (I). LENDING RELATIONSHIPS, AT BANK-LEVEL: BANK OF AMERICA DISTRIBUTION

- We could further drill down into the loan portfolio: Bank of America has **2,119 lending relationships in 2017; 1,396 in 2007.**

Credit risk of Bank of America, portfolio of loans to NFC - Historical evolution<sup>1</sup>

Graph 5



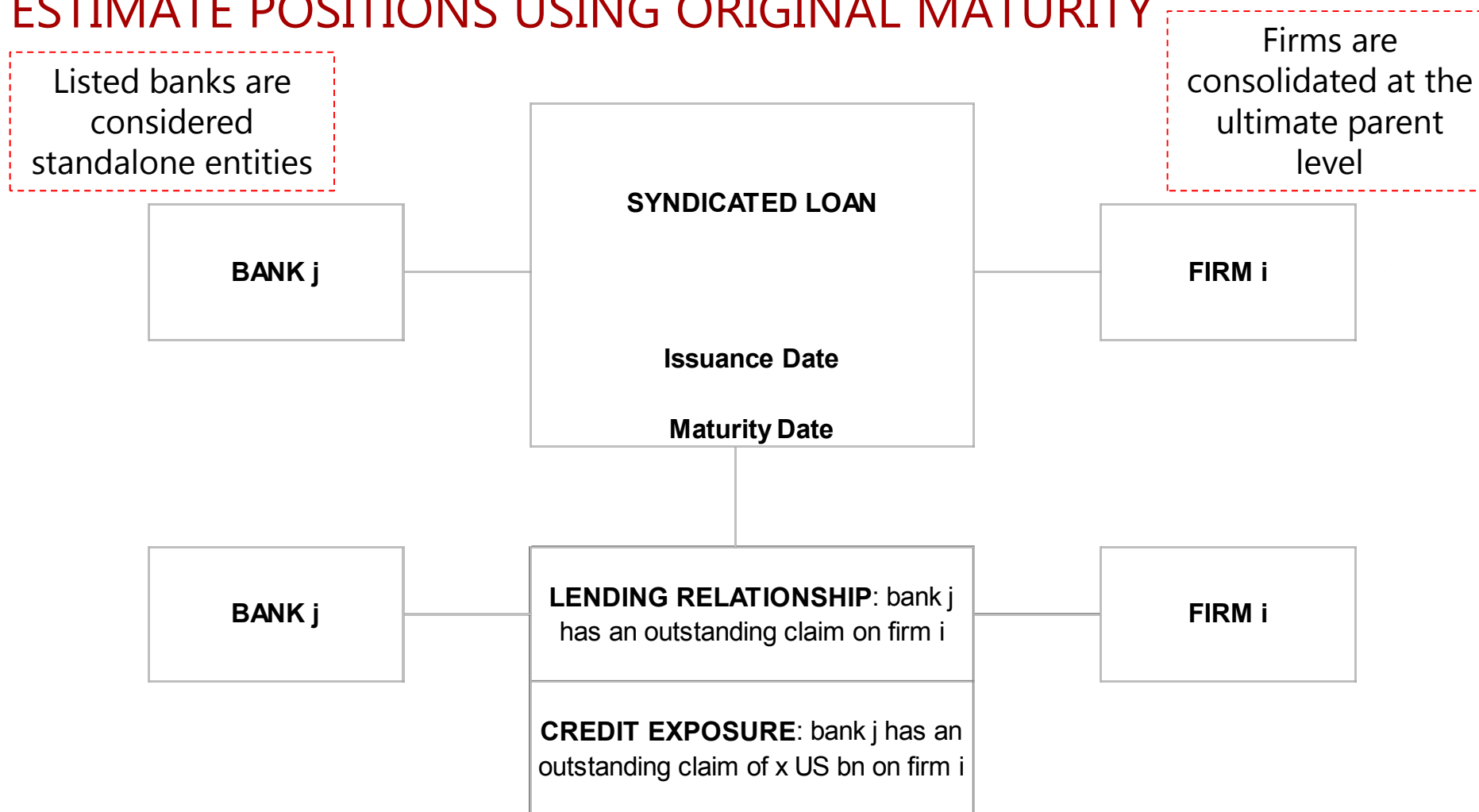
<sup>1</sup> For firms with an outstanding loan as of Dec 2017.

