

# Derivative Margin Calls: A new driver of MMF flows?

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# Motivation

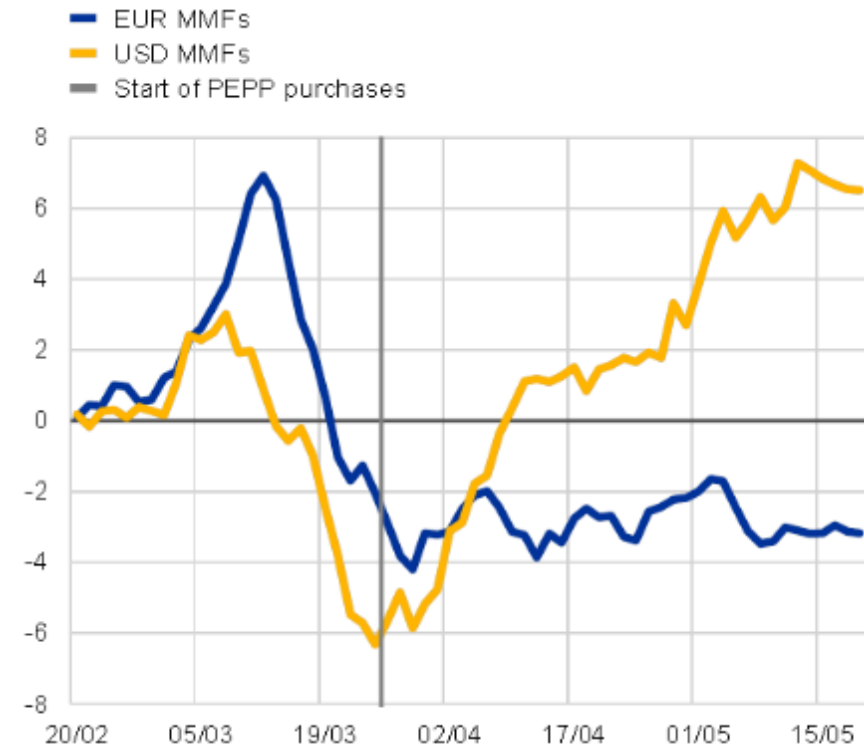
Large **volatility in MMF flows** during the March 2020 market turmoil

- Between 13 and 20 March 2020, euro area MMFs experienced outflows of nearly 8% of AUM
- Responses by central banks helped stabilise outflows

→ Consequences for financial stability and funding of the real economy

What the **drivers** behind these flows?

Cumulative net flows into euro area MMFs  
(% of total assets, 20/02/2020-17/05/2020)



Source: Box 7 in ECB's Financial Stability Review, May 2020.

# MMFs

- **Money market funds (MMFs)** provide **short-term finance** to financial institutions, corporations and governments
- MMFs are **short-term cash management tools** that provide a high degree of liquidity, diversification and stability of value

# Derivative Margins

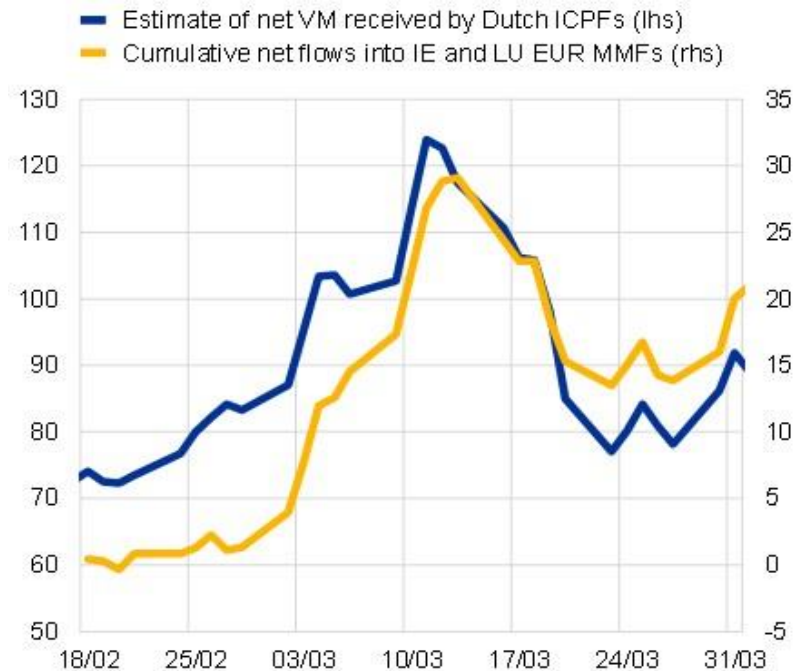
**Margins** are **collateral** required to protect the two parties involved in a derivative contract/portfolio in the event of **default** of the other counterparty

