

Corporate Debt Structure and Unconventional Monetary Policy in the United States¹

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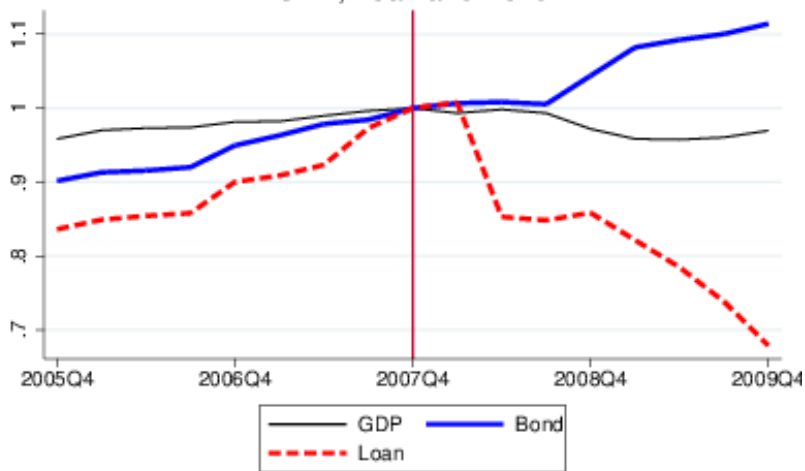
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¹This presentation reflects the opinions of the authors and does not necessarily express the views of the Banque de France or the Eurosystem.

Motivation

- The composition of corporate credit has profoundly changed since the fall of 2008.
 - Bank loans to non-financial corporations declined while corporate bonds issuance increased (Adrian et al., 2013)
- At the same time, the Fed implemented unconventional monetary policies (UMP) to improve firms' financing conditions and stimulate the real economy.
- Research questions:
 - Did unconventional monetary policies play a role in the substitution from bank financing to bond financing?
 - Did unconventional monetary policies affect aggregate activity through an easier access to corporate bond markets?

GDP, Loan and Bond



Deviations with respect to US peak (2007Q4).
Series are normalized to 1 at the peak period

*Grjebine, Szczerbowicz and Tripier, 2017

Challenge: identification of UMP shock

- The previous literature measures the impact of UMP policies using zero-sign restrictions VAR that requires identifying assumptions (Weale and Wieladek (2016), Boeckx et al. (2017)).
- VAR model with external instruments use short-term policy indicator and instruments capturing mostly conventional monetary policy effects (Karadi and Gertler, 2015)
- We adapt a VAR model with external instruments to capture *unconventional* monetary policy effect:
 - Policy indicator: 5-year real rate (reflects UMP stance)
 - Instrument: daily changes of 5-year real rate around FOMC announcements and Fed's officials' speeches.

Results

- UMP implies an increase in the corporate bond issuance, but a slight decline in bank loans to NFC in the short run.
- Mechanisms of monetary transmission:
 - Financial intermediaries increase their holdings of risky securities, in detriment of government bond holdings and lending to NFC - financial intermediaries search for higher returns, thus affecting asset prices.
 - Borrowing costs for non-financial corporations in bond market fall sharply: issuance of corporate bonds increases.
- On the macroeconomic side, UMP are followed by increase in output, prices, consumption and investment.

Literature

- Effects of the Fed's unconventional measures on corporate bonds markets
 - Krishnamurthy and Vissing-Jorgensen (2011), Wright (2012), Gilchrist and Zakrajsek (2013), and Altavilla and Giannone (2017): UMP reduced yields and risk premia on long-term corporate bonds.
 - Lo Duca, Nicoletti, and Vidal Martinez (2016): UMP increased corporate bond issuance worldwide.
- Macroeconomic effects of unconventional measures in an identified VAR framework
 - Baumeister and Benati (2013), Gambacorta, Hofmann, and Peersman (2014) and Weale and Wieladek (2016).

Contributions

- Identification method that is better-suited to measure unconventional monetary policy effects.
- Focus on debt structure: we provide evidence on the role of U.S. monetary policy in the firms' substituting away from bank loans towards bond issuance.
- We show that unlike conventional MP, UMP stimulate the substitution between loans and bonds through their impact on longer-term corporate bond markets conditions.

Identification strategy

- Identification strategy combines event-study methodology and VAR with external instruments (Gertler and Karadi, 2014).

