What drives liquidity?

Identifying shocks to market makers' supply of liquidity and their role in economic fluctuations

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[1] The views expressed are those of the author and do not indicate concurrence by the Federal Reserve Board of Governors or other research staff.

Motivation

After crisis, renewed interest in intermediaries' risk-bearing capacity

But hard to identify shocks

- Supply and demand
- Endogeneity

This paper

Focus on broker-dealers and Treasury market

- Implications for supply of intermediation by dealer firms

What shocks drive market liquidity?

- Structural VAR with sign restrictions

Business cycles and asset prices

Dealers and market liquidity

Volatility episodes

- Quant ('07), Flash ('10), Taper Tantrum ('13)
- *Symptomatic* of liquidity drought?

Approach

Look for *a price and a quantity of liquidity* such that

1. dealer willingness $\uparrow$ implies

$$P \downarrow Q \uparrow$$

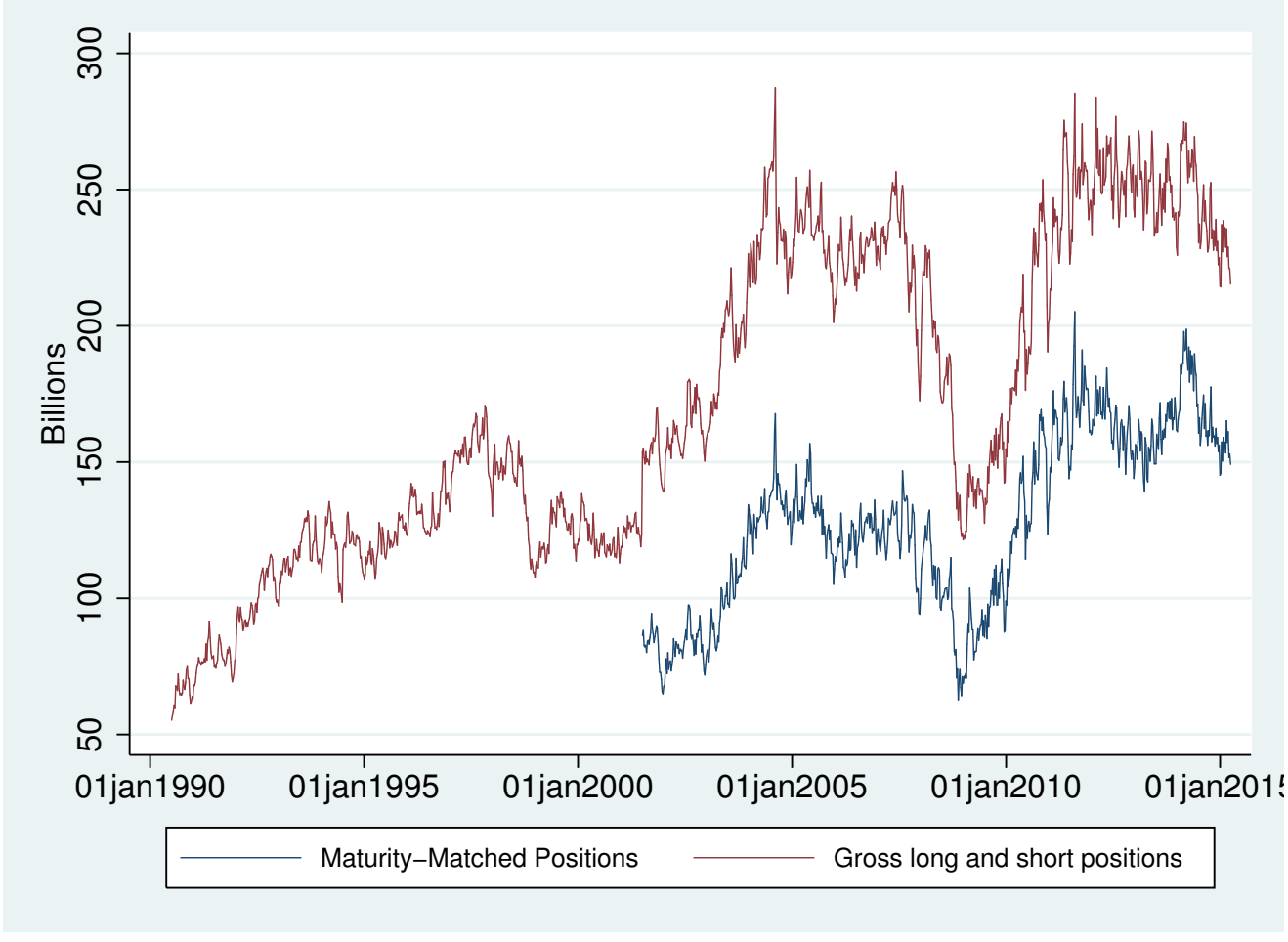
2. macro shocks (TFP, uncertainty, markup, time pref, sentiment, monetary) do not imply