- **Initial Margins (IM)**: posted at execution  
→ adjusted during life  
Aim: cover losses between the last VM payment and liquidation/hedge/replacement of the trade
- **Variation Margins (VM)**: daily payments (cash) reflecting fluctuations in the market value of the contract/portfolio

# Empirical Evidence

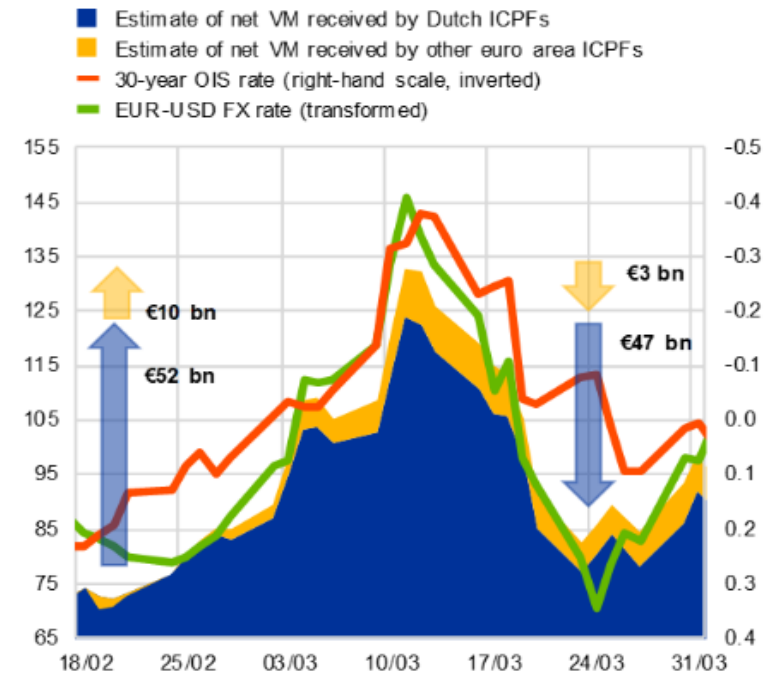
- **Strong correlation** (over 80%) between flows in/out of Euro-denominated MMFs and VMs faced by some ICPFs holding these MMFs

**Co-movement of ICPF VM and euro-denominated MMF flows**  
(€ bn; 18/02 – 31/03 2020)



Source: Box 8 in ECB's Financial Stability Review, November 2020.

**Co-movement of interest- and FX-rates with VM paid/received by ICPFs**  
(lhs: € bn; rhs: %; 18/02 – 31/03 2020)



# Main Hypothesis

Our hypothesis: **VM payments** as a driver of **MMF flows**

Other hypotheses in the literature:

- Flight-to-safety (Boucinha et al., FSR Box May 2020)
- Characteristics of MMFs, e.g. LVNAV structure, MMF liquidity requirements (Capota et al., 2021)
- Holdings of USD assets by non-US institutional investors (BOE, 2021)
- Characteristics of the short-term market (BlackRock whitepaper, 2020)

Our novel hypothesis:

- VM payments as a **new source of liquidity stress** for institutional investors during crisis times
- Institutional investors **use MMFs for liquidity management**
- therefore, they **pass through the liquidity shock** coming from VMs to MMFs