VAR Identification

- Reduced form model:

$$y_t = \sum_{i=1}^{\rho} B_i y_{t-i} + C_y + v_t, \quad t = 1, \dots, T$$

$$v_t = A\varepsilon_t$$

- $\varepsilon_t = [\varepsilon_t^1, \varepsilon_t^2]$ where ε_t^1 represents exogenous variations in the policy indicator, and ε_t^2 the remaining structural shocks.
- We use external instruments to identify A^1

VAR Identification: external instruments

- We identify UMP using external instrument z_t (Stock and Watson (2012) and Mertens and Ravn (2013)).
- The instrument must be correlated with the unconventional monetary policy ε_t^1 but uncorrelated with all other structural shocks ε_t^2 :

$$E [z_t \varepsilon_t^1] = \psi$$

$$E [z_t \varepsilon_t^2] = 0$$

- To identify variation in v_t^1 due to ε_t^1 , we regress v_t^1 on z_t .

External instruments for UMP shocks

- We choose the best policy indicator (i.e., the "unconventional policy relevant" interest rate) and its instrument in two steps:
 - First, we measure the financial market reactions to the Federal Reserve's announcements using event-based regressions.
 - Second, we examine the response of reduced-form residuals of different policy indicators from the monthly VAR to potential instruments.

HF External Instruments: Event-based Regressions

- We run the event-based regressions to measure the impact of the Fed's UMP announcements on financial markets (02/07/2007 - 31/12/2017, daily)

$$\Delta y_t = \alpha + \beta UMP_t + \sum_{n=1}^N \psi_n \Delta S_{t-n}^M + \sum_{l=1}^7 \psi_l D_{l,t} + \epsilon_t$$

Δy_t is a 1-day change in a financial asset price;

$UMP_t = 1$ on the days of UMP announcements;

ΔS_{t-n}^M are lagged values of dependent variable;

$D_{l,t}$ are dummies for the day of the week (Monday, Tuesday...);

ϵ_t is a stochastic error term.

- The **longer-term interest rates and MBS spreads** reacted the most to the Fed's announcements (potential external instruments).

Financial Markets Responses to UMP announcements

Dependent variables	Coefficient	Standard error	R-squared
2y Treasuries	-0.06***	0.02	0.02
5y Treasuries	-0.14***	0.04	0.03
10y Treasuries	-0.15***	0.04	0.03
30y Treasuries	-0.10***	0.03	0.02
2y TIPS	-0.11***	0.04	0.05
5y TIPS	-0.16***	0.04	0.05
10y TIPS	-0.16***	0.04	0.04
2y Break-evens	0.04*	0.02	0.07
5y Break-evens	0.02	0.02	0.04
10y Break-evens	0.00	0.01	0.02
2y Interest rates expectations	-0.03*	0.02	0.01
5y Interest rates expectations	-0.04**	0.02	0.01
10y Interest rates expectations	-0.04**	0.02	0.01
2y Term premium	-0.04***	0.01	0.01
5y Term premium	-0.10***	0.03	0.03
10y Term premium	-0.12***	0.04	0.02
15y MBS Spread	-0.06*	0.03	0.01
20y MBS Spread	-0.11***	0.04	0.03
30y MBS Spread	-0.21***	0.07	0.05

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

Policy Indicator and Policy Instrument

- Since the ZLB, short-term interest rates is no longer representative of MP stance. We consider several medium-long term interest rates as an UMP stance to include in the VAR.
- We regress residuals of potential monetary stance on potential external instruments to verify that they explain the residuals.
- We rely on the statistic tests of Stock, Wright, and Yogo (2002) to single out the interest rates that do not suffer from weak instrument problem.
- As a result, we include **5 year real interest rate as an indicator of the UMP stance and we use its changes around FOMC announcements as an external instrument** in the VAR analysis.

