



**ESRB**  
European Systemic Risk Board  
European System of Financial Supervision

# Mapping the interconnectedness between EU banks and shadow banking entities

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**The usual disclaimer applies:**

**The views expressed are those of the authors and do not necessarily reflect the views of the ESRB, EBA or their member institutions.**



# Motivation

*“Policymakers and researchers need **better models and data to understand the interconnections** between the banking system and non-bank financial institutions”*

Stanley Fischer, Dec 2015

- The global financial crisis exposed shortcomings in the assessment of cross-sector and cross-border linkages in the financial system.
- Interaction of banks with shadow banking entities can lead to the amplification and spillovers of systemic risks
- Few studies which map the exposures of EU banks to shadow banking entities. This paper aims to fill this gap in the literature.



# Contribution to literature

- **Monitoring:** growing interest in shadow banking (see, for example, ESRB EU Shadow Banking Monitor, ESRB OP No. 10, FSB Global Shadow Banking Monitoring Reports)
- **Regulatory arbitrage:** fragmented regulatory regimes and a lack of information and disclosure can impede systemic risk monitoring. Growing literature on regulatory arbitrage, see e.g. Acharya, Schnabl and Suarez (2013 JFE).
- **Guarantees and backstops:** implicit guarantees and backstops associated with step-in risks for the banking system and may contain systemic consequences. See e.g. BCBS (2015), Claessens and Ratnovski (2014 IMF WP), Gornicka (2016 JFI).



# Description of the dataset

- EBA collected information on exposures from a sample of EU banks (= assets or off-balance sheet items used to compute capital requirements)
- **Broad definition of “shadow banking entities”** (two conditions):
  - one or more **credit intermediation activities** (i.e. g maturity transformation, liquidity transformation, leverage, ...)
  - not subject to the CRD/CRR or are considered to be regulated in a similar way
- Only individual exposures of at least 0.25% of the banks’ eligible capital
- 3,182 individual exposures to ~2,700 shadow banks reported by 169 banks from 22 EU countries



# Geography of exposures to shadow banking entities

## Distribution of EU institutions' exposures to shadow banking entities by country of reporting institution and domicile of shadow banking entity (number of individual exposures)

	DE	FR	GB	IE	JE	KR	KY	LU	NL	RU	TR	US	EU other	RW other	Total
AT	8	0	8	11	0	6	8	4	13	21	2	14	93	26	214
DE	352	7	53	61	8	7	44	81	72	20	24	124	41	45	939
FR	1	45	13	7	1	5	16	5	6	2	2	61	8	22	194
GB	26	21	115	39	14	20	98	53	21	7	10	164	17	174	779
IT	0	2	4	15	1	6	0	9	1	10	15	2	33	13	111
LU	26	21	16	26	0	1	16	172	49	2	0	9	36	25	399
Other EU	8	8	23	11	2	9	15	27	64	31	22	12	265	49	546
<b>Total</b>	<b>421</b>	<b>104</b>	<b>232</b>	<b>170</b>	<b>26</b>	<b>54</b>	<b>197</b>	<b>351</b>	<b>226</b>	<b>93</b>	<b>75</b>	<b>386</b>	<b>493</b>	<b>354</b>	<b>3,182</b>

Source: ESRB Secretariat calculations based on data from EBA (2015), Report on institutions' exposures to 'shadow banking entities', December 2015.

Note: Data refers to individual exposures equal to or above 0.25 per cent of eligible capital. Country labels on the left hand side of the chart refer to the country of domicile of the reporting institution. Country labels along with top of the chart refer to country of domicile of shadow banking entity.



# Geography of exposures to shadow banking entities

## Distribution of EU institutions' exposures to shadow banking entities by country of reporting institution and domicile of shadow banking entity (in EUR bn)