# Preview of the Results

- **VM payments** faced by some non-bank investors holding MMFs were an important **driver of the MMF flows**
- Margin posted tends to increase **MMF outflows**, indicating that some MMF investors quickly redeemed MMF shares to meet the margin payments
- Margin received increases **MMF inflows** in some cases
  - Some MMF investors may either take time before reinvesting liquidity from margin payments in MMFs or they may also use other instruments to store the liquidity

# Outline

- Introduction
- Data
- Model
- Results
- Conclusions & future perspectives

# Datasets

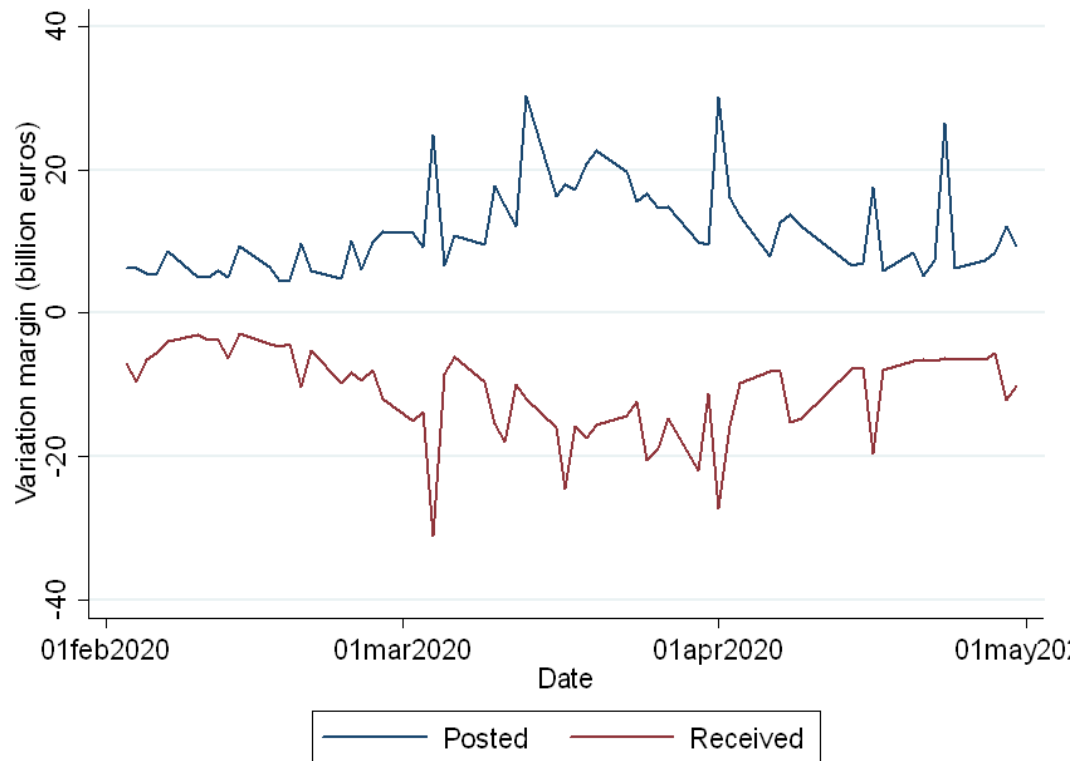
We combine three **highly granular and unique datasets**:

- Fund-by-fund **Refinitiv Lipper** to obtain daily MMF flows at fund level
- **Securities Holdings Statistics by Sector (SHSS)** to identify holdings in individual MMFs by investors (at country-sector level)
- Transaction-by-transaction **EMIR data** to compute VM payments
  - Since SHSS data provide investor information only at a country-sector level, we aggregate variation margin at a country-sector level
  - We focus on **EUR flows** (EUR-denominated MMFs and EUR VM payments)



# Margin Calls

*Variation margin payments (flows) of euro area non-bank entities*



# MMF Outflows

*Cumulative flows into euro-denominated money market funds*



# Hypothesis

## **Hypothesis for MMF outflows:**

VM posted by a MMF investor can lead to MMF outflows

## **Hypothesis for MMF inflows**

VM received by a MMF investor can lead to MMF inflows

# Baseline model specification

Simultaneous effects of VM payments on MMF flows

$$\begin{aligned} Outflows_{i,t} &= \alpha + \sum_g \beta_g * held_{g,i} * VM\ posted_{g,t} + I_i + T_t + \varepsilon_{i,t} \\ Inflows_{i,t} &= \alpha + \sum_g \beta_g * held_{g,i} * VM\ received_{g,t} + I_i + T_t + \varepsilon_{i,t} \end{aligned}$$