Sources: DealScan; authors' calculations.

- Up to now we have not looked at the size of the exposure.



# MEASURING CROSS-COUNTRY FIRM-BANK EXPOSURES. ESTIMATE POSITIONS USING ORIGINAL MATURITY



- Data gaps in loan allocation across lenders: half for lead arrangers (pro-rata) and half for rest of the members of the syndicate (pro-rata).

**How we do it?** Instead we retrieve the **common identifiers** of the ultimate parent of the borrower/lender (eg LEI).

Ultimate parent company
Wilmar International Ltd ISIN: SG1T56930848 SEDOL: B17KC69 <b>LEI: 549300H2EAI4YRLWBB20</b> Headquarters: Singapore

Borrower
Wii Pte Ltd ISIN: . SEDOL: . <b>LEI: 549300ZZI8LH8D8RPL28</b> Headquarters: Singapore

SYNDICATED LOAN
Announcement: 10.07.2013 Amount: 365 Currency: US Dollar Type: Near Investment

Syndicate	
National Australia Bank	F8SB4JFBSYQFRQEH3Z21
Westpac Banking	EN5TNI6CI43VEPAMHL14
Hang Seng Bank Ltd (Hong Kong)	5493009Z5F07LWZYMK62
National Bank of Kuwait (Sing)	549300NB7FE83IH6BW96
Bank of China Ltd	54930053HGCFWVHYZX42
First Commercial Bank (Taiwan)	.
Agricultural Bank of China(SG)	549300E7TSGLCOVSY746
Bank of East Asia (Singapore)	CO6GC26LCGGRTUESIP55
JA Mitsui Leasing Ltd	.
Sumitomo Mitsui Trust Bank Ltd	.
Land Bank of Taiwan	.
Metropolitan Bank & Trust	549300SQYI82RVWFN715
Mega Intl Coml Bank Co Ltd	.
Commonwealth Bank of Australia	MSFSBD3QN1GSN7Q6C537
Hongkong & Shanghai Bank (HK)	.
United Overseas Bank Ltd	IO66REGK3RCBAMA8HR66
DBS Bank Ltd	.
Bank of Tokyo-Mitsubishi UFJ	353800V2V8PUY9TK3E06
CIMB Bank Bhd	549300FYDN5UD7USZW18
Bank of Philippine Islands	549300UW4UH6XT2X8C50
Bank of Communications Co Ltd	549300AX1UM10U30HK09
Aozora Bank Ltd	XOXUGKC9FD2CYUQNC010
Sumitomo Mitsui Banking Corp	35380028MYWPB6AUO129
Hua Nan Financial Holdings	.
ABN AMRO Bank	724500DWE10NNL1AXZ52
Industrial & Comm Bank China	5493002ERZU2K9PZDL40
Habib Bank Ltd	549300N63RJKPUYAY631
Taiwan Cooperative Bank	.
E Sun Commercial Bank Ltd	.
Banco De Oro Unibank Inc	.

## MAIN RESULTS (I). LENDING RELATIONSHIPS. CROSS-BORDER

- Cross-border lending relationships: if bank *i* and firm *j* are headquartered in different countries.

Cross-border lending relationships based on syndicated loans data

Table 2

	Bank*Firm	# Banks	Av.# firms per Bank	# Firms	Av. # banks per firm
2000	9,359	51	184	1,767	10
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2016	20,440	58	352	4,281	10

<sup>1</sup> Lending relationships defined treating banks/firms on a consolidated basis.

Sources: own elaboration, DealScan, Thompson Reuters.

- Country of headquarters: for banks we use its country of incorporation (not the ultimate parent); for firms the country of incorporation of the ultimate parent.



