

Similar Investors¹

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Investor Similarity Affects Investment Decisions

This Paper: **investors who trade an asset care about who else holds it.**

Several investors invest in the same asset, compare their portfolios and adjust their investment decisions.

Why? And what are the consequences for financial stability?

We bring the question of investor similarity to U.S. Money Market Funds (MMFs) investing in security issuers (banks)

→ the decision of the fund manager (the “investor”):

- MMFs mostly roll over existing exposures
- but MMFs react to information by rebalancing away from “risky” issuers (Gallagher et al., 2019)

Main result: MMFs consistently shift away from security issuers exposed to similar MMFs

- this way, the fund manager reduces her exposure to joint liquidation costs (Wagner, 2012)

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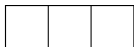
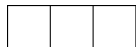
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The Diversification-Diversity Trade-Off

Wagner (2012): The diversification-diversity trade-off



Funds

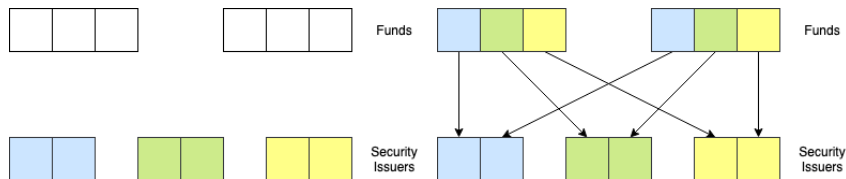


Security
Issuers

The Diversification-Diversity Trade-Off

Wagner (2012): The diversification-diversity trade-off

- If investors fully diversify, they are all **identical**

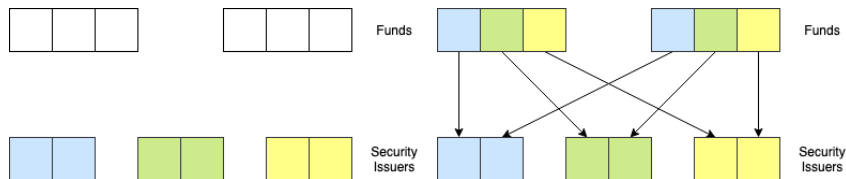


- Without frictions affecting liquidation costs, this is the optimal strategy
- However, fire-sales create systemic liquidation costs (e.g., see Coval and Stafford (2007) for equity markets, Ellul, Jotikasthira, Lundblad (2011) for corporate bond markets)
 - Investors prefer *diverse* over *diversified* portfolios

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- However, fire-sales create systemic liquidation costs (e.g., see Coval and Stafford (2007) for equity markets, Ellul, Jotikasthira, Lundblad (2011) for corporate bond markets)
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This Paper: Investor Similarity and Bank Liquidity Risk

First, we analyze the decision of the **fund manager** (the “investor”)

- What is the decision of the investor when she realizes the other investors of the security issuer are similar to her?
 - A bank funded by similar investors is more fragile exactly in the states where the investor needs liquidity
→ the bank is riskier for a similar investor

Second, we derive **the implications of investors' similarity for the issuer** and its overall access to funding.

- What are the consequences for banks with a similar investor base?

This Paper: Investor Similarity and Bank Liquidity Risk

We bring the question of investor similarity to U.S. Money Market Funds (MMFs):

- U.S. MMFs provide funding to the banks (“issuers”) in the form of certificates of deposits, financial commercial papers, or repurchase agreements
 - focus on unsecured funding (prime MMFs): 295 individual security issuers, 213 funds.
- Out of 295 issuers with access to U.S. MMFs, 203 are financial institutions, of which 155 banks.
- Assumptions:
 - ① Following the SEC regulation of 2010, U.S. MMFs have to report monthly mark-to-market net asset value (NAV) per share of their portfolios on Form N-MFP, which is then published by the SEC:
MMFs portfolio composition is public information.
 - ② Unlike deposits, MMF funding is not insured:
MMFs shift away from risky issuers (for unsecured investments)
 - European svg debt crisis evidence: Chernenko and Sunderam (2014); Ivashina et al. (2015); Gallagher et al. (2019)

Hypotheses

Two hypotheses:

① Fund decision

- H1: A fund reduces its exposure to an issuer when the fund learns it is similar to other investors (funds) of that issuer.

② Bank funding liquidity risk

- H2: The average similarity of the funds investing in an issuer increases the issuer's funding liquidity risk. The issuer cannot substitute the loss of funding from similar investors in a crisis.

- 1 Measuring Investor Similarity
- 2 Similar Investors' Decisions
- 3 Consequences of Similar Investors' Decisions

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Measuring Portfolio Similarity

Measuring similarity

- 1 How do you measure similarity between 2 funds?
 - Euclidean distance of portfolio shares
- 2 Who do you compare yourself to?
 - other funds investing in the same asset (security issuer)
→ The measure of fund similarity is not only fund-specific, but also **issuer-specific**.