$i \sim$  MMF  
 $g \sim$  investor group (sector-country level)  
 $t \sim$  date

- $Outflows_{i,t}$  equals to MMF outflows when they are positive, and to zero when they are negative
  - $VM\ posted_{g,t}$  and  $VM\ received_{g,t}$  refer to VM posted and received (simultaneous effects but also lags/leads)
  - $held_{g,i}$  is a dummy equal to one if the investor group  $g$  holds MMF  $i$
- In both models, we expect  $\beta_g > 0$  for at least some (not necessarily all) investor groups
- Model run separately for each MMF domicile (FR, IE, LU)
- Model focuses on the most important investor groups with large VM payments (always non-banks: IF, PF, IC)

# Results: MMF outflows and VM posted

Table 5: Regression results for MMF outflows and VM flows posted

Dependent variable: MMF outflows											
Luxembourgish MMFs			French MMFs			Irish MMFs					
<i>Independent variables: VM flows posted * MMF held</i>											
	(1)	(2)	(3)		(4)	(5)	(6)		(7)	(8)	(9)
LU IF	<b>0.002*</b> [0.054]	<b>0.002*</b> [0.066]	0.001 [0.163]	FR IF	-0.004 [0.513]	-0.003 [0.593]	-0.005 [0.307]	LU IF	0.000 [0.900]	0.001 [0.843]	-0.000 [0.950]
DE IF	0.002 [0.303]	0.002 [0.423]	<b>0.003*</b> [0.082]	LU IF	<b>0.011***</b> [0.000]	<b>0.011***</b> [0.000]	<b>0.007***</b> [0.000]	IE IF	-0.003 [0.620]	-0.003 [0.704]	-0.007 [0.129]
NL PF	<b>0.009**</b> [0.023]	<b>0.008**</b> [0.030]	<b>0.011**</b> [0.010]	DE IF	<b>0.024**</b> [0.011]	<b>0.020**</b> [0.026]	<b>0.037***</b> [0.003]	NL PF	<b>0.011***</b> [0.004]	<b>0.011***</b> [0.009]	<b>0.010***</b> [0.001]
FR IC	0.002 [0.809]	0.001 [0.905]	0.003 [0.694]	FR Bank	0.000 [0.143]	0.000 [0.117]	0.000 [0.638]	IT IF	-0.013 [0.210]	-0.012 [0.227]	-0.004 [0.674]
ES IF	0.005 [0.332]	0.005 [0.332]	0.005 [0.314]	ES IF	-0.010 [0.217]	-0.009 [0.233]	-0.011 [0.279]	DE IF	-0.001 [0.729]	-0.002 [0.724]	0.001 [0.819]
Fund effects	RE	FE	No	Fund effects	RE	FE	No	Fund effects	RE	FE	No
Lagged dep.	No	No	Yes	Lagged dep.	No	No	Yes	Lagged dep.	No	No	Yes
Date FE	Yes	Yes	Yes	Date FE	Yes	Yes	Yes	Date FE	Yes	Yes	Yes
Observations	15,803	15,803	15,535	Observations	15,218	15,218	14,953	Observations	3,055	3,055	2,986
R-squared	0.069	0.221	0.129	R-squared	0.079	0.301	0.162	R-squared	0.065	0.263	0.153
Hausman test	p-value: 0.08			Hausman test	p-value: 0.00			Hausman test	p-value: 0.67		

Some investors withdrew funds from MMFs to post margins

Interpretation: When Dutch PFs post EUR 1 bn in VM, Irish MMFs held by Dutch PFs are estimated to face outflows of around EUR 11 mn