## MAIN RESULTS (II). CREDIT EXPOSURES. TOP 10 IN 2017, TERM LOANS.

- Top 10 credit exposures, term loans: numbers are not implausible, eg as of Aug 18 Broadcom Inc reports 40 US bn outstanding loans; Cheniere Energy Inc. reports 33 US bn.

Credit exposures as of end-2017, term loans

Table 4

Bank	Firm	Exposure	Bank country	Firm country	Firm assets
Bank of America Corp	Broadcom Inc	11,940	US	US	544,180
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- Cross-border exposures: 4 out the 10 top 10 credit exposures are cross-border; in three instances European banks



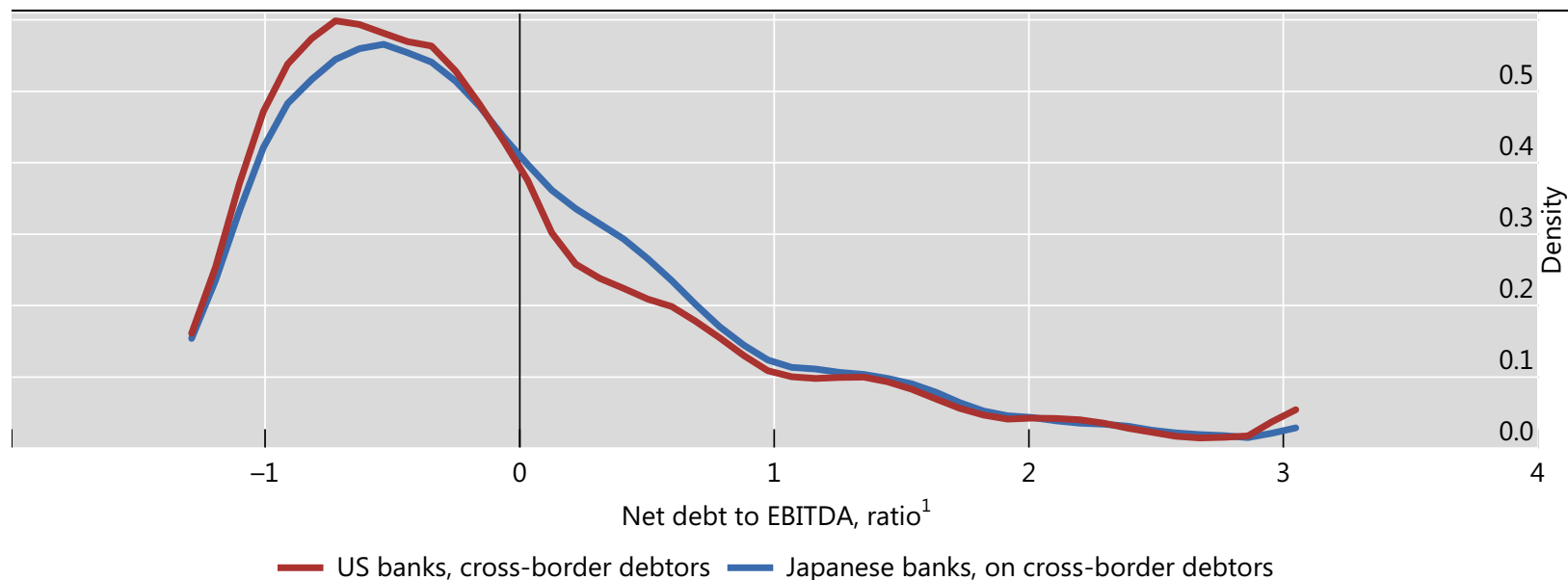


# MAIN RESULTS (I). LENDING RELATIONSHIPS. LOAN PORTFOLIO RISK ANALYSIS. US vs JAPANESE BANKS

- Cross-border loan portfolio US banks: Japanese banks' cross-border loan portfolio are riskier.

Credit risk of US and JP portfolio of cross-border loans to NFC<sup>1</sup>

Graph 2



<sup>1</sup> For firms with an outstanding loan vs US and Japanese banks as of Dec 2017.

Sources: DealScan; authors' calculations.