B / SB	DE	FR	GB	IE	JE	KR	KY	LU	NL	RU	TR	US	EU other	RW other	Total
AT	0.2	0.0	0.3	0.2	0.0	0.1	0.2	0.2	0.3	0.8	0.1	0.6	3.1	0.7	6.8
DE	28.1	0.8	5.1	9.4	1.3	0.4	2.9	6.9	1.7	2.3	3.9	33.5	2.2	7.6	106.0
FR	0.5	16.2	3.7	1.9	0.2	2.9	4.9	1.4	2.0	0.5	0.5	30.1	2.7	10.9	78.3
GB	5.2	4.8	44.7	19.8	14.7	7.8	24.9	12.0	3.5	1.5	3.0	84.0	4.0	54.5	284.4
IT	0.0	1.3	2.8	2.6	0.4	1.3	0.0	2.5	0.1	2.1	7.5	0.5	2.9	2.9	26.8
LU	1.1	0.7	0.8	0.4	0.0	0.0	0.3	2.5	3.0	0.2	0.0	0.1	1.0	0.4	10.4
Other EU	0.5	1.4	1.5	1.1	0.5	2.3	3.2	3.3	3.2	2.9	4.5	2.8	12.8	6.7	46.8
<b>Total</b>	<b>35.5</b>	<b>25.1</b>	<b>59.0</b>	<b>35.4</b>	<b>17.0</b>	<b>14.8</b>	<b>36.4</b>	<b>28.8</b>	<b>13.8</b>	<b>10.4</b>	<b>19.5</b>	<b>151.5</b>	<b>28.7</b>	<b>83.5</b>	<b>559.4</b>

Source: ESRB Secretariat calculations based on data from EBA (2015), Report on institutions' exposures to 'shadow banking entities', December 2015.

Note: Data refers to individual exposures equal to or above 0.25 per cent of eligible capital. Country labels on the left hand side of the chart refer to the country of domicile of the reporting institution. Country labels along with top of the chart refer to country of domicile of shadow banking entity. The chart excludes investment firms and exposures greater than 25% of the institution's eligible capital (the large exposure limit).



# Geography of exposures to shadow banking entities

- Shadow banking entities form part of complex financial intermediation chains
- Total exposures amount to €559 bn, i.e. approximately 4.3% of EU GDP

## Distribution of EU institutions' exposures to shadow banking entities by country and domicile of shadow banking entity (% of GDP of the country of the reporting institution)

B / SB	DE	FR	GB	IE	JE	KR	KY	LU	NL	RU	TR	US	EU other	RW other	Total
AT	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.0	0.2	1.0	0.2	2.2
DE	1.0	0.0	0.2	0.3	0.0	0.0	0.1	0.3	0.1	0.1	0.1	1.2	0.1	0.3	3.9
FR	0.0	0.8	0.2	0.1	0.0	0.1	0.2	0.1	0.1	0.0	0.0	1.5	0.1	0.5	3.8
GB	0.3	0.3	2.4	1.0	0.8	0.4	1.3	0.6	0.2	0.1	0.2	4.4	0.2	2.9	15.0
IT	0.0	0.1	0.2	0.2	0.0	0.1	0.0	0.2	0.0	0.1	0.5	0.0	0.2	0.2	1.7
LU	2.4	1.5	1.8	1.0	0.0	0.0	0.6	5.5	6.5	0.5	0.0	0.1	2.1	0.8	22.9
Other EU	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	1.1
Total	0.3	0.2	0.5	0.3	0.1	0.1	0.3	0.2	0.1	0.1	0.1	1.2	0.2	0.6	4.3

Source: Eurostat and ESRB Secretariat calculations based on EBA (2015), Report on institutions' exposures to 'shadow banking entities', December 2015.

Note: Data refers to individual exposures equal to or above 0.25 per cent of eligible capital. Country labels on the left hand side of the chart refer to the country of domicile of the reporting institution. Country along with top of the chart refer to the country of domicile of the shadow banking entity.





# Classification of shadow banking entities

- EU banks have around two thirds of their exposures to:
  3. Non-MMF investment funds / 4. finance companies / 7. securitisations

## Distribution of EU institutions' exposures to shadow banking entities by country of domicile and type of shadow banking entity *(weighted by size of exposure)*