Notes: The table shows regression results of MMFs' outflows against the interaction between VM flows posted by investor groups and a dummy equal to one when the investor groups hold the MMF. Investor groups included in the regressions are the five groups with the largest VMs among the top ten largest investor groups. The time period used is from the beginning of February to the end of April 2020. Standard errors are clustered at fund level. P-values are in brackets.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

# Robustness: MMF outflows and VM posted

Dependent variable: MMF outflows (t)

Irish MMFs			Luxemburg MMFs			French MMFs		
<i>Independent variables: Margin posted * MMF held</i>								
<i>Luxembourg IF</i>			<i>Luxembourg IF</i>			<i>French IC</i>		
(t)	0.001 [0.816]	0.002 [0.670]	(t)	<b>0.002**</b> [0.043]	<b>0.003**</b> [0.023]	(t)	-0.026 [0.197]	-0.024 [0.207]
(t+1)		-0.001 [0.781]	(t+1)		-0.000 [0.920]	(t+1)		-0.003 [0.856]
(t+2)		-0.001 [0.786]	(t+2)		-0.001 [0.454]	(t+2)		0.014 [0.378]
<i>Irish IF</i>			<i>Irish IC</i>			<i>French IF</i>		
(t)	-0.004 [0.578]	-0.009 [0.281]	(t)	0.013 [0.576]	0.011 [0.672]	(t)	0.003 [0.545]	-0.007 [0.320]
(t+1)		0.003 [0.621]	(t+1)		0.002 [0.838]	(t+1)		-0.003 [0.488]
(t+2)		0.007 [0.509]	(t+2)		0.009 [0.254]	(t+2)		<b>0.013*</b> [0.084]
<i>Dutch PF</i>			<i>German IF</i>			<i>Luxembourg IF</i>		
(t)	<b>0.011***</b> [0.009]	<b>0.011***</b> [0.009]	(t)	0.002 [0.382]	0.002 [0.434]	(t)	<b>0.015***</b> [0.000]	<b>0.016***</b> [0.001]
(t+1)		0.002 [0.652]	(t+1)		-0.000 [0.933]	(t+1)		0.003 [0.459]
(t+2)		0.003 [0.347]	(t+2)		0.000 [0.821]	(t+2)		-0.003 [0.610]

# Results: MMF inflows and VM received

- Some investors deposit funds in MMFs when they receive margins
- Effect of margins received on MMFs inflows is potentially smaller:
  - Investors may not immediately reinvest received margins in a crisis period
  - Investors may invest received margins in MMFs only partially, while diversifying the storing of liquidity across different asset types

Interpretation: When Irish ICs receive EUR 1 bn in VM, the next day Luxembourgish MMFs held by Irish ICs are estimated to receive EUR 40 mn of inflows

Dependent variable: MMF inflows (t)

Irish MMFs			Luxemburg MMFs			French MMFs		
<i>Independent variables: Margin received * MMF held</i>								
<i>Luxembourg IF</i>			<i>Luxembourg IF</i>			<i>French IC</i>		
(t)	0.003 [0.383]	<b>0.009*</b> [0.090]	(t)	<b>0.003***</b> [0.001]	<b>0.002*</b> [0.087]	(t)	-0.000 [0.976]	-0.012 [0.191]
(t-1)		-0.005 [0.286]	(t-1)		0.002 [0.110]	(t-1)		0.006 [0.331]
(t-2)		-0.004 [0.316]	(t-2)		-0.001 [0.427]	(t-2)		0.021 [0.135]
<i>Irish IF</i>			<i>Irish IC</i>			<i>French IF</i>		
(t)	0.000 [0.991]	0.005 [0.665]	(t)	0.007 [0.507]	0.003 [0.732]	(t)	0.003 [0.395]	0.001 [0.809]
(t-1)		0.000 [0.976]	(t-1)		<b>0.040***</b> [0.010]	(t-1)		-0.003 [0.402]
(t-2)		-0.012 [0.192]	(t-2)		0.009 [0.456]	(t-2)		0.002 [0.427]
<i>Dutch PF</i>			<i>German IF</i>			<i>Luxembourg IF</i>		
(t)	0.005 [0.145]	0.004 [0.178]	(t)	0.001 [0.276]	0.000 [0.812]	(t)	-0.003 [0.338]	-0.006 [0.190]
(t-1)		0.001 [0.833]	(t-1)		0.003 [0.115]	(t-1)		0.004 [0.230]
(t-2)		0.002 [0.570]	(t-2)		0.001 [0.474]	(t-2)		-0.001 [0.652]

