Introduction
What do we do and what do we find?

**Question:** Does aggregate stock market liquidity help to predict future bond returns above and beyond the usual term structure and macro factors?
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**Approach:** We regress future excess bond returns on aggregate stock market liquidity.
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**Question:** Does aggregate stock market liquidity help to predict future bond returns above and beyond the usual term structure and macro factors?

**Approach:** We regress future excess bond returns on aggregate stock market liquidity.

**Main finding:** stock market liquidity significantly predicts excess bond returns

- controlling for both *yield curve* and *macro* information (forwards and Cochrane-Piazzesi factor for yield curve, Ludvigson-Ng factors for macro)
- small sample inference based on bootstrap
- out-of-sample forecasting tests
- yearly and monthly bond returns
- effect economically significant (45 bps on annual returns)
What do we know?

Excess bond returns related to yields

- $n$-year forward rate - one-year-yield (Fama and Bliss, 1987)
- treasury yield spreads (Campbell and Shiller, 1991)
- linear combination of 5 forward spreads (Cochrane and Piazessi, 2005)
What do we know?

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Excess bond returns related to macroeconomic information

- macro variables have information about future bond excess returns (Ludvigson and Ng, 2009; Cooper and Priestly, 2009)
- latent component negatively related to economic activity (Duffee, 2011a)
Why equity market liquidity? I

We examine different potential explanations.
Why equity market liquidity? I

We examine different potential explanations.

Bond liquidity:
- commonality in bond and stock liquidity (Chordia, Sarkar and Subrahmanyam, 2005)
- maybe stock liquidity is proxying for a bond liquidity premium
- we find no empirical support
Why equity market liquidity? I

We examine different potential explanations.

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**Market-wide private information:**
- Albuquerque *et al.* (2008): market-wide private information can forecast industry stock returns and currency returns
- Amihud liquidity measure captures private information (Brennan *et al.*, 2011).
- we find no empirical support for our liquidity measure capturing private information
Why equity market liquidity? II

Flight to liquidity & Flight to safety

- investor flee to safer and more liquid assets during economic uncertainty

  theoretical work
  - uncertainty about investors preferences and time-varying risk aversion (Gallmeyer et al., 2005 and Saar, 2006)
  - liquidity is a forward-looking measure for risk preferences

  empirical work
  - flight to liquidity tend to precede flight to safety (Connolly, Stiversa and Suna (2005), Underwood (2009) and Beber, Brandt and Kavajecz (2009))
  - leading information in stock market liquidity is consistent with flight to liquidity and flight to safety (Næs, Skjeltorp and Ødegaard, 2011)

- consistent with our empirical findings
Why equity market liquidity? III

Macro channel

- shock to market liquidity has impact on macroeconomy, cost of capital and investments
- theoretical work
  - models with funding and resaleability constraints: Kiyotaki and Moore (2008) and Brunnermeier and Pedersen (2009)
  - Eisfeldt (2005): model with endogenous liquidity linked to productivity
  - lower liquidity induces lower investments
- empirical work
  - market liquidity affects cost of capital (Skjeltorp and Ødegaard, 11; Lipson and Mortal, 09)
  - relation between cost of capital and risk premia through investment channel (Lettau and Ludvigson, 02)
  - consistent with theoretical above models: Aggregate stock market liquidity $\rightarrow$ macro. Stock market liquidity is a leading indicator for business cycle (Næs, Skjeltorp and Ødegaard, 2011)
- consistent with our empirical findings
Contribution

Bond modelling literature

- show that equity market liquidity contains info for bond excess returns
- join others in showing that info beyond bond yields is important
- examining alternative explanations, finding support for a flight-to-quality channel and a macro channel
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Link between bond and stock markets
- provide evidence that stock and bond mkts potentially driven by common liquidity factor
- inform theoretical work on the topic (Koijen et al., 06; Lettau and Wachter, 11)
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Macroeconomics
- provide empirical support for literature on macroeconomics with financial frictions and market microstructure models with endogenous liquidity
Data

Fama-Bliss US Treasury Bonds

- Fama-Bliss yields, end-of-month, January 1964 - December 2008
- maturities: 1, 2, 3, 4, 5 years
- log one-year monthly excess returns $r_{xt}$ - overlapping observations

Fama Bond Portfolios

- Fama bond portfolio yields, end-of-month, January 1964 - December 2008
- maturities: <1, 1-2, 2-3, 3-4, 4-5, 5-10 years
- log monthly excess returns

Ludvigson-Ng macro factors

- 9 factors extracted from 132 monthly macro series
Data

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Ludvigson-Ng macro factors
- 9 factors extracted from 132 monthly macro series
Measure of stock market liquidity

- Amihud (2002) illiquidity ratio $\frac{1}{N} \sum_{t=1}^{N} \left( \frac{|r_t|}{VOLUME_t} \right)$
- monthly, CRSP common shares listed at NYSE, averaging over stocks
- detrending using log yearly change
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Two measures