$$P \downarrow Q \uparrow \text{ or vice versa}$$

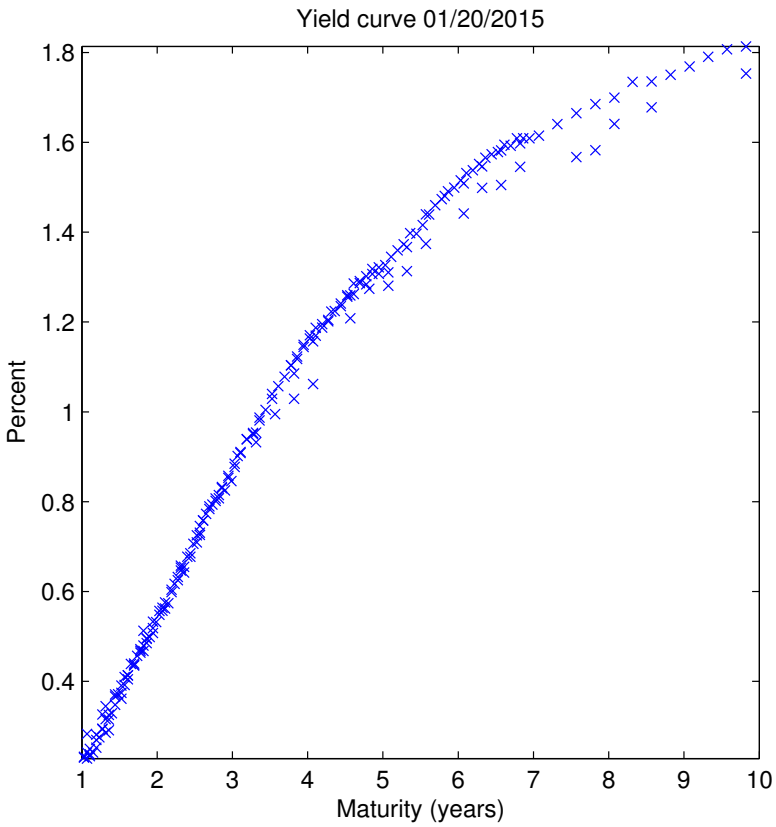
Theory model

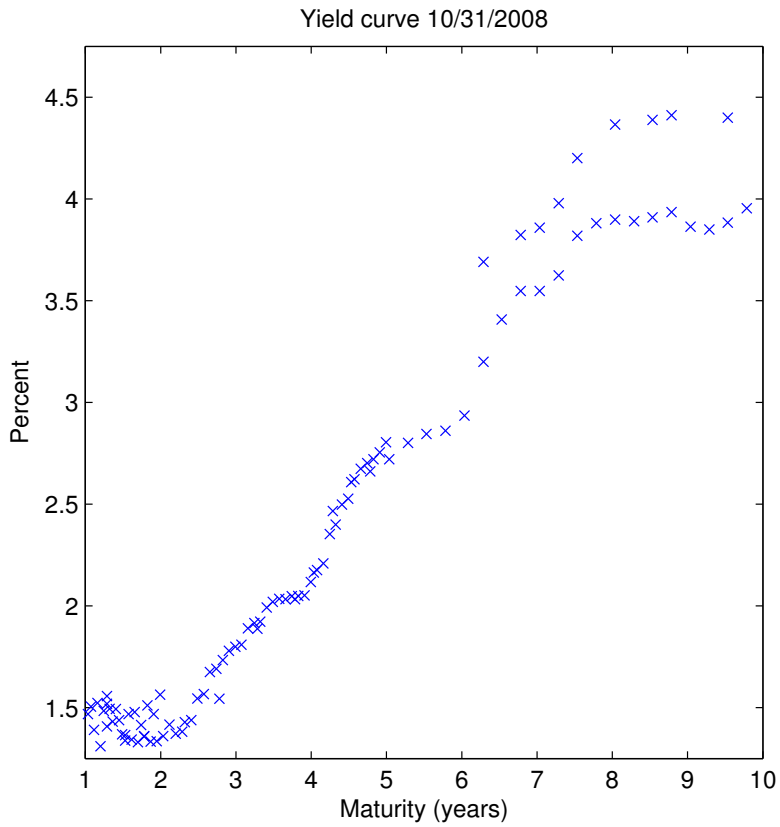
Robustness: Control for broad financial conditions