# Conclusion

- VM payments faced by some non-bank investors holding MMFs were an important driver of the MMF flows
  - Margin posted tends to increase MMF outflows (some MMF investors quickly redeemed MMF shares to meet the margin payments)
  - Margin received increases MMF inflows in some cases
- Non-banks used MMFs to manage liquidity related to margin calls in the March 2020 market turmoil
- Non-banks passed the liquidity shock to MMFs and thus to funding of banks and NFCs

# Policy implications

- **Enhance liquidity preparedness of non-banks to meet margin calls:**
  - ➔ **Risks of reliance on the cash-like properties of MMF shares** as a reliable source of liquidity under stress
- **Enhance MMFs' resiliency** to significant outflows
- **Enhance monitoring and understanding of interconnectedness**, incl. in view of regulatory reforms and by new/enhanced data collections (where data not available)
- **OTC derivative reform**
  - Stricter margining reduces counterparty credit risk, but creates liquidity risk spillovers
  - Trade repository data enabled our analysis (jointly with other datasets)



# Future perspectives

The analysis could be expanded to other sources of liquidity and margin payments since:

- MMFs are not the only **source of liquidity** for non-bank investors to meet margin payments (bank deposits, liquidation of assets, credit/liquidity lines, repos – post bonds to borrow cash)
- Other **margin payments** (particularly initial margin on cleared derivatives) also tend to significantly rise during highly volatile periods

Questions?

# Data Selection

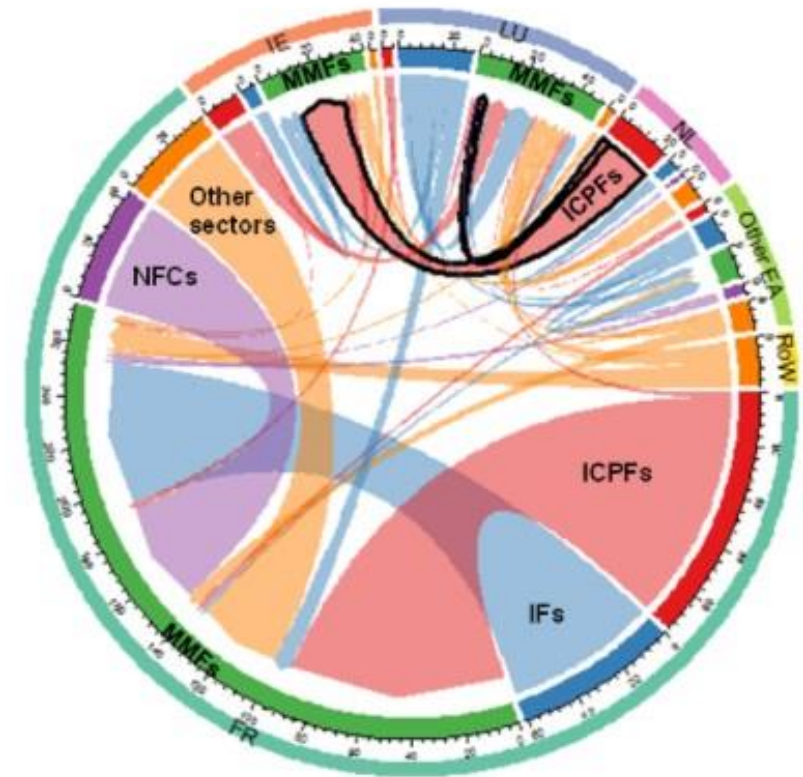
- Most **VM payments** of euro area entities holding derivative **contracts are in EUR**
  - We assume that EUR-denominated margin payments would be linked with flows in **EUR-denominated MMF**
  - The lion's share of euro area MMFs are issued in **LU, IE and FR**
- **We focus on**
- EUR-denominated funds in LU, IE and FR (~ 41% of euro area MMF assets)
  - EUR-denominated margin payments and MMF flows
  - Crisis period around March 2020 (February to April 2020)