- \( D_{12}ILR \): average over all stocks
- \( D_{12}ILRSMB \): average of small stocks minus average of big stocks
Excess bond returns

log excess return of $n$ year bond: \[ r_x^{(n)}_{t+1} = p_{t+1}^{(n-1)} - p_t^{(n)} - y_t^{(1)} \]
Excess bond returns

log excess return of $n$ year bond: $r_{x_{t+1}}^{(n)} = p_{t+1}^{(n-1)} - p_{t}^{(n)} - y_{t}^{(1)}$

equally weighted bond excess return: $\overline{rx}_{t+1} = \frac{1}{4} \sum_{n=2}^{5} r_{x_{t+1}}^{(n)}$
Excess bond returns

log excess return of $n$ year bond: $r_{x_{t+1}}^{(n)} = p_{t+1}^{(n-1)} - p_t^{(n)} - y_t^{(1)}$

equally weighted bond excess return: $\bar{r}_{x_{t+1}} = \frac{1}{4} \sum_{n=2}^{5} r_{x_{t+1}}^{(n)}$

Creating the CP factor

\[
\bar{r}_{x_{t+1}} = \gamma'X_{t}^{CP} + \bar{\varepsilon}_{t+1},
\]

\[
X_{t}^{CP} = [1, y_t^{(1)}, f_t^{(2)}, \ldots, f_t^{(5)}]
\]
Excess bond returns

log excess return of \( n \) year bond: 
\[
r_{x,t+1}^{(n)} = p_{t+1}^{(n-1)} - p_t^{(n)} - y_t^{(1)}
\]
equally weighted bond excess return: 
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\]

- Creating the CP factor

\[
\overline{r}_{x,t+1} = \gamma' X_{t}^{CP} + \varepsilon_{t+1},
\]  

\[
X_{t}^{CP} = [1, y_t^{(1)}, f_t^{(2)}, \ldots, f_t^{(5)}]
\]

- Creating the LN factor

\[
\overline{r}_{x,t+1} = \delta' X_{t}^{LN} + \varepsilon_{t+1},
\]  

\[
X_{t}^{LN} = [1, LNF_{1,t}, \ldots, LNF_{9,t}]
\]
Econometric issues

- monthly observations of yearly returns → overlapping observations
- Newey-West MA(18) standard errors
- bootstrapped standard errors - small sample bias
Excess bond returns & Stock market liquidity

Correlation = 0.28
'Canonical Regression'

Table: \( r x_{t+12} = \beta'X_t + \varepsilon_{t+12}^{(n)} \)

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Adj. \( R^2 \) 0.41 0.40

Bouwman, Sojli, Tham (EUR)

Stock Market Liquidity and Bond Risk Premiums

Frankfurt – May 4, 2012
In-sample - Average equally weighted portfolio

Table: Yearly portfolio

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## Table: Monthly portfolio

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## In-sample regressions - Yearly portfolios

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<td>CP</td>
<td>0.315 (0.00)</td>
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<td>$D_{12}ILR$</td>
<td>0.006 (0.03)</td>
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Out-of-sample forecasts - Yearly portfolios

- out-of-sample period December 1979 - December 2008
- moving estimation window of 15 years
- Giacomini-White (2006) (GW) test for equal predictive ability
- Clark-West (2007) (CW) test for equal predictive ability
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<table>
<thead>
<tr>
<th>Average Return</th>
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## Out-of-sample forecasts - Monthly portfolios

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Empirical findings on explanations I

Bond liquidity:

- we include a bid-ask spread measure of bond liquidity in the predictive regressions.

- finding: bond liquidity is insignificant and does not affect predictive power of stock market liquidity.
Empirical findings on explanations I

Bond liquidity:
- we include a bid-ask spread measure of bond liquidity in the predictive regressions.
- finding: bond liquidity is insignificant and does not affect predictive power of stock market liquidity.

Market-wide private information:
- we include in our predictive regressions measures of market-wide private information proposed by Albuquerque et al. (2008)
- finding: market-wide private information significantly predict bond returns, but do not affect the predictive power of stock market liquidity.
Empirical findings on explanations II

**Flight to liquidity & Flight to safety**

- flight-to-quality → portfolio shift out of equity into Treasuries and money market funds
  - we look at net exchange flows inequity mutual funds and money market funds
  - finding: stock market illiquidity is strongly comoves with flows in money market funds and out of equity funds.
  - we also look at the holdings of balanced funds and find that stock market illiquidity comoves with a shift from equities into bonds

- VIX/VXO as a proxy of flight to quality (Bekaert et al., 2010, Bailey and Stulz, 1989)
  - we regress VXO on lagged stock market liquidity
  - finding: liquidity significantly predicts future VXO
  - all in all our findings are consistent with a flight-to-quality story
Empirical findings on explanations III

Macro channel

- shock to market liquidity has impact on macroeconomy, cost of capital and investments

- we regress real private fixed investments on lagged liquidity (Skjeltorp and Ødegaard, 2011)

- finding: a decrease in liquidity significantly predicts a decrease in investments
Conclusion

- we find evidence that information in stock market liquidity contains predictive information for excess bond returns above and beyond information in the yield curve and macroeconomic variables

- findings consistent with flight-to-liquidity/flight-to-quality and macro story