

**Abstract**

This paper investigates variation in the composition of banks' collateral pledged for credit refinancing operations – a phenomenon we refer to as collateral switching. Relying on weekly bank-level data of pledged collateral for the ECB's refinancing operations between 2012 and 2024 we construct an indicator of banks' collateral pool concentration dynamics and exploit unsupervised learning techniques to identify switching events in each bank's time series. We document a number of stylized facts. First, a notable share of banks mobilizing collateral exhibit switching both through periods of high SRO demand as well as periods with zero SRO take up. Second, banks that “park” collateral with the central banks without recourse to SROs often exhibit switching after any new lending. The findings of this paper have policy relevance as they suggest that collateral pool composition is less stable than predicted by aggregate data used by previous literature and that prepositioned collateral follows mostly an opportunity cost motive.

**Empirical setup and data**

**Key research questions:**

- How stable is collateral pool composition in view of observed movements over time?
- How can we measure stability?

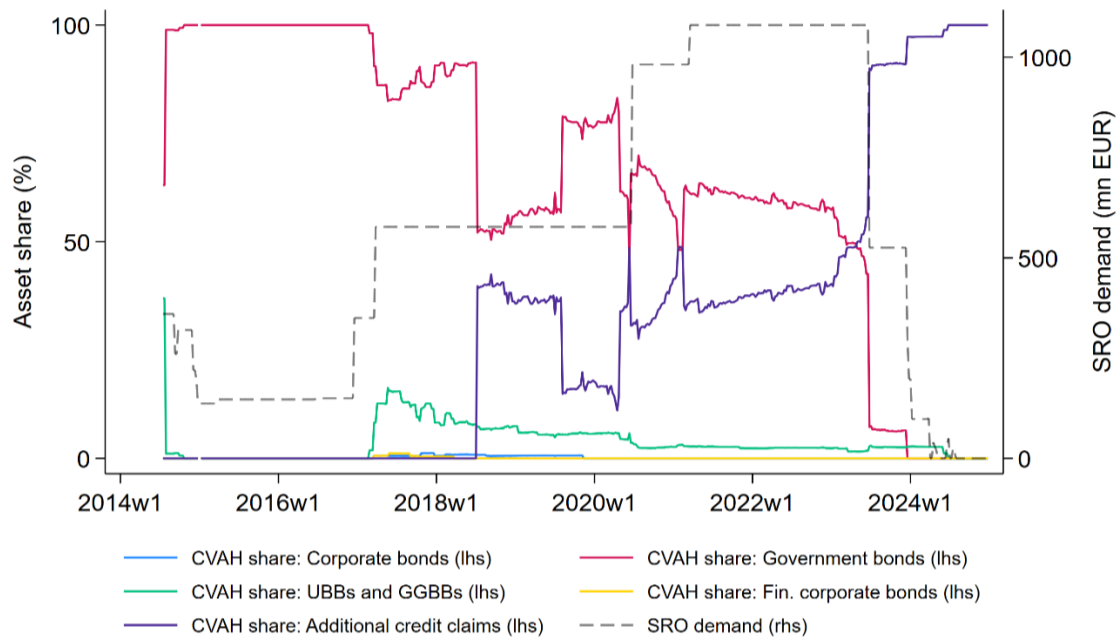
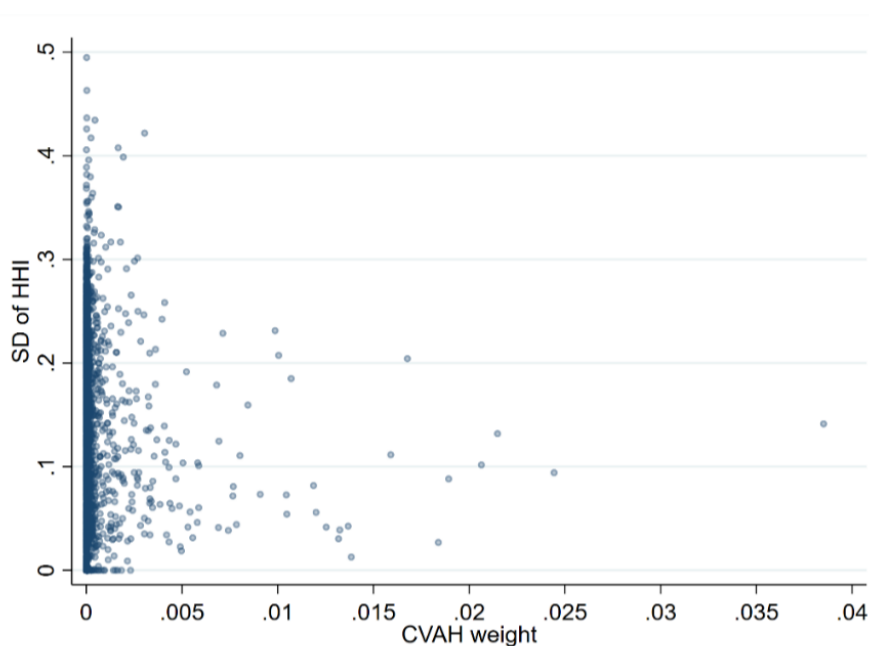
**Data:** weekly MFI panel (2012-2024) of mobilized collateral by asset class