# MMF Investors

## Main investors

- French MMFs:  
French ICPFs, French IFs, and French NFCs
- Irish MMFs:  
Dutch ICPFs
- Luxembourgish MMFs:  
Irish ICPFs, and Luxembourgish IFs

*Holder of EUR-denominated MMFs domiciled in the euro area*



# Model

$$\begin{aligned} Outflows_{i,t} &= \alpha + \sum_g \beta_g * held_{g,i} * VM\ posted_{g,t} + I_i + T_t + \varepsilon_{i,t} \\ Inflows_{i,t} &= \alpha + \sum_g \beta_g * held_{g,i} * VM\ received_{g,t} + I_i + T_t + \varepsilon_{i,t} \end{aligned}$$

- $i$  denotes a MMF,  $g$  an investor group at sector-country level, and  $t$  the date
- $VM\ posted_{g,t}$  and  $VM\ received_{g,t}$  refer to VM posted and received
- $held_{g,i}$  is a dummy equal to one if the investor group  $g$  holds MMF  $i$
- $I_i$  and  $T_t$  are MMF and time fixed effects
- $Outflows_{i,t}$  equals to MMF outflows when they are positive, and to zero when they are negative
- Standard errors clustered at the MMF level

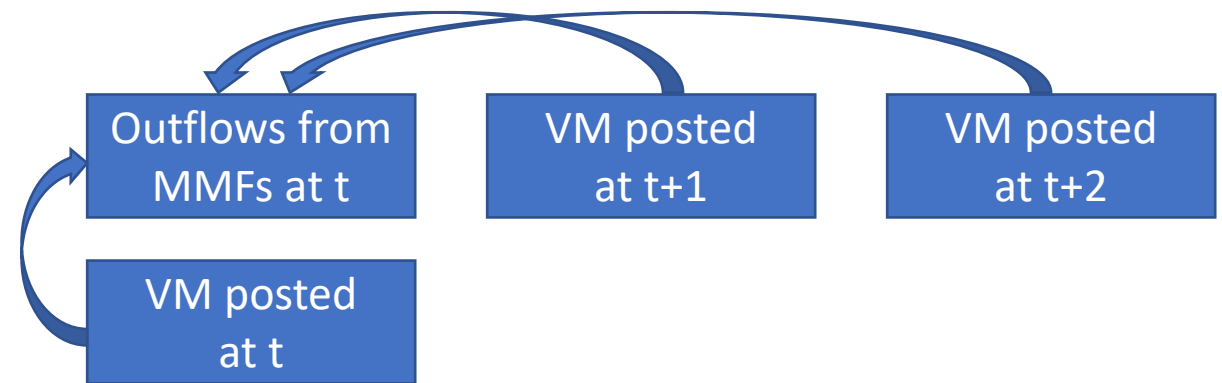
# Model extension

**Extended model:** we add forward and lagged values of VM payments to capture the potential dynamics over time

(i) **MMF outflows and margin posted:**

If margin is called today, it is to be posted the same or the following days

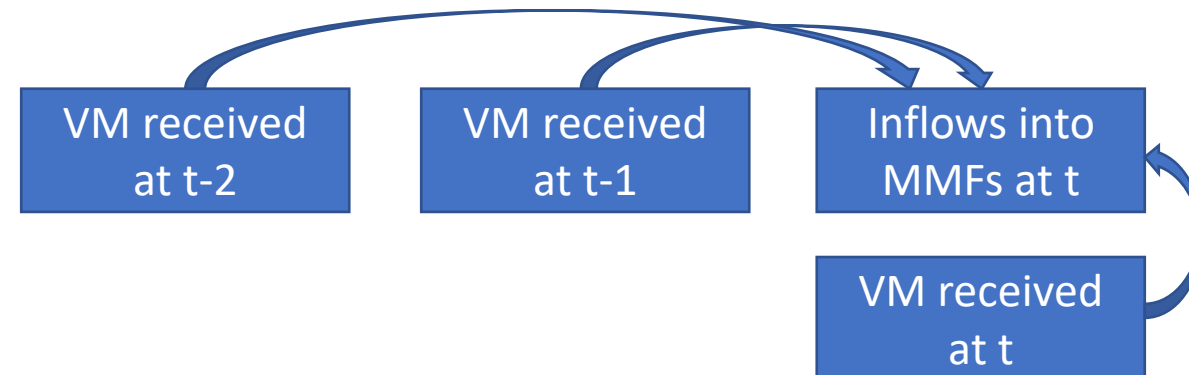
→ We add two leads of VM posted



(ii) **MMF inflows and margin received:**

Investors receiving margins may deposit the funds to MMFs on the same or following days

→ We add two lags of VM received



# Model additional specifications

- Euro-denominated MMFs are domiciled in three euro area countries: IE, LU and FR
  - Differences across these domiciles:
    - **MMF flow dynamics** in March 2020 qualitatively differ across countries
    - **The type of MMF** differs (mainly LVNAV in IE and LU, mainly VNAV in FR)
    - **The type of investor** differs (investors in FR MMFs mainly domestic, while investors in IE and LU mainly non-domestic)
- To control for these differences, we run separate models for each domicile

# Model additional specifications

190 investor groups: all possible combinations of 10 investor sectors in 19 countries

→ Need to limit the number of groups/explanatory variables