Country / type of 'shadow banking entity'	1. UCITS MMFs	2. Non-UCITS MMFs	3. Non-MMF investment funds	4. Finance companies	5. Broker-dealers	6. Credit insurers/ financial guarantors	7. Securitisation	8. Non-equivalent banks / insurers	9. Other	Total
DE	0.0	0.0	3.7	1.0	0.0	0.0	1.2	0.0	0.4	6.3
ES	0.0	0.0	0.0	0.3	0.0	0.1	0.3	0.0	0.1	0.7
FR	0.7	0.0	0.5	0.6	0.0	0.0	2.2	0.0	0.4	4.5
GB	0.0	0.4	2.5	2.0	0.4	0.5	2.2	0.0	2.4	10.5
HK	0.1	0.0	0.5	0.0	0.6	0.0	0.0	0.0	0.1	1.3
IE	0.0	0.0	0.8	0.7	0.0	0.0	4.5	0.0	0.3	6.3
JE	0.0	0.0	0.2	0.1	0.0	0.0	2.7	0.0	0.0	3.0
JP	0.0	0.0	0.2	0.1	0.6	0.0	0.0	0.4	0.2	1.5
KR	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.9	0.5	2.6
KY	0.0	0.0	3.4	0.7	0.0	0.0	1.8	0.1	0.5	6.5
LU	0.3	0.0	2.3	0.7	0.2	0.0	1.2	0.0	0.4	5.2
NL	0.0	0.0	0.2	0.6	0.0	0.0	1.5	0.0	0.1	2.5
RU	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.7	0.1	1.9
TR	0.0	0.0	0.0	0.4	0.0	0.0	0.0	3.0	0.0	3.5
US	0.7	0.2	4.0	8.2	0.3	0.3	7.1	1.6	4.7	27.1
EU other	0.1	0.0	2.0	1.4	0.0	0.0	0.4	0.1	0.3	4.4
RW other	0.0	0.1	1.9	1.2	0.6	0.6	0.8	4.4	2.5	12.1
<b>Total</b>	<b>2.0</b>	<b>0.9</b>	<b>22.3</b>	<b>18.2</b>	<b>2.8</b>	<b>1.4</b>	<b>26.2</b>	<b>13.3</b>	<b>13.0</b>	<b>100.0</b>

Source: ESRB Secretariat calculations based on EBA (2015), Report on institutions' exposures to 'shadow banking entities', December 2015.

Note: Data refers to individual exposures equal to or above 0.25 per cent of eligible capital. Country labels on the left hand side of the chart refer to the country of domicile of the shadow banking entity. The numbers along the top of the chart refer to the type of shadow banking entity as per EBA (2015). 1 = UCITS MMF; 2 = Non-UCITS MMF; 3 = Non-MMF investment fund; 4 = finance companies; 5 = broker-dealers; 6 = credit insurers/ financial guarantors; 7 = securitisation; 8 = non-equivalent banks / insurers; 9 = other.

# Classification of shadow banking entities

Most relevant types of shadow banking entities:

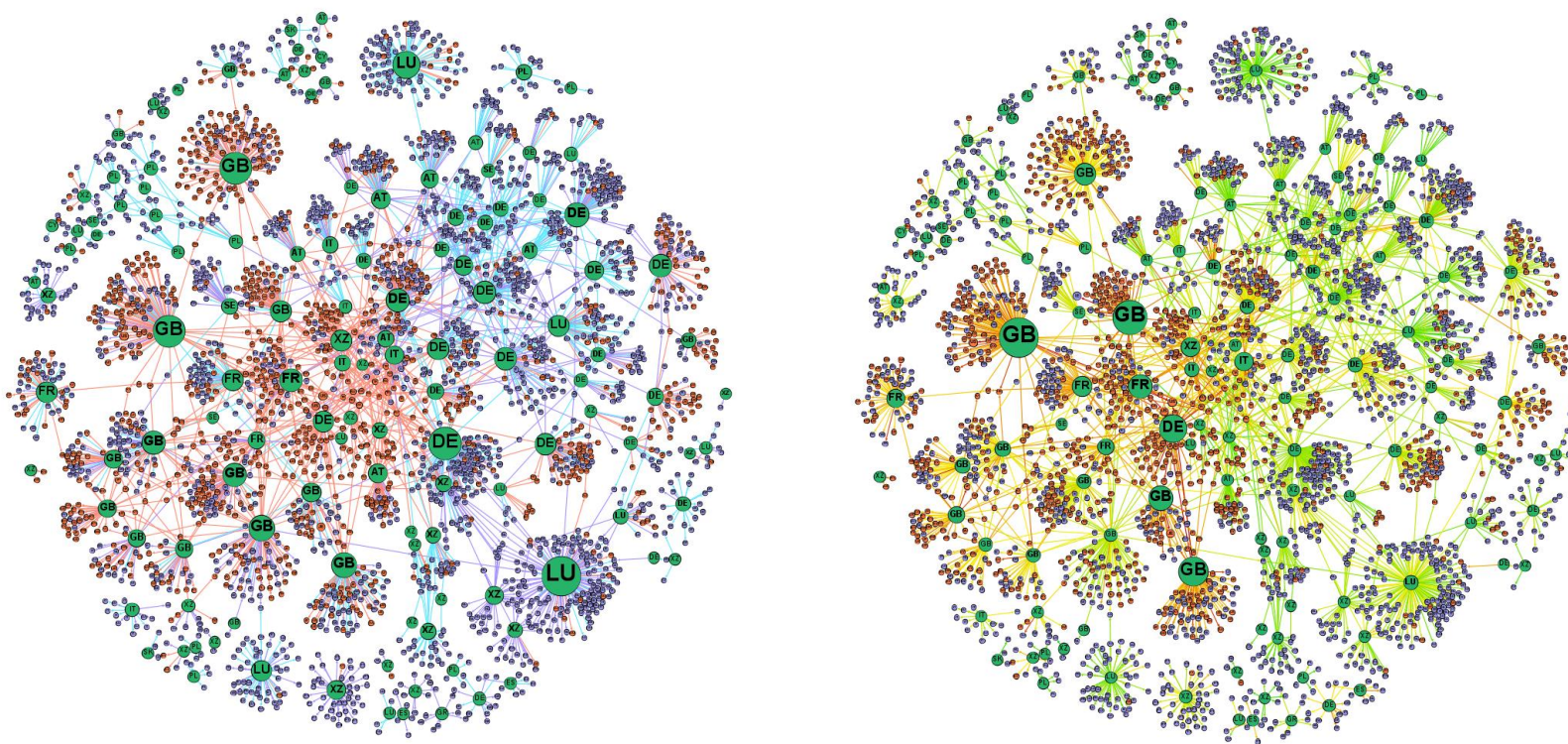
- 1. Securitisations:** securitisation-based credit intermediation and funding of financial entities (e.g. SPV)
- 2. Finance companies:** entities engaging in loan provision dependent on short-term funding (e.g. leasing, finance companies)
- 3. Non-MMF investment funds:** hedge funds, equity funds, real-estate funds, fixed income funds and other



