Financial conditions and the macroeconomy: A two-factor view

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Financial conditions indices

- A summary of the evolution of financing conditions at the broad economy level
  - → Relevant as an intermediate step in the transmission of monetary policy
- Weighted averages of key financial variables spanning across different financial markets
  - → e.g. GS-FCI: five variables (nominal short-term rate, nominal long-term rate, corporate spread, equity prices, exchange rate) weighted based on their impact on GDP growth
- Challenge of using off-the-shelf indices:
  - → We don't know what drives their dynamics
  - → Especially problematic when components pull in different directions

A taxonomy of existing indices

1. **Depending on variable composition:**
   - Financial conditions indices (FCI):
     → e.g. GSFCI, Fed's FCI-G, Chicago Fed, St. Louis Fed
   - Financial stress indices (FSI):
     → e.g. Bloomberg, Kansas City Fed, CISS, ADB FSIs

2. **Depending on weighting methodology and interpretation:**
   - Weights based on the impact on GDP growth
     → e.g. GSFCI, Fed's FCI-G
   - Statistical weights
     → e.g. Chicago Fed National FCI, Bloomberg, CISS

Summary of our research (so far)

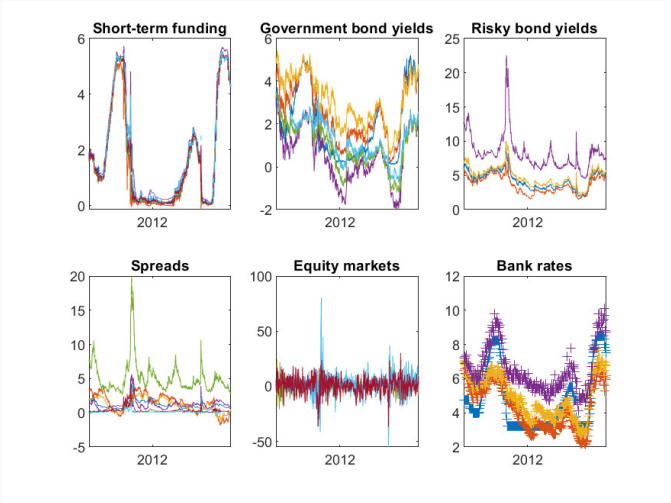
- We construct a new data-driven index based on a dynamic factor model (DFM)
  - → Address the black-box issue with common FCIs
  - → Enables us to assess how different "ingredients" contribute to the factors
- Factor loadings enable us to associate each factor to different facets of "financial conditions"
  - → The level of yields
  - → Risk attitudes and perceptions
- Factors can be combined using different weighing schemes to form a comprehensive index
  - → Different target variables lead to different weights
  - → The risk-factor has a stronger bearing on measures of credit and economic activity...
  - → ...especially for tail events

⇒ We plug factors into the SVAR model by Gilchrist and Zakrajsek (2012) to assess their role in the transmission of risk shocks

⇒ And run a local projections exercise to assess the transmission of monetary policy shocks through the factors

Constructing an FCI

The "ingredients" of our FCI for the US...



1. Short-term funding: FFR, 3m T-bills, CP/CD rates
2. Safe yields: Yield curve, 1y-10y
3. Risky yields: Corporate bond yields (AAA, BBB, IG, HY)
4. Spreads: Slope of the yield curve, spreads on risky bonds
5. Equities: Returns, market cap, dividend yields
6. Bank rates: Mortgages, consumer and commercial credit

The dynamic factor model

- Let $X_{1:T}$ be a N-dimensional multiple time series with T observations; its factor representation is

$$X_t = \Lambda F_t + e_t, e_t \sim N(0, R)$$

  where F_t is a matrix of r factors and Λ is the matrix of factor loadings
- The common factors follow an AR process of order p:

$$F_t = \sum_{i=1}^{p} A_i F_{t-i} + u_t, u_t \sim N(0, Q)$$

- Unobserved factors are reconstructed through Kalman filter, and estimated via ML
- X_t may have missing elements (also due to mixed frequencies) $\Rightarrow$ EM algorithm (Banbura and Modugno 2014)