Dealer intermediation

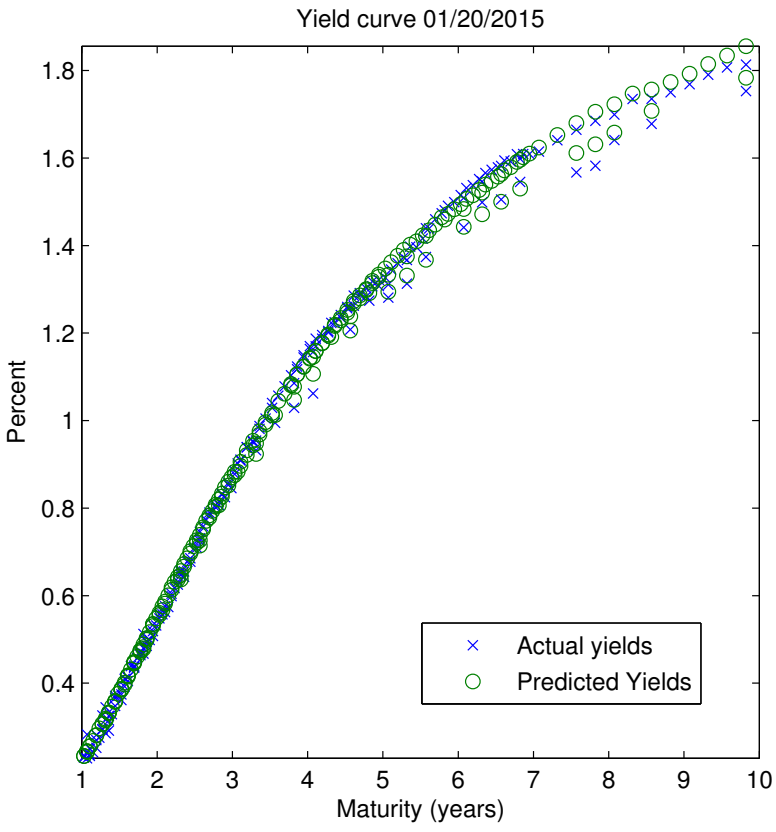


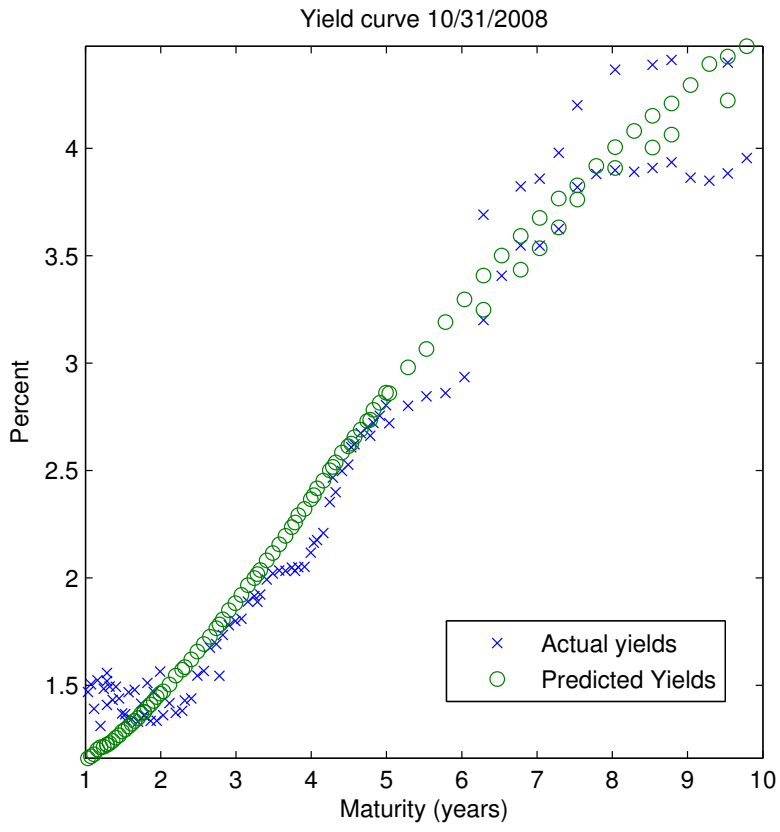
Dealer intermediation





Dealer intermediation





$$f(n) = \beta_0 + \beta_1 \exp(-n/\tau_1) + \beta_2 (n/\tau_1) \exp(-n/\tau_1) + \beta_3 (n/\tau_2) \exp(-n/\tau_2)$$

Theory: Overview

Noise compensates dealers for making markets

A investors, B investors

A bonds, B bonds: same maturity

Segmented: A investors trade only A bonds (GV 2002)

Dealers

Dealer intermediation

Segmented markets

- Client owns a bond and no longer wants rate risk; wants to sell, not short similar maturity
- Close out a short
- "price-insensitive insurance companies" (Pedersen 2015)

Theory: Overview

"P" $= |p_b - p_a|$ and "Q" = gross long and short positions of the dealer

Dealer risk aversion $\Rightarrow P \uparrow Q \downarrow$