Effects of HF instruments on 1st stage VAR residuals

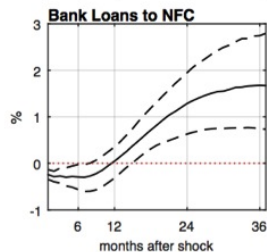
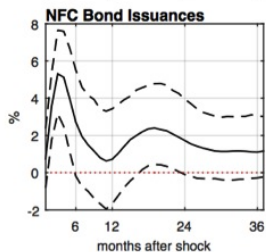
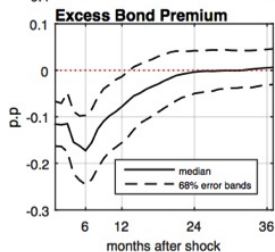
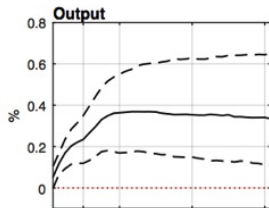
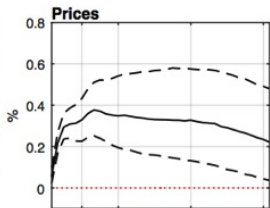
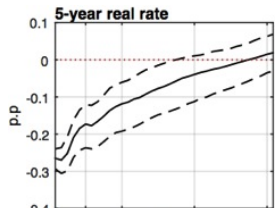
	Nom5y	Nom10y	Real5y	Real10y	MBS S_30y
S_Nom5y	0.860*** (0.194)				
S_Nom10y		0.769*** (0.205)			
S_Real5y			1.256*** (0.218)		
S_Real10y				0.839*** (0.188)	
S_MBS Spread_30y					0.557*** (0.154)
Observations	95	95	95	95	95
R-squared	0.175	0.132	0.263	0.177	0.123
F test model	19.75	14.10	33.11	20.01	13.03

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

VAR with external instruments: Data

- Sample period 2008:M6 - 2016:M8, monthly data, 4 lags.
- Benchmark VAR:
 - GDP
 - Prices
 - Excess Bond Premium
 - Bonds issued by non-financial corporations (six-month moving average)
 - Bank loans to non-financial corporations
 - Policy indicator: 5-year real interest rate

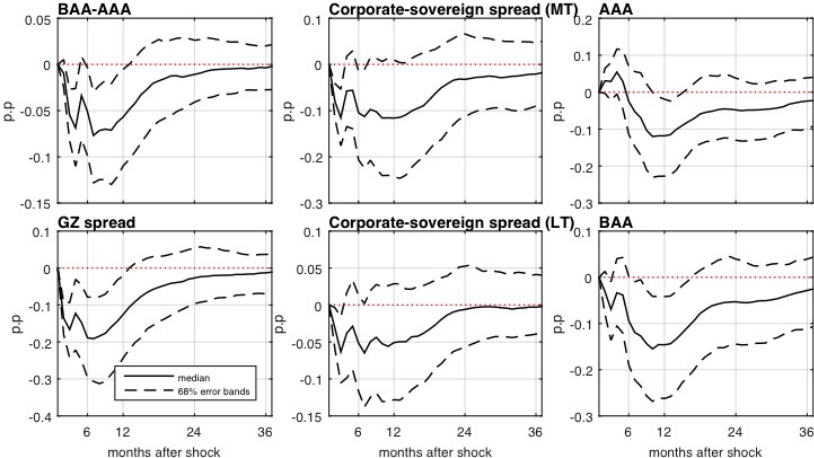
Benchmark



Bond markets

- Additional variables: Corporate bond markets
 - BAA-AAA spread, GZ spread, Corporate-sovereign spreads (medium and long-term), AAA and BAA corporate yields
- Corporate bond yields diminish more than the corresponding sovereign yields ("default risk channel" of UMP Krishnamurthy and Vissing-Jorgensen, 2011)
- Lower-rated bonds yields diminished more than the higher-rated bonds yields ("reach for yield", Foley-Fisher, Ramcharan, and Yu, 2016).

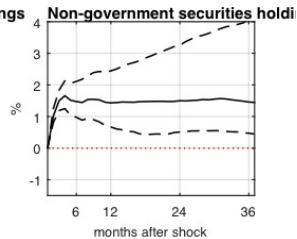
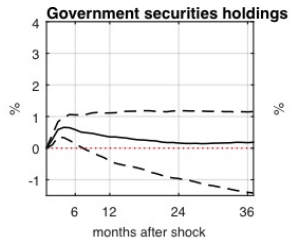
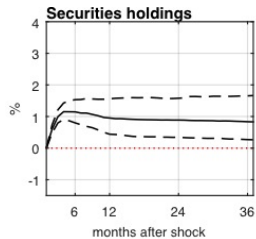
Bond markets