If they make investment decisions with respect to a specific issuer i , **investors only care about their similarity to the investors who invest in that issuer.**

Measuring Portfolio Similarity

The measure of fund similarity is not only fund-specific, but also **issuer-specific**.

Average distance of fund f to other funds investing in security issuer i at time t :

$$FundDist_{fi,t} = \sum_{\varphi \neq f} w_{\varphi i,t} \sqrt{\sum_{i=1}^I \left(\frac{amount_{fi,t}}{fundsize_{f,t}} - \frac{amount_{\varphi i,t}}{fundsize_{\varphi,t}} \right)^2},$$

where I is the total number of securities a fund invests in at time t , and $fundsize_{f,t} = \sum_{i=1}^I amount_{fi,t}$.

Average fund similarity in issuer i :

$$Similarity_{fi,t} = 100 \times \left(1 - \frac{1}{\sqrt{2}} FundDist_{fi,t} \right) \in [0, 100].$$

Measuring Portfolio Similarity

$$FundDist_{f,t} = \sum_{\varphi \neq f} w_{\varphi i,t} \sqrt{\sum_{i=1}^I \left(\frac{amount_{f,i,t}}{fundsize_{f,t}} - \frac{amount_{\varphi i,t}}{fundsize_{\varphi,t}} \right)^2},$$

2 elements in the average distance:

- 1 How do you measure similarity between two funds?
 - Euclidean distance of portfolio shares between funds f and φ .
- 2 Who do you compare yourself to?
 - Weights $w_{\varphi i,t}$: share of investment that security issuer i obtains from the other fund φ at time t

$$w_{\varphi i,t} := \frac{amount_{\varphi i,t}}{\sum_{f \neq \varphi} amount_{f,i,t}} \in [0, 1].$$

Measuring Portfolio Similarity: an Example

Simple hypothetical example: 3 funds (BlackRock, Dreyfus, Fidelity) investing in 2 issuers (Deutsche Bank, Bank of America)

	<i>DB</i>	<i>BoA</i>
<i>BlackRock</i>	1	1
<i>Dreyfus</i>	1	1
<i>Fidelity</i>	1	0

Weighted average fund distances:

$$\begin{aligned} \text{FundDist}_{\text{BlackRock}} &= \text{FundDist}_{\text{Dreyfus}} \approx \begin{matrix} \text{DB} & \text{BoA} \\ (0.354, & 0) \end{matrix} \\ &\quad \text{FundDist}_{\text{Fidelity}} \approx \begin{matrix} (0.707, & 0.707) \end{matrix} \end{aligned}$$

Weighted average fund similarity:

$$\begin{aligned} \text{Similarity}_{\text{BlackRock}} &= \text{Similarity}_{\text{Dreyfus}} = \begin{matrix} \text{DB} & \text{BoA} \\ (75, & 100) \end{matrix} \\ &\quad \text{Similarity}_{\text{Fidelity}} = \begin{matrix} (50, & 50) \end{matrix} \end{aligned}$$

Measuring Portfolio Similarity: an Example

Simple example: 3 funds investing in 2 issuers

	<i>DB</i>	<i>BoA</i>
<i>BlackRock</i>	1	1
<i>Dreyfus</i>	1	1
<i>Fidelity</i>	1	0

For fund *BlackRock*:

- distances: how different is the other fund's portfolio to mine?

	<i>Dreyfus</i>	<i>Fidelity</i>
<i>BlackRock</i>	0	0.707

- weights: how much the other fund contributes to the issuer funding?

	<i>DB</i>	<i>BoA</i>
<i>Dreyfus</i>	1/2	1
<i>Fidelity</i>	1/2	0

Measuring Portfolio Similarity: an Example

Simple example: 3 funds investing in 2 issuers

	<i>DB</i>	<i>BoA</i>
<i>BlackRock</i>	1	1
<i>Dreyfus</i>	1	1
<i>Fidelity</i>	1	0

For fund *Fidelity*:

- distances: how different is the other fund's portfolio to mine?

	<i>BlackRock</i>	<i>Dreyfus</i>
<i>Fidelity</i>	0.707	0.707

- weights: how much the other fund contributes to the issuer funding?