Factor loadings

Two factors explain about 60% of total variance

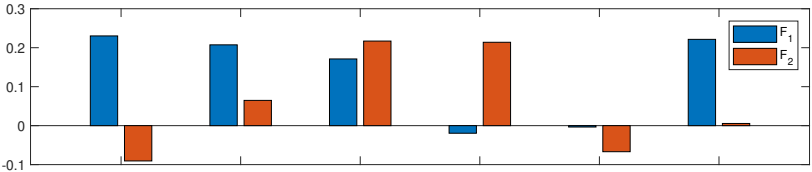
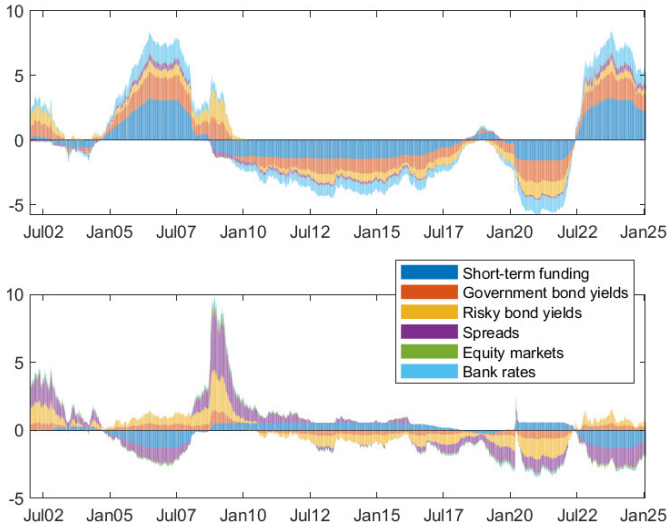
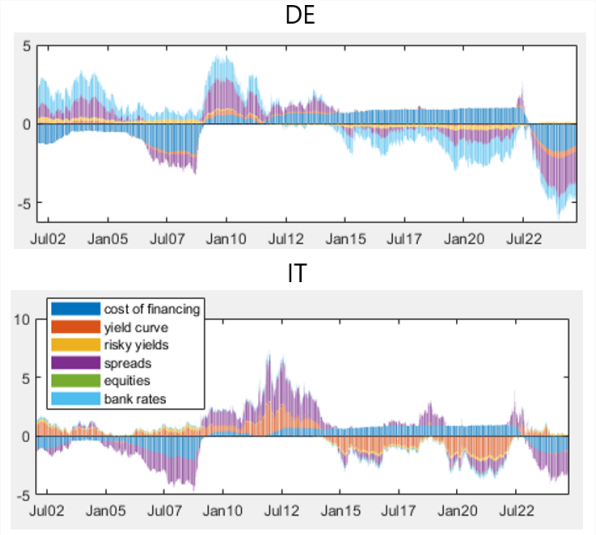


Figure 1: Average factor loadings for each bloc

The two factors (and their contributors)



The factors in the euro area



- Substantial heterogeneity in F_2
- Reflecting market segmentation...
- ...especially during the euro area crisis

The factors and the macroeconomy

Predictive regressions

To assess the additional predictive power of the factors over a benchmark AR(p) model, we run the predictive regressions:

$$\Delta^h Y_{t+h} = \alpha + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \gamma_i FC_t(i) + \epsilon_{t+h},$$

The partial R^2 of the factors can be used as weight to construct a composite index

Regression results

Financial indicator	Horizon: one quarter		Horizon: one year	
A. Credit growth				
F1	-0.08	—	-0.11	—
	[-1.39]		[-1.47]	
F2	—	−0.23**	—	−0.24**
		[-2.23]		[-2.26]
Partial R^2	0.03	0.13	0.04	0.12
B. Investment growth				
F1	−0.17	—	−0.30	—
	[−0.96]		[−1.53]	
F2	—	−0.95**	—	−0.74**
		[−2.23]		[−2.17]
Partial R^2	0.01	0.18	0.04	0.14
C. Real GDP growth				
F1	-0.8	—	−0.12**	—
	[-0.9]		[-2.02]	
F2	—	−0.46***	—	−0.20**
		[-3.30]		[-2.01]
Partial R^2	0.01	0.16	0.06	0.10

Table 1: The Predictive Power of Financial Conditions for Economic Activity

Asymmetry in the predictive distributions

We run quantile regressions à la Adrain, Boyarchenko and Giannone (2019) of GDP growth, its lag and the factors