**Measurement of dynamics**

**Question:** How can we monitor within-bank variation in collateral pool composition changes?

**Empirical strategy:**

- To identify shifts in collateral pool composition, we start by constructing a bank-specific indicator that measures variations in banks collateral pool concentration over time in form of a standard deviation. Intuitively the indicator captures compositional changes via variation in individual asset classes' weight in banks' collateral pools over time.
- In practice, shifts in collateral pool composition arise when banks substitute asset classes either at the intensive or extensive margin.



Notes: Staff computations based on C2D data. The left figure shows the standard deviation of a bank-specific concentration index and the bank's specific weight in terms of Collateral Value after Haircuts (CVAH). The right figure shows a mobilisation pattern of an anonymized bank with shares of assets being pledged and respective SRO demand over time.

**Identification of switching via unsupervised learning (k-means)**

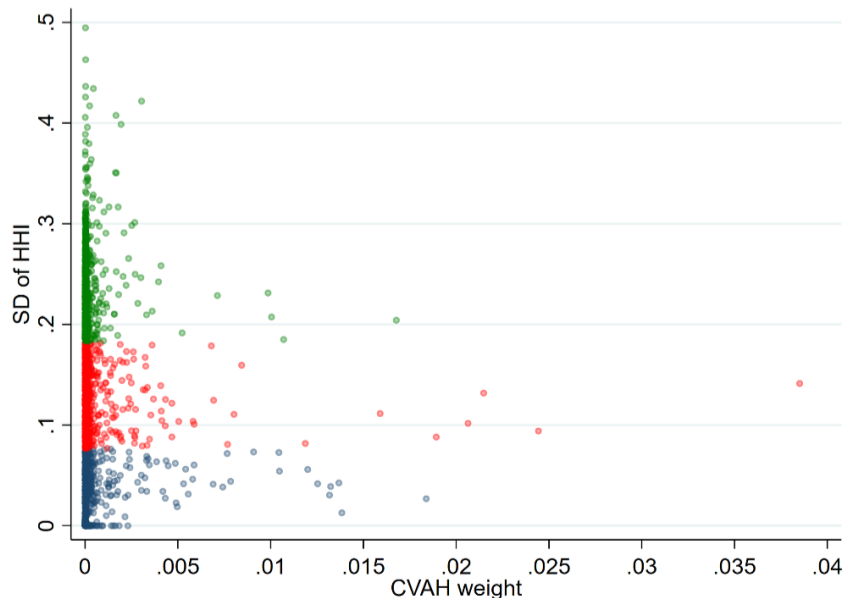
**Question:** How can we identify switchers formally?