	<i>DB</i>	<i>BoA</i>
<i>BlackRock</i>	1/2	1/2
<i>Dreyfus</i>	1/2	1/2

Measuring Portfolio Similarity: an Example

	<i>DB</i>	<i>BoA</i>
<i>BlackRock</i>	1	1
<i>Dreyfus</i>	1	1
<i>Fidelity</i>	1	0

$$\begin{aligned} \text{Similarity}_{\text{BlackRock}} &= \text{Similarity}_{\text{Dreyfus}} = \begin{matrix} \text{DB} & \text{BoA} \\ (75, & 100) \end{matrix} \\ &= \text{Similarity}_{\text{Fidelity}} = \begin{matrix} \text{DB} & \text{BoA} \\ (50, & 50) \end{matrix} \end{aligned}$$

2 exact same funds *BlackRock* and *Dreyfus*.

- *BlackRock* observes that *Bank of America* is only exposed to *Dreyfus*, which is exactly the same \rightarrow *BoA* is riskier than *DB*.
- *Fidelity* observes that *DB* and *BoA* are both exposed to *BlackRock* and *Dreyfus*: they are different from *Fidelity* \rightarrow *DB* and *BoA* have the same level of risk.
- H1 implies that *BlackRock* and *Dreyfus* will reduce their exposure to *DB* more compared to *Fidelity*. *BlackRock* and *Dreyfus* are “**similar investors**”.

Outline

- 1 Measuring Investor Similarity
- 2 Similar Investors' Decisions**
- 3 Consequences of Similar Investors' Decisions

Testing H1 (Fund Decision)

H1: A fund reduces its exposure to an issuer when the fund learns it is similar to the other investors (funds) of that issuer.

Methodology: We compare different funds investing in the same issuer at the same date, controlling for time-invariant fund characteristics, month FEs, holding constant fund size, security contract type, maturity and yield:

$$\text{FundingFlow}_{fit} = \beta_{it} + \beta_f + \beta_t + \gamma \text{Similarity}_{fit-1} + \delta \text{controls}_{fit-1} + \varepsilon_{fit},$$

where β_{it} are issuer*month fixed effects, β_f are fund fixed effects, and β_t are month fixed effects, Similarity_{fit} is the similarity of fund f to the other funds investing in issuer i at time t .

Note: The sample is restricted to fund-issuer pairs with a non-zero exposure at time $t - 1$, and to issuers with at least 3 funds.

Testing H1 (Fund Decision): Outflow Probability

Probability of Outflow increases by 0.4% when the fund similarity increases by 1 pp.

	<i>Outflow_{fit}</i>			
	(1)	(2)	(3)	(4)
<i>Similarity_{fit-1}</i>	0.004*** (4.43)	0.004*** (4.52)	0.006*** (4.64)	0.010*** (9.03)
Issuer*month FE	Y	Y	Y	Y
Issuer*fund FE	N	N	Y	N
Fund, month FE	Y	Y	Y	Y
Security controls, FE	Y	N	Y	Y
drops mat<30days	N	N	N	Y
<i>R</i> ²	22.00	13.09	26.87	16.47
Adjusted <i>R</i> ²	19.75	10.59	20.68	13.03
Observations	136982	136982	136465	82253
Issuers*month	3575	3575	3552	3007
Funds	210	210	207	207
Months	43	43	43	43
Issuers*funds			6844	

Testing H1 (Fund Decision): Funding Flows

Fund-issuer funding flows (Δ Outstanding) decrease by 0.5% when the fund similarity is 1 pp higher

- corresponds to additional 958 USD monthly outflow (uncond. fund-issuer flows: 503 USD, uncond. outstanding: 201,000 USD).

	Δ Outstanding _{fit}			
	(5)	(6)	(7)	(8)
<i>Similarity</i> _{fit-1}	-0.477*** (-6.34)	-0.506*** (-6.68)	-0.799*** (-8.85)	-0.421*** (-8.44)
Issuer*month FE	Y	Y	Y	Y
Issuer*fund FE	N	N	Y	N
Fund, month FE	Y	Y	Y	Y
Security controls, FE drops mat<30days	Y N	N N	Y N	Y Y
R^2	9.21	8.19	12.48	11.63
Adjusted R^2	6.14	5.09	3.89	7.80
Observations	113073	113073	112637	77698
Issuers*month	3449	3449	3430	2975
Funds	204	204	204	202
Months	43	43	43	43
Issuers*funds			6380	

Diversity-Diversification Tradeoff

The effect of similarity vanishes for high level of portfolio concentration. For example, the effect of similarity on funding flows becomes zero for a fund with an HHI of 75%.