# Network representation

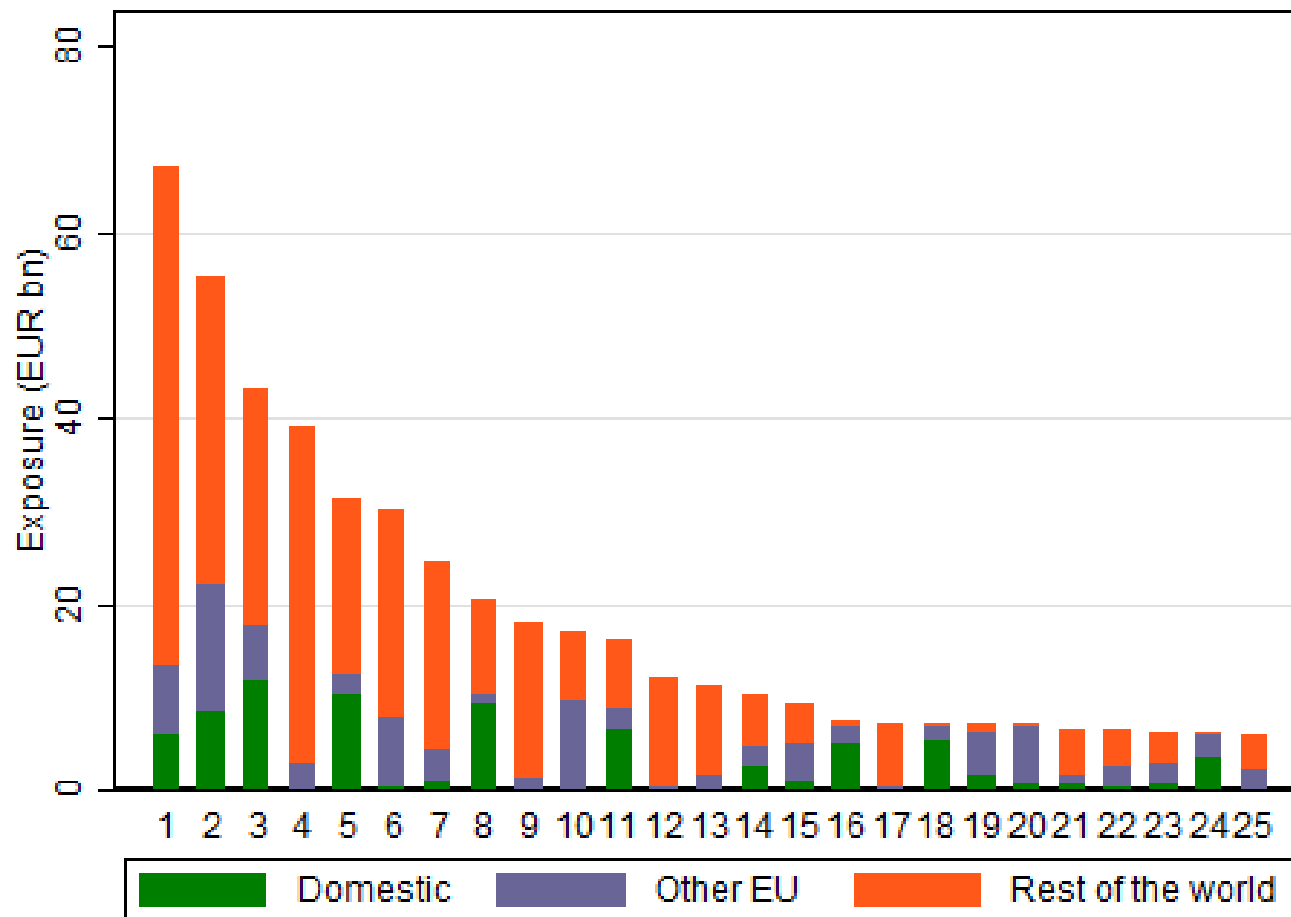
- Many EU banks have large cross-border exposures, in particular to non-EU domiciled entities
- A number of the most interconnected EU banks also have the largest individual exposures

## Exposures after exemptions and credit risk mitigation by country of shadow banking counterparty



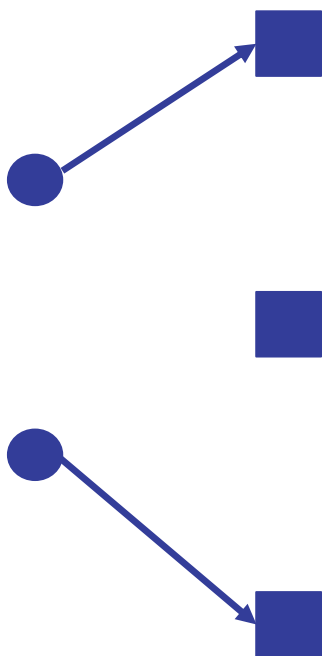
Source: ESRB Secretariat calculations based on data from EBA (2015), Report on institutions' exposures to 'shadow banking entities', December 2015. Note: Data refers to individual exposures equal to or above 0.25 per cent of institutions' eligible capital. Green nodes: reporting institutions (banks) labelled by country of residence. Purple and orange nodes: EU and non-EU domiciled shadow banking entities, respectively. The chart excludes investment firms and exposures greater than 25% of the institution's eligible capital (the large exposure limit). **Left-hand panel:** Node size is proportional to degree centrality (the number of counterparties). Blue links represent domestic exposures (EU institution to a domestic shadow banking entity); purple links represent EU exposures (EU institution to EU domiciled shadow banking entity) and orange links represent non-EU exposures (EU institution to non-EU domiciled shadow banking entity). **Right-hand panel:** Node size is proportional to total exposures (sum of all individual exposures). Colour of link ranges from green to orange depending on the size of the individual exposure (green links: smaller exposures, orange links: larger individual exposures).