**Empirical strategy:**

- To isolate switching banks more formally, we choose a data-driven approach and rely on clustering of the HHI standard deviation via unsupervised learning, namely k-means
- For our analysis we apply a parameterization of  $k = 3$  and define switching banks as those present in the cluster with the highest centroid.
- To corroborate our classification, we apply a random validation approach to inspect the plausibility of our threshold by visualising the time series of sampled banks.

**Findings**

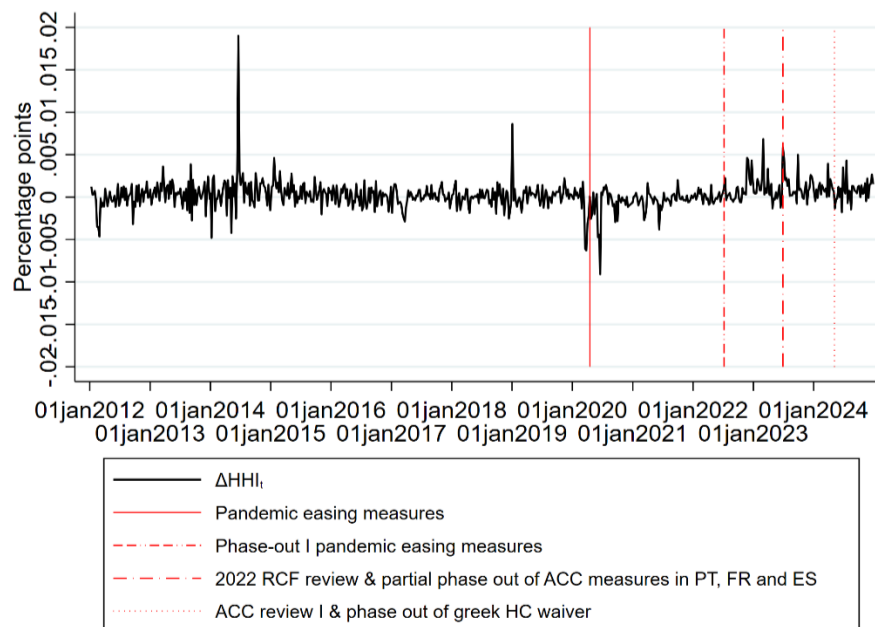
- We find that 796 banks are associated with switching over time at least once
- Our microlevel validation reveals that switching pattern occur in three different forms: First, we find that switching occurs without SRO demand. Second, we identify switching with positive SRO demand and third switching with both positive and zero SRO demand



Notes: Staff computations based on C2D data. Figure shows the k-mean clustered standard deviation of the MFI-specific HHI of collateral pool composition (Y axis) against the MFI's weight in the CVAH distribution (X-Axis).

**Causal role of policy shifts**

- Different cases of switching point to different root causes of variation: While variation in the absence of SRO demand points to reallocation of assets caused by outside factors (e.g. varying opportunity costs of pre-positioned assets due to opportunities in the repo market), shifts in collateral pools with non-zero SRO demand can point to shifts induced by collateral policies.
- Figure 5 shows first differences in the aggregate HHI index along with major collateral policies over the past years. Notably, one can observe pronounced spikes around the pandemic easing measures as well as major phase outs of those.
- The charts underpins the role of collateral policies (as well as exogenous macroeconomic circumstances) in determining the collateral pool variations



Notes: Staff computations based on C2D data. Figure shows average weekly changes in the HHI of banks' collateral pool composition. Red lines indicate various collateral easing and policy measures.

**Conclusions**

- A notable share of banks exhibit collateral switching both during periods of high SRO demand and during periods with zero SRO take-up.
- Banks that “park” collateral with the central bank without recourse to SROs often switch their collateral following access to new lending operations.
- Casual analysis related to switching drivers to be performed.