Investor risk aversion $\Rightarrow P \uparrow Q \uparrow$

Mean or variance of rates $\Rightarrow$ no effect on P or Q

Model

$$Y_t = b + ct + B_1 Y_{t-1} + B_2 Y_{t-2} + ... + B_l Y_{t-l} + \xi_t$$

$$E\left[\xi_t \xi_t^{'}\right] = \Sigma$$

Find A

$$A^{-1}\xi_t = v_t$$

where v_t mutually independent

$$E\left[v_t v_t^{'}\right] = I_m$$

Weak Normal Wishart prior. Weekly data: 1990 - 2015.

Model

Y_t

- Noise
- Aggregate gross long and short positions
- Equity-market implied vol (VIX)
- Equity excess returns ($r_t^{mkt} - r_t^{rf}$)
- Treasury market implied vol (MOVE)

Identification

Benchmark

	Supply	Demand
Noise	-	+
Gross positions	+	+
VIX		
Equity returns		
MOVE		

Required to hold on impact and $K = 12$ more weeks

Identification

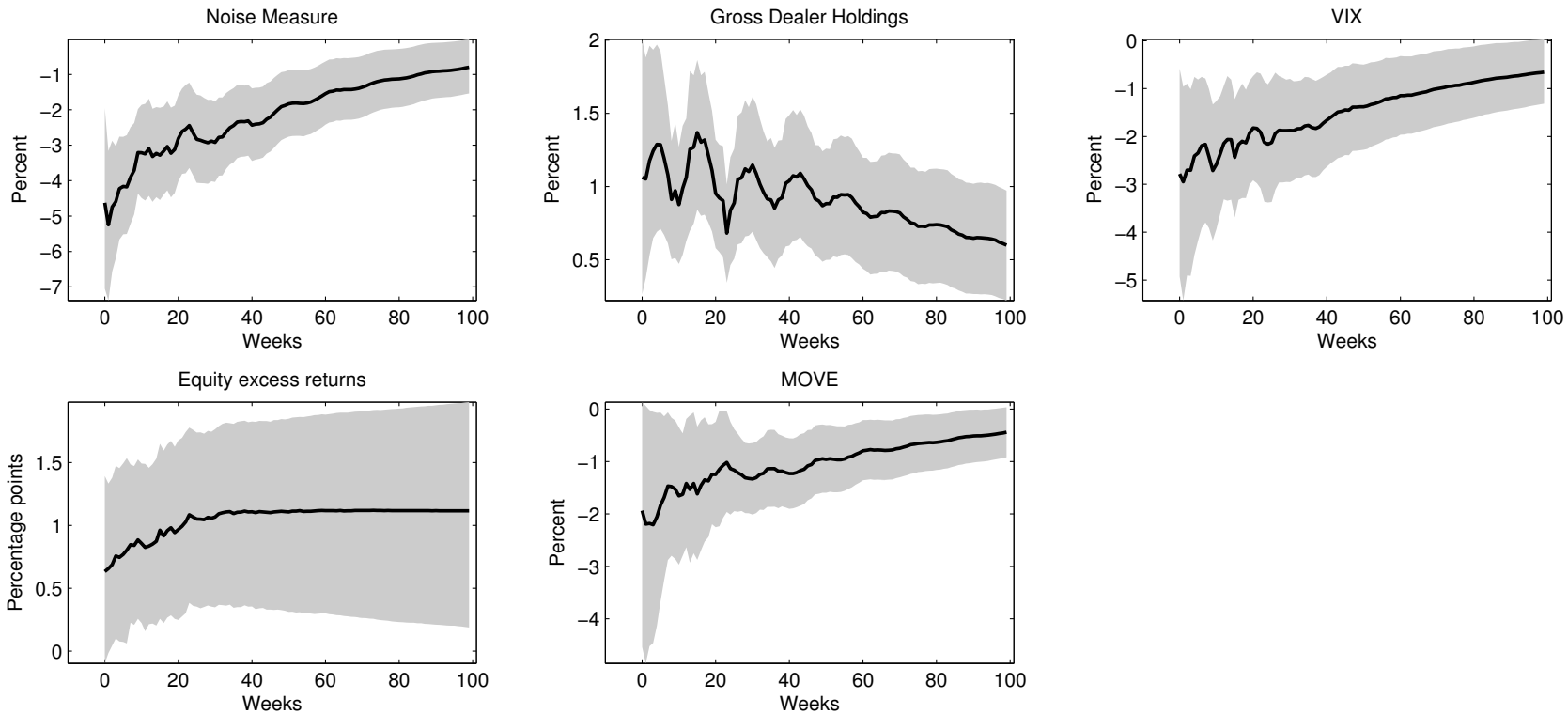
Alternative: Controlling for rate risk and equity market shocks