# Top 25 banks by their exposures

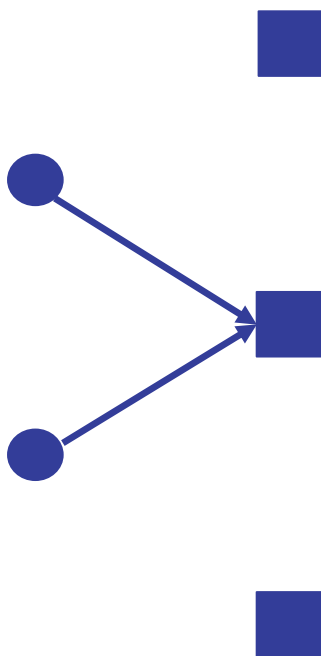


# Overlap / concentration analysis

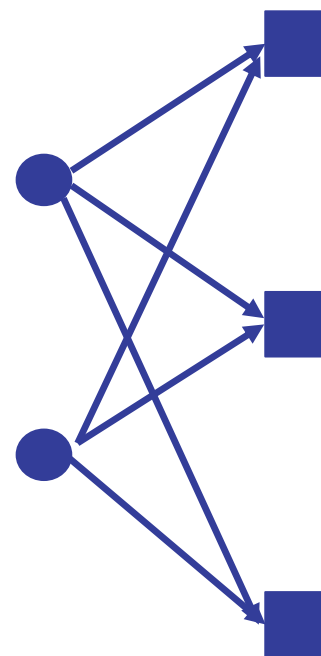
- Identifying common sources of risk



High concentration,  
low overlap



High concentration,  
high overlap

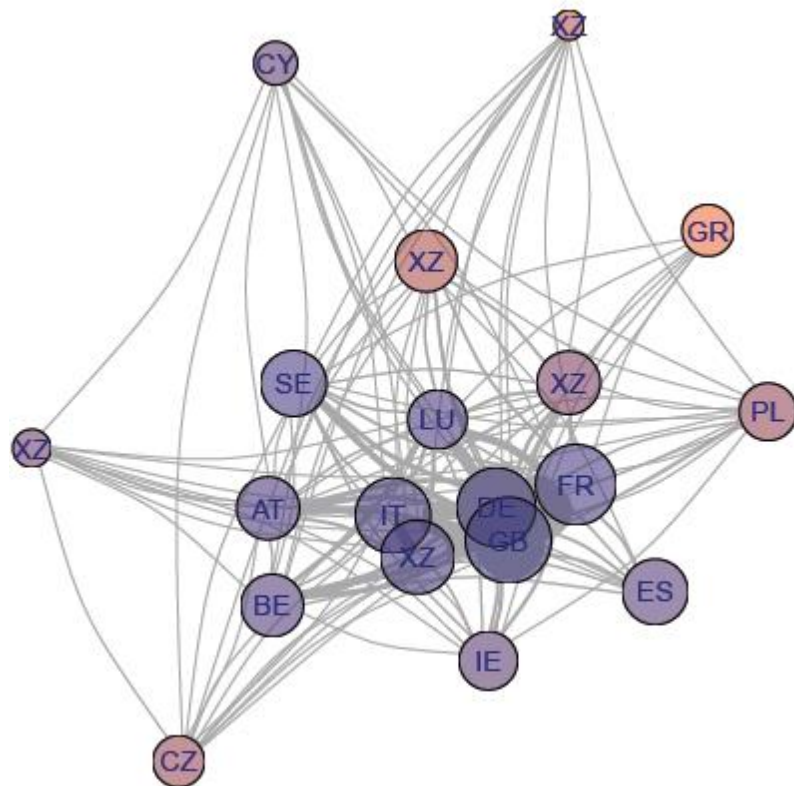


Low concentration,  
high overlap

# Overlap / concentration analysis

- Low levels of individual concentration (high diversification)
- This diversification engenders *high overlap* levels between different banks (exposed to the same shadow bank)

Key sources of **common vulnerability** are US finance companies, securitisations and other entities, with a cluster between the DE, FR, GB banking systems



# Conclusions

- Increasing importance of shadow banking entities underlines the need for a better understanding of the **nature of its linkages and potential contagion channels** to the traditional banking system
- EU banks exposures mostly concentrated around **securitisations, finance companies and non-MMF investment funds**
- Global and cross-border nature of exposures – **approx. 60% of EU banks exposures are towards non-EU domiciled shadow banking entities. Approx. 27% of exposures towards US domiciled shadow banking entities.**
- High but shared diversification across shadow banks may potentially lead to common sources of vulnerability





**Thank you!**