- **Step 1:** For each domicile, we rank the investor groups according to **the share of total net assets (TNA) of MMFs** that they hold, restricting the list to the top five
- **Step 2:** Among the top five, we select the three investor groups with **the largest VM flows**

Table 2: Summary statistics (million euros)

	Share held of MMFs' TNA		5th ptile	Median	95th ptile	Mean
Top 5 investor groups	Irish MMFs (50 MMFs)	Outflows	0.00	0.02	68.86	18.52
		Inflows	0.00	1.34	151.63	32.36
	Irish IF	Posted	84.87	241.77	708.28	310.04
		Received	100.96	219.98	751.64	310.09
	Luxemb. IF	Posted	491.68	1073.86	2337.15	1175.95
		Received	427.66	1150.45	1928.57	1140.82
	Dutch PF	Posted	424.86	1626.28	4134.36	1852.17
		Received	366.46	1783.74	3831.44	1862.89
	Irish IC	Posted	2.60	28.73	153.50	39.19
		Received	2.00	26.36	126.91	38.01
Italian IC	Posted	5.73	33.19	91.26	37.38	
	Received	1.02	28.40	101.44	37.81	



# Model additional specifications

	Irish MMFs (50 MMFs)		Luxembourg MMFs (262 MMFs)		French MMFs (250 MMFs)	
Top 5 investor groups	<b>Irish IF</b>	3.00%	<b>Luxemb. IF</b>	11.21%	<b>French IC</b>	26.39%
	<b>Luxemb. IF</b>	2.93%	Italian IC	9.40%	<b>French IF</b>	18.99%
	<b>Dutch PF</b>	2.16%	<b>Irish IC</b>	6.18%	French NFC	11.99%
	Irish IC	1.56%	Dutch IF	4.59%	<b>Luxemb. IF</b>	2.49%
	Italian IC	1.19%	<b>German IF</b>	2.72%	Italian IC	1.81%

*Note: All the 10 sectors considered are: (i) banks; (ii) Central Clearing House (CCP); (iii) Government; (iv) Insurance Corporations (IC); (v) Pension Funds (PF), (vi) Investment Funds (IF); (vii) National Central Banks (NCB); (viii) Non-Financial Corporations (NFC); (ix) Other Financial Institutions (OFI); and (x) Others.*

# Further remarks

- Our results support the hypothesis that some non-banks investing in MMF used these MMFs to manage liquidity related to VM payments in the March 2020 market turmoil
  - The results are likely to suffer from a measurement error downwards bias because:
    - the individual firm-level variability in the data is dampened by aggregation to sectors
    - the VM payments might be underestimated in EMIR data (e.g. due to under- or mis-reporting)
- we expect our estimates to be lower bound for the actual effects