	Supply	Demand	Rate risk	Equity market
Noise	-	+		
Gross positions	+	+		
VIX				+
Equity returns				−
MOVE			+	

Required to hold on impact and $K = 12$ more weeks

Model

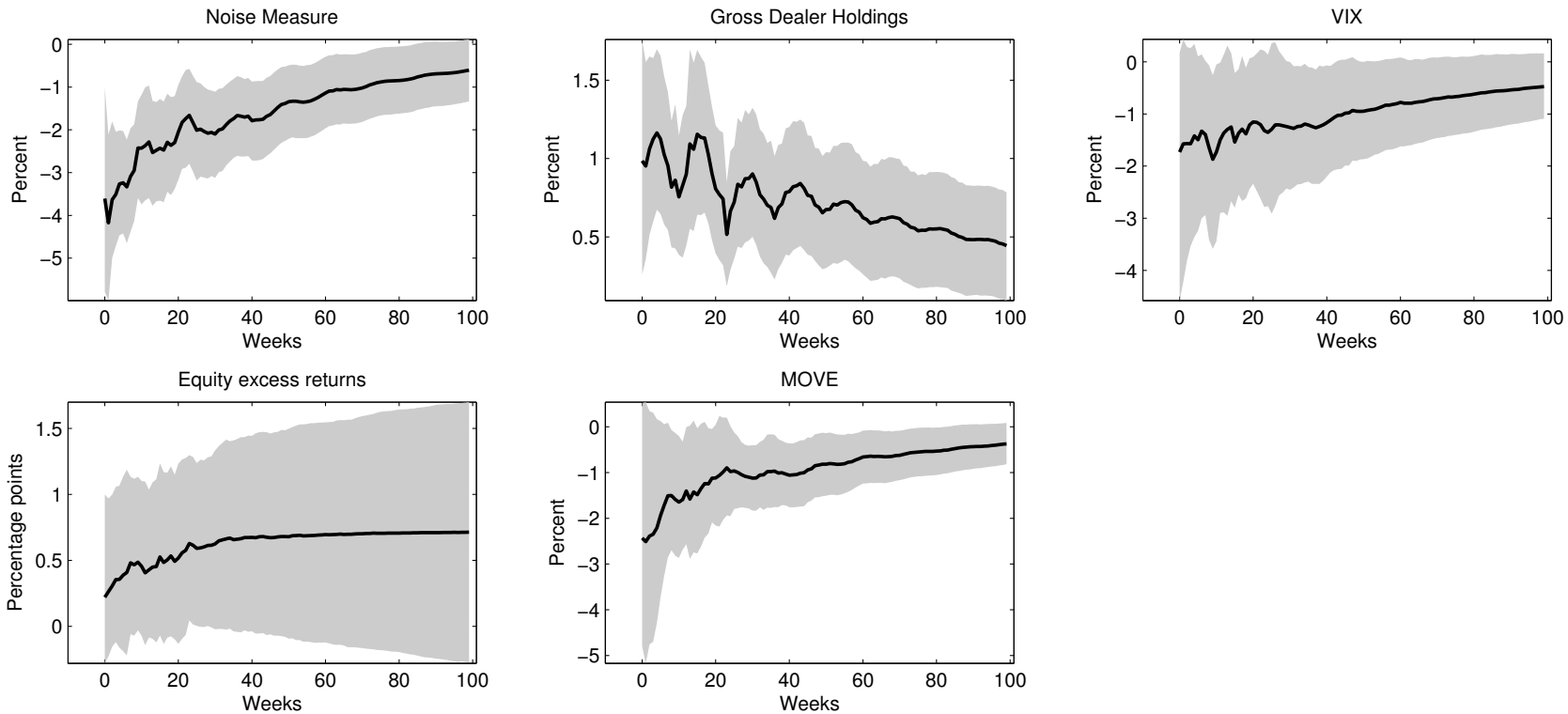
IRFs: Liquidity supply shock



Gray: pointwise 68-percent credible interval