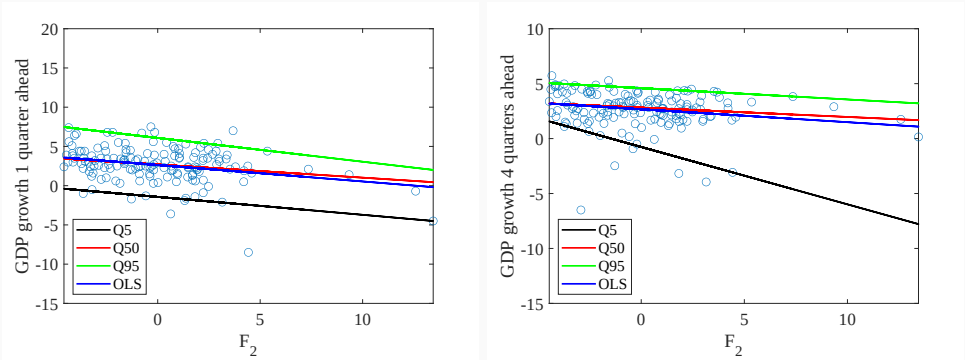


Figure 3: F_2 has strong effects on the left tail

Asymmetry in the predictive distributions

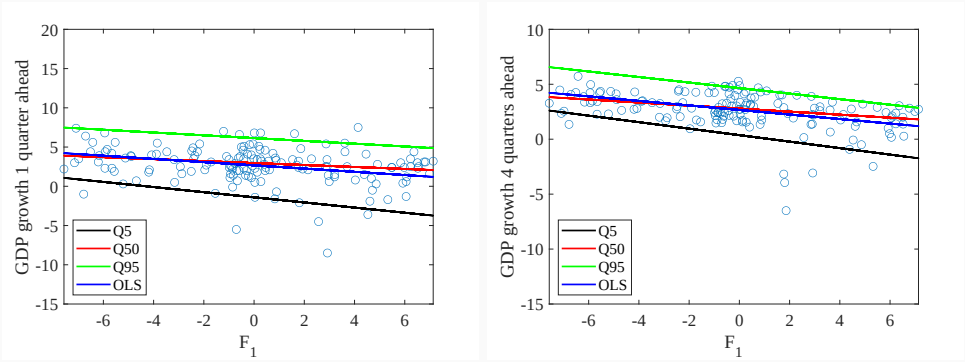
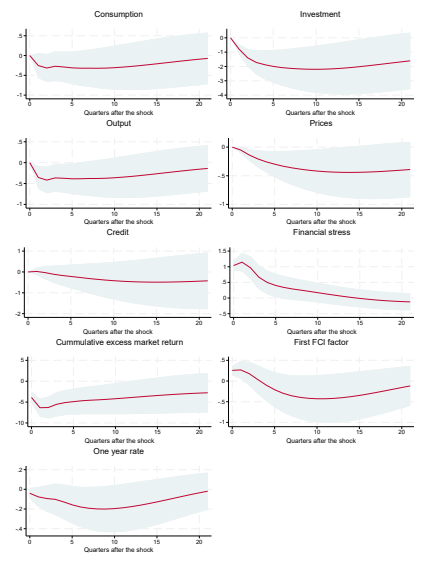


Figure 4: F_1 has milder effects on both tails

The transmission of risk shocks

- We build on the structural SVAR by Gilchrist and Zakrajsek (2012), replacing the 10-year yield with F_1, and the EBP with the F_2
- Hence the VAR contans the following variables (in this order):
  (i) the log-difference of real PCE;
  (ii) the log-difference of real business fixed investment;
  (iii) the log-difference of real GDP;
  (iv) inflation;
  (v) the log-difference of real total credit to the private nonfinancial sector;
  (vi) the quarterly average of F_2;
  (vii) the quarterly excess stock market return;
  (viii) the quarterly average of F_1;
  (ix) the quarterly average of the one-year-treasury yield.
- The identifying assumption is that shocks to F_2 affect economic activity and inflation with a lag, while government bond yields and stock prices can react contemporaneously

Responses to a risk shock



Monetary policy transmission through the factors

What does monetary policy do to factors?

- We estimate the dynamic responses of each factor to monetary policy surprises using a local projection approach
- For each forecast horizon $h = 0, ..., H-1$ we run a separate regression of factors F_1 and F_2 on a high-frequency identified monetary policy shock (mps_t), and control variables $\mathbf{x}_t$:

$$F_{t+h} = \alpha_h + \beta_h \cdot mps_t + \mathbf{A_h} \cdot \mathbf{x}_t + e_{t+h},$$

  - The matrix $\mathbf{x}_t$ includes lags of the dependent variable, contemporaneous and lagged values of the log-transformed CPI, of the unemployment rate, of the log-transformed industrial production, and of the Commodity Price Index
  - "Pure" monetary policy surprises à la Jarocinski and Karadi (2020)

Responses of the factors to a monetary policy shock

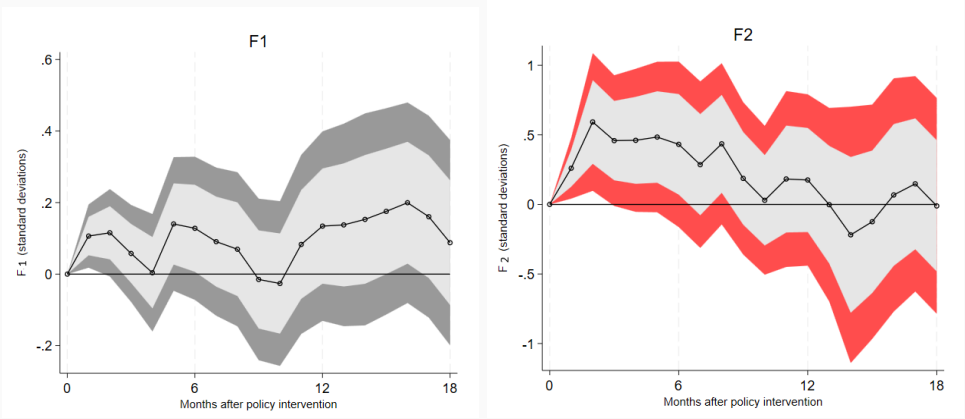


Figure 6: Local projections of the factors on monetary policy shocks à la Jarocinski and Karadi (2020)

Wrapping up

- We look at financial conditions through the lens of a data-rich DFM
- The various facets of financial conditions are captured by different factors
  - The first factor captures the overall level of rates
  - The second factor captures conditions in risky segments (corporate credit, equities)
- The second factor has a stronger bearing on macroeconomic conditions
  - It receives a higher weight if one wants a composite index
  - It has notable asymmetric effects on the left tail
  - It can be used to pin down risk shocks in structural VARs
- Monetary policy has a grip on both factors

Thank you!