	<i>Outflow_{fit}</i>		<i>ΔOutstanding_{fit}</i>	
	(1)	(2)	(3)	(4)
<i>Similarity_{fit-1}</i>	0.005*** (4.15)	0.006*** (4.82)	-0.537*** (-5.41)	-0.623*** (-5.45)
<i>HHI_{fit-1}</i>	0.001 (0.96)	0.006*** (2.90)	-0.085** (-2.00)	-0.491*** (-3.32)
<i>Similarity_{fit-1} * HHI_{fit-1}</i>		-7.82×10^{-5} *** (-2.58)		0.006*** (3.12)
Issuer*month FE	Y	Y	Y	Y
Issuer*fund FE	N	N	N	N
Fund, month FE	Y	Y	Y	Y
Security controls, FE	Y	Y	Y	Y
<i>R</i> ²	22.00	22.01	9.22	9.23
Adjusted <i>R</i> ²	19.75	19.76	6.15	6.16
Observations	136982	136982	113073	113073
Issuers*month	3575	3575	3449	3449
Funds	210	210	204	204
Months	43	43	43	43

Diversity-Diversification Tradeoff: additional tests

- We investigate alternative explanations:
 - concentration limits
 - benchmarking indices
 - eurozone exposures

- We show that funds pay more attention to similarity when
 - the fund's portfolio is diversified
 - the fund's exposure is large
 - the fund is experiencing redemptions

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Testing H2 (Issuer's Funding Liquidity Risk)

H2: The average similarity of the funds investing in an issuer increases the issuer's funding liquidity risk. The issuer cannot substitute the loss of funding from similar investors in a crisis.

$$Similarity_{it} = \sum_f w_{fit} Similarity_{fit}$$

Methodology: We compare different issuers, controlling for time-invariant issuer characteristics, month FEs, holding constant the level of diversification of the issuer's liabilities (number of funds and HHI).

$$\log(vol_{it}/vol_{it-1}) = \beta_i + \beta_t + \gamma_1 Similarity_{it-1} + \gamma_2 Similarity_{it-1} * Crisis_t + \delta controls_{it-1} + \varepsilon_{it},$$

where β_i are issuer fixed effects, β_t are month fixed effects, $Crisis_t$ is a dummy variable equal to one during the European sovereign debt crisis months (from June 2011 until December 2011).

Testing H2 (Issuer's Funding Liquidity Risk)

The average similarity of the funds of an issuer only affects access to funding during a crisis.

Panel A: Funding liquidity risk and issuer's average fund similarity

$\Delta Outstanding_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Similarity_{y_{it-1}}$	0.008 (0.07)	0.113 (0.99)	-0.055 (-0.40)	0.126 (0.91)	0.127 (0.98)	0.212* (1.74)	0.054 (0.37)	0.220 (1.49)
HHI_{it-1}	3.735 (1.03)		14.628** (2.34)		1.270 (0.33)		13.084** (2.07)	
$\#funds_{it-1}$	-0.224*** (-5.39)		-0.344*** (-3.70)		-0.240*** (-5.57)		-0.363*** (-3.76)	
$Similarity_{y_{it-1}} * Crisis_t$						-0.808*** (-3.60)	-0.687*** (-3.43)	-0.629** (-2.46)
$HHI_{it-1} * Crisis_t$					13.489** (2.09)		6.693 (0.87)	
$\#funds_{it-1} * Crisis_t$					0.073* (1.85)		0.045 (0.96)	
Issuer, time FE, security controls	Y	Y	Y	Y	Y	Y	Y	Y
Issuer*year, time FE, security controls	N	N	Y	Y	N	N	Y	Y
R^2	7.62	6.80	15.86	14.92	8.11	7.19	16.10	15.13
Adjusted R^2	1.45	0.62	2.01	0.97	1.90	1.02	2.21	1.18
Observations	4,536	4,536	4,479	4,479	4,536	4,536	4,479	4,479
Issuers	237	237	231	231	237	237	231	231
Issuers*Year	-	-	586	586	-	-	586	586
Months	43	43	43	43	43	43	43	43

Testing H2 (Issuer's Funding Liquidity Risk)

The average similarity of the funds of an issuer only affects access to funding during a crisis.

When the average fund similarity of an issuer is 1pp higher

- total funding flows decrease by an additional 0.8% during crisis months
 - Additional monthly outflow of 44,800 USD during crisis months (unconditional outstanding: 5.5 USD million).

When the average fund similarity of an issuer is one standard deviation higher (17.5 pp)

- 14% additional reduction of the average outstanding investment during crisis months.

Summary

Investor similarity increases funding liquidity risk of security issuers when investors face systemic liquidation costs.

- We use publicly available data from US MMFs and their investments in security issuers, in particular in EU banks during the sovereign debt crisis.
- H1: A fund manager reduces her exposure to an issuer funded by similar investors.
 - not explained by concentration limits, tracking indices, or exposure to eurozone issuers
 - more important for diversified funds, large exposures, and redemption episodes
- H2: The average similarity of the funds investing in an issuer increases the issuer's funding liquidity risk. The issuer cannot substitute the loss of funding from similar investors in a crisis.