Model

IRFs: Liquidity supply shock - alternative specification



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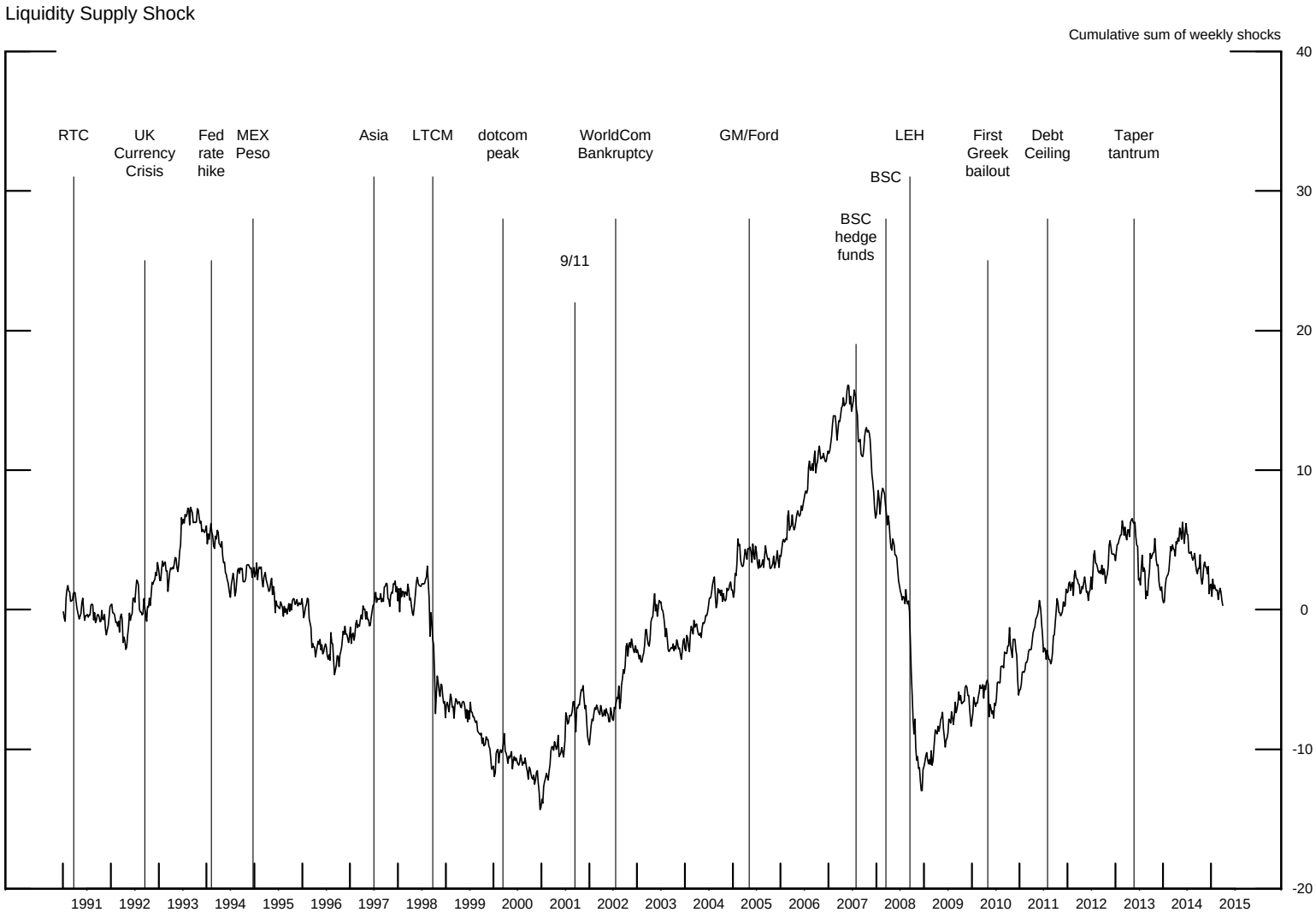
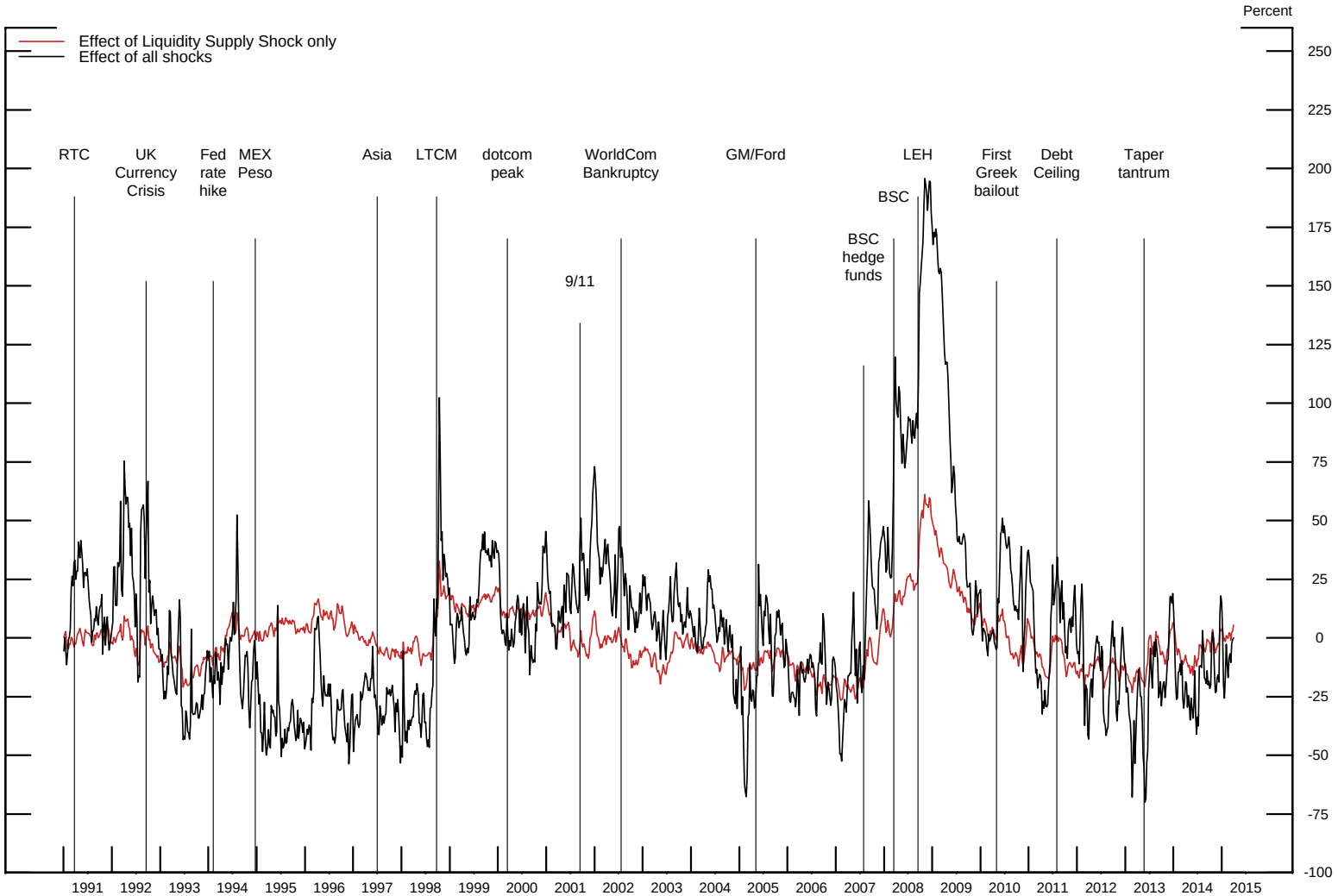
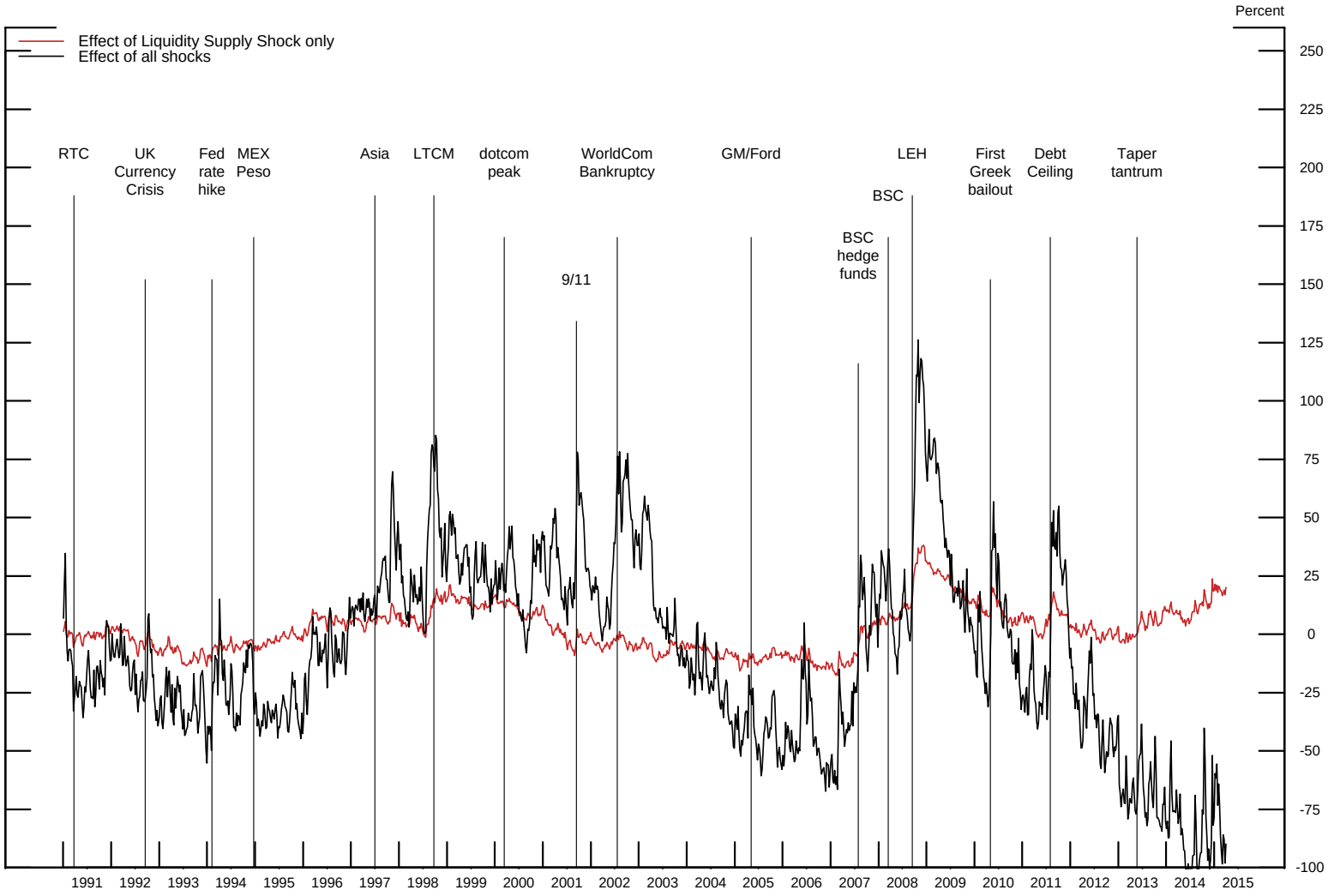
Cumulative sum of shocks