Bank securities holdings

- Additional variables: Bank balance sheets
 - All securities, Government and Non-government securities holdings
- Financial intermediaries accumulate riskier assets following the expansionary UMP shock ("portfolio-balance" effect)

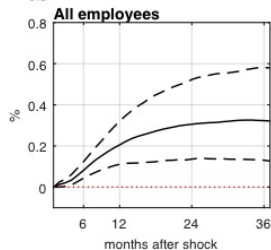
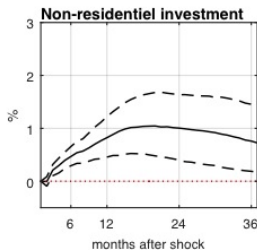
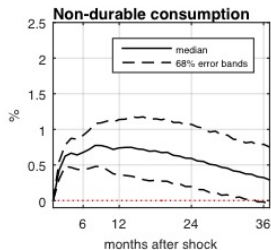
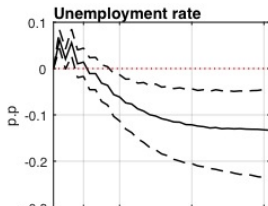
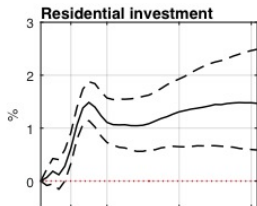
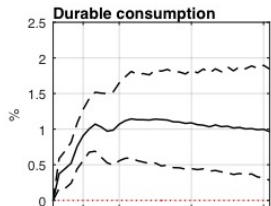
Bank securities holdings



Additional macroeconomic variables

- Additional macroeconomic variables
 - Durable and Non-durable consumption, Residential and Non-residential investment, Unemployment
- Durable and non-durable consumption both increase, but the former to a bigger extent
- Residential and non-residential investment go up, with a higher impact on the former
- The unemployment rate falls

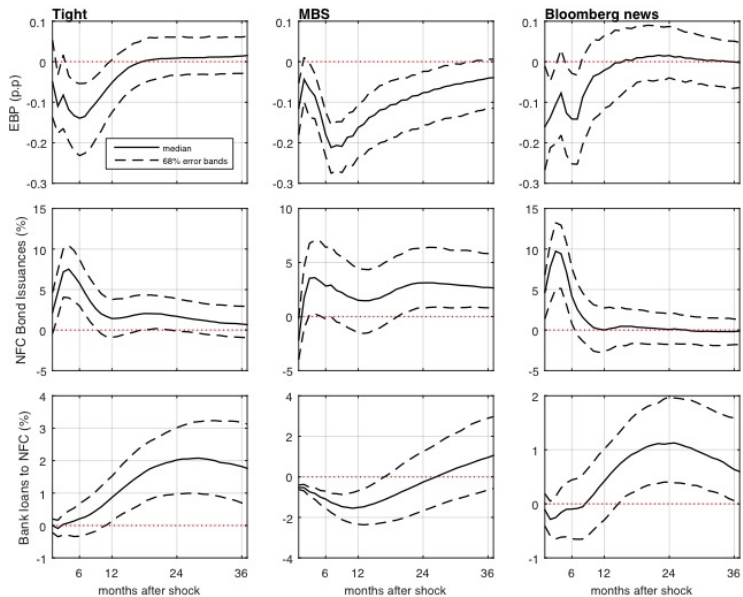
Macroeconomic Variables



Robustness checks

- What if Fed's announcements were anticipated?
 - We use the number of Bloomberg news concerning the U.S. quantitative easing as a proxy for the market expectations about the program being implemented.
- What if some other news occurred on the same day?
 - We narrow down the event window from one day to 30 minutes around the announcement.
- What if 5-year real interest rate is not the only measure of monetary policy stance?
 - We use the 30-year MBS spread as a measure of monetary policy stance and instrument.

Robustness



Conclusions

- There has been a shift in the corporate debt composition since the fall of 2008 in the United States.
- We have examined the effect of UMP on the bond-loan substitution using the VAR model identified with an external instrument.
- Accommodative monetary policy shock
 - contributes to the shift in the corporate debt composition from bank loans to bonds.
 - reduces yields and spreads on corporate bonds and boosts investors' appetite for risky securities.
 - increases output, prices, consumption and investment, and decreases unemployment.