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Online annex for "The rise of non-bank financial institutions: implications for monetary policy"

Assessing the influence of monetary policy on financial institution net worth

To estimate the influence of monetary policy on the net worth of financial institutions, we select a sample of 3,186 financial institutions with equity listings across 36 economies between 1988 and 2025. We then classify them into six groups. We use the Global Industry Classification Standard (GICS) to identify banks. For the remaining entities, we use the 2022 North American Industry Classification System (NAICS) to identify insurance companies and pension funds, non-deposit taking credit institutions, investment funds and portfolio management companies. Due to the bimodality of investment fund leverage, we split investment companies further into two groups, classifying those with financial debt greater than 5% of assets as hedge funds.

To estimate how monetary policy transmission affects their net worth, we run separate local projections for each group of financial institutions. Specifically, for each subsample we estimate the following regressions up to horizon $h = 0, \dots, 20$ months:

$$y_{ic,t+h} - y_{ic,t-1} = \alpha_i^h + \mu_t^h + \beta_1^h MP_{c,t} + \boldsymbol{\gamma^h} X_{ic,t-1} + \boldsymbol{\theta^h} W_{c,t-1} + \varepsilon_{ic,t+h} \quad (1)$$

where $y_{ic,t+h} - y_{ic,t-1}$ is the log change in the equity price of firm *i* in country *c,* between month *t* and $t + h$ to capture the change in net worth, α^h is a firm fixed effect, and μ_t^h is a month-year fixed effect; $MP_{c,t}$ is a measure of monetary policy surprises from Choi et al (2024) with additional updates. The term $X_{ic,t-1}$ denotes the set of firm-level control variables, which include six lags of monthly log changes in equity prices and the lag of log total assets. The term $W_{ic,t-1}$ denotes the set of country-level control variables, which includes lags of GDP growth, inflation and real policy rates.

The parameters of interest, β_1^h, represent impulse response functions of equity prices for the respective type of non-bank financial institution (NBFI) following a 100 basis point monetary policy shock. To assess how maturity mismatch and leverage influence the impact of monetary policy on financial intermediaries we conduct two separate analyses. First, we take the estimated β_1^h coefficients for each of the financial institution groups and plot them against the average financial leverage and maturity mismatch of the firms in the same group (Graph 2.A).

NBFIs and the influence of monetary policy on financial conditions and aggregate demand

To estimate how monetary policy transmission to financial conditions and aggregate demand is shaped by NBFIs, we use the local projections for a panel of 13 advanced economies (AEs) and 11 emerging market economies (EMEs), between 2002 and 2024. Specifically, we estimate the following regressions for country c at month t up to horizon $h = 0, \dots, 20$:

$$y_{c,t+h} - y_{c,t-1} = \alpha_c^h + \mu_t^h + \beta_1^h \mathrm{D}_{LOW,t-1}^h \times MP_{c,t} + \beta_2^h \mathrm{D}_{HIGH,t-1}^h \times MP_{c,t} + \sum_{l=1}^{3} \beta_{3,l}^h X_{c,t-l} + + \varepsilon_{c,t+h}$$

where $y_{c,t+h} - y_{c,t-1}$ is the cumulative change in the Financial Conditions Index (FCI) or 10-year government bond yields, or the cumulative percentage change in monthly interpolated GDP, α^h is a

country fixed effect, and μ_t^h is a month fixed effect; the terms $D_{LOW,t-1}^h$ and $D_{HIGH,t-1}^h$ are dummy variables taking the value of 1 if the ratio of NBFI total assets to GDP in a country in the previous year is larger than the median ratio across countries for the same year. We proxy NBFIs either as the sum of insurance companies and pension funds or "other financial institutions" (OFIs). The latter category includes hedge funds, mutual funds, private equity and other client types.

$MP_{c,t}$ is a measure of the monetary policy surprises described above. The term $X_{c,t-l}$ denotes the control set, which includes monthly changes (over the past three months) in the dependent variable, consumer price index (CPI) inflation and long-term yields. We additionally control for differences in the level of economic development which could influence monetary transmission. We do this by further including dummy variables that take on the value of 1 if GDP per capita in a country in the previous year is larger than the median ratio of GDP per capita for the same year, which we interact with our monetary policy shocks.

Cross-border spillovers of NBFI flows

We examine how NBFI cross-border capital flows respond to US monetary policy surprises and the spillover effects to domestic financial conditions, particularly in sovereign bond markets. The analysis of cross-border flows relies on a combination of fund-level and macroeconomic data sources to construct estimates of different NBFI components. We draw fund-level data from the Lipper database, which mainly covers investment funds and provides information on their geographic focus and investment allocation. Investment fund inflows are derived by aggregating monthly fund flows from Lipper. Destination countries for inflows are identified by each fund's geographic concentration, while funds domiciled within the same geographic concentration are excluded to avoid double-counting domestic investments. Investment fund inflows are estimated for 10 AEs and 10 EMEs.

The impact of US monetary shocks on cross-border flows is estimated using a local projections framework with quarterly data from 2004 to 2025. The model is expressed as:

$$\hat{y}_{i,t+h} = \alpha_i^h + \beta^h MP_{US,t} + \gamma^h\left(MP_{US,t} \times USD\_con_{t-1}\right) + \sum_{j=1}^{2} \phi_j^h \hat{y}_{i,tij} + \sum_{j=0}^{2} \theta_j^h \boldsymbol{X_{i,t-j}} + \varepsilon_{i,t+h}$$

The dependent variables $\hat{y}_{i,t+h}$ are cross-border investment fund inflows and gross portfolio inflows for country i at time $t+h$, expressed as percentage deviations from country-specific trends, where trends are estimated using the Hodrick-Prescott filter. α_i denotes country fixed effects, $MP_{US,t}$ are the US monetary policy surprises described above, and $\boldsymbol{X_{i,t-j}}$ is a vector of control variables which include sovereign yield differentials relative to US Treasuries (one-year and 10-year), domestic credit growth to the private non-financial sector, log exchange rate changes against the US dollar, real GDP growth and GDP deflator inflation. The model is estimated using ordinary least squares with country-clustered standard errors.