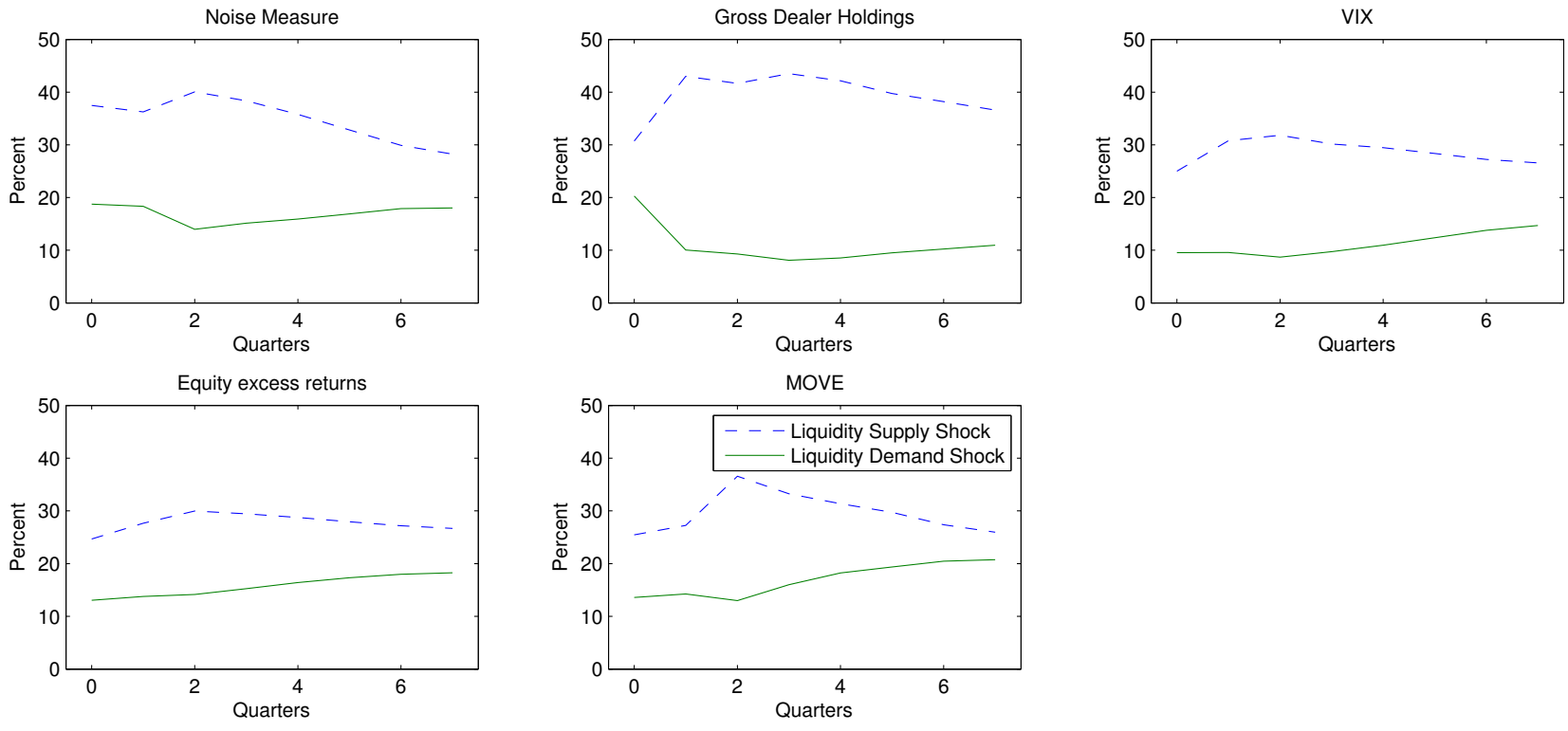
Cumulative effect on noise



Cumulative effect on VIX



Forecast error variance decomposition



Business cycles

$$\Delta x_{t_m} = \alpha_0 + \sum_{i=0}^{I} \theta_{s,i} v_{s,t_m - i} + \epsilon_{s,t_m}$$

$$\rho(L)\epsilon_{s,t_m} = \zeta_{s,t} \sim_{i.i.d.} N(0, h_s^{-1})$$

Identification

- No feedback within a given month from Δx_{t_m} to v_{s,t_m}

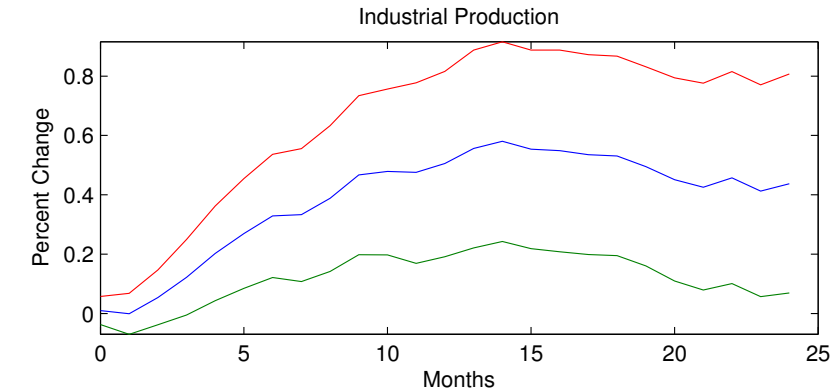
Business cycles

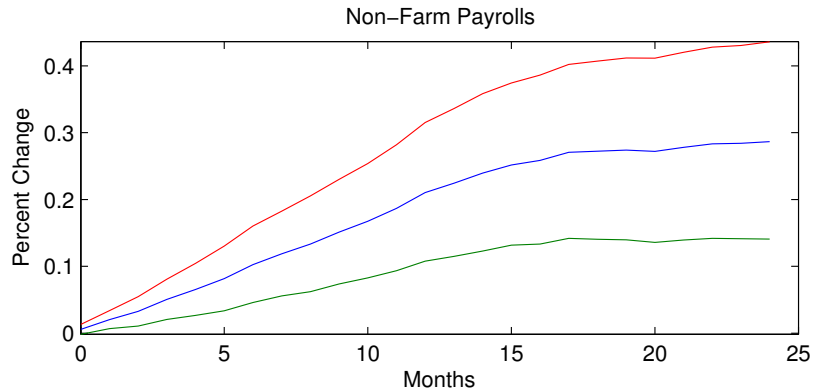
Estimation

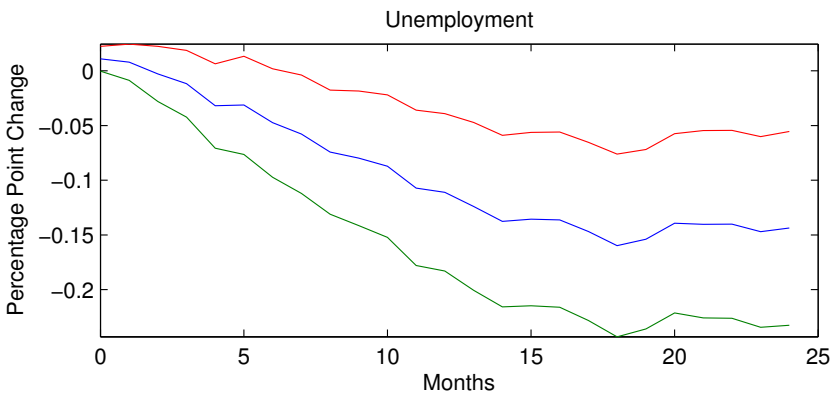
- Takes into account regressors are generated
- Unified Bayesian approach

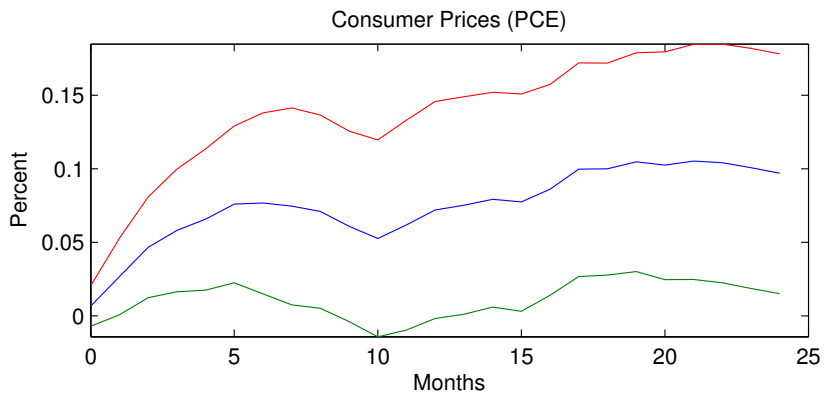
Business cycles

Impulse responses to supply shock

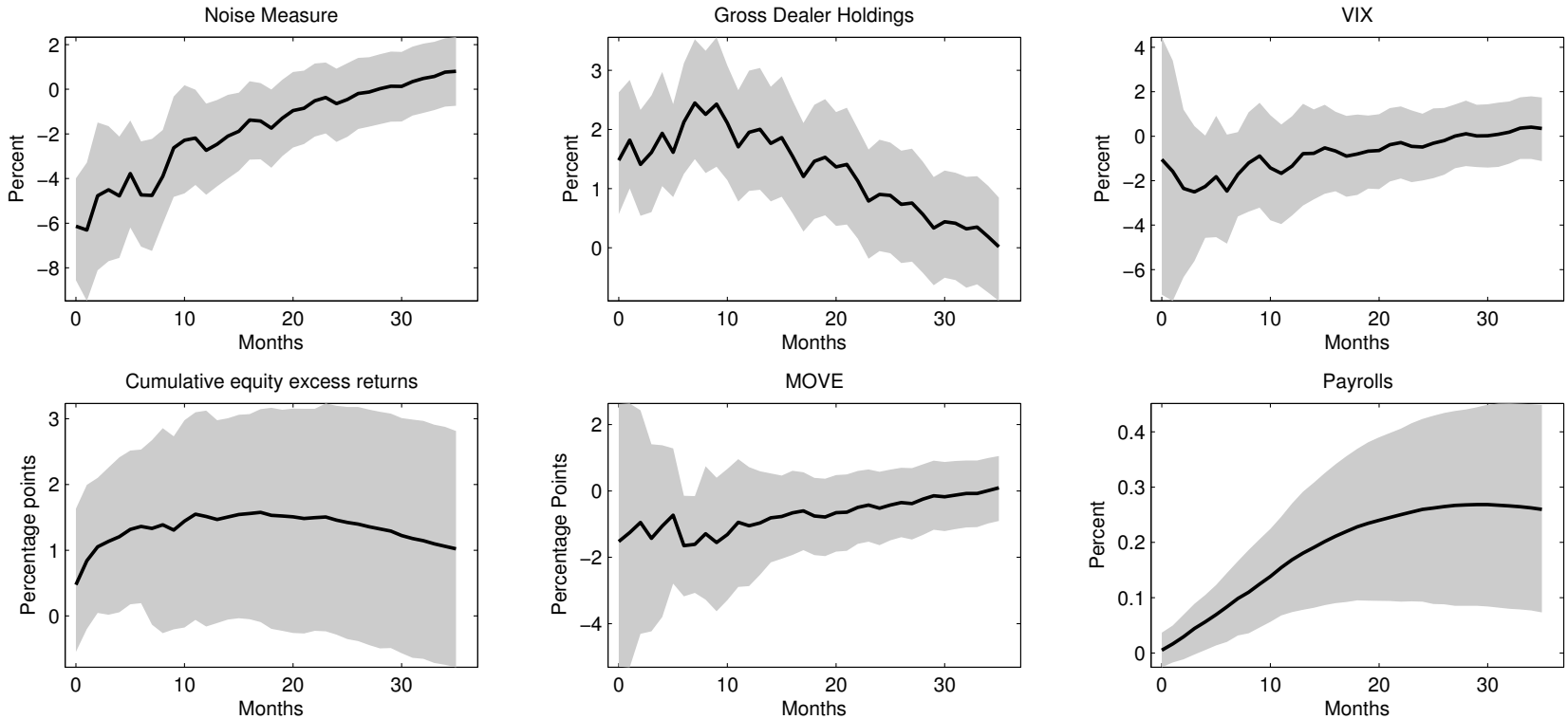








Robustness



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Conclusion

New method for identifying shocks to the supply of intermediation by broker dealers

- Improves on previous methods including recursively identified VARs

Liquidity supply shocks have important effects on real activity, inflation, asset prices

Normative conclusions require macro models with financial sector

- Approach in this paper can potentially discipline models