Global Liquidity, Risk Premiums and Growth Opportunities

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Liquidity: an elusive concept?

- **Before August 2007:**
  "the global economy is awash with liquidity"

- **After:**
  "Liquidity is an illusion.....It’s always there when you don’t need it, and rarely there when you do"
  
  Michael Milken (WSJ August 27, 2007)
There has been progress in modeling/measuring liquidity

- Incomplete markets macro GE modeling framework (e.g. Kiyotaki and Moore, 2008)
- Role of financial institutions’ balance sheets (e.g. Adrian and Shin (2007, 2008), Berger and Bouwman (2007))
Yet...

- most of the empirical literature has focused primarily on U.S. markets using data seldom available in other countries.
- no study has explicitly documented changes in markets liquidity as a structural development, possibly related to advances in financial integration
- we wish to make 3 contributions to the literature
Contribution 1: Construct new indicators

- Based on basic finance theory using readily available market price data
- Likely better than other measures
- Document their evolution and co-movements (30 countries, equity, bond and money markets)
- Construct measures of global systemic liquidity shocks and document their evolution
Contribution 2: Assess if they are risk factors of some spreads

- advanced economies (spreads: 10-year bond yield – short term rate)
- emerging markets (EMBI spreads)
Contribution 3: Assess their real effects

- Are improvements in liquidity associated with better countries’ growth opportunities?

- In De Nicolò and Ivaschenko (IMF WP, 2008) we found that financial integration improves market liquidity.
Results (1)

- Liquidity appears to have increased in all countries and markets.
- Co-movements between liquidity indicators across markets and countries have become stronger.
- Incidence of global systemic liquidity shocks has increased.
Results (2)

- Liquidity indicators appear to be important determinants of bond and EMBI spreads.

- Global indicators have significant explanatory power for spreads, consistent with the increases in sensitivity of risk premiums to global risk factors.
Domestic as well as global liquidity indicators are significant determinants of price-earnings ratios in most countries.

This also supports the conjecture we made in the earlier paper:

- liquidity is one of the channels through which the benefits of financial integration are translated into better growth opportunities.
Plan

- A simple model
- Measurement
- Evidence
Three desiderata for constructing liquidity indicators

- should be rooted in basic finance theory
- easily computable for a large set of asset classes and markets
- capture liquidity of a market rather specific assets in a market (Rahi and Zigrand (2008) show the overall (welfare) benefits of market liquidity may be best identified at a market level
Measurement is derived from a simple model of liquidity

- The model is a variation of Hausbruck’s (2007), which embeds adverse selection costs (as in Kyle (1985)) in Roll’s (1984) model of effective bid-asks spreads.

- It delivers a measure of market liquidity based on a set of return auto-covariances within a given investment horizon.
A Simple Model

• $q(t)$ is the trading direction: +1 buy, -1 sell
• The laws of motion of the fundamental price $V$ and the trading prices $P$ are given by:

\[ V_t = V_{t-1} + \lambda_t q_t + \sigma_t \epsilon_t \]

\[ P_t = V_t + c q_t \]
Returns and auto-covariances

- The date $t$ return is given by:

$$R_t \equiv P_t - P_{t-1} = \lambda_t q_t + \sigma_t \varepsilon_t + c(q_t - q_{t-1})$$

- Covariance of returns between $t$ and $t-k$

$$\text{cov}_t(R_t, R_{t-k}) = \lambda^2 E q_t q_{t-k} + \lambda c(E q_t(q_{t-k} - q_{t-k-1}) + E q_{t-k}(q_t - q_{t-1})) + c^2 E(q_t - q_{t-1})(q_{t-k} - q_{t-k-1})$$
The covariance of the trading direction can be different from 0

- If \( Eq_t q_{t-k} \neq 0 \)
- then the return covariances interact with the size of illiquidity of a particular asset or market (also driven by a given liquidity shock if it evolves randomly).

- Note:

\[
\text{var}_t(R_t) = \lambda_t^2 + \sigma_t + (1 - Eq_t q_{t-1})2c(\lambda_t + c)
\]

\[
\text{var}_t(VR_t) = \lambda_t^2 + \sigma_t
\]
The sum of returns at each trading day $K$ equals the monthly return

$$R_t = \sum_{s \in K} R_s$$

$$\text{var}_t(R_t) = \sum_{s \in K} \text{var}_t(R_s) + 2 \sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)$$
The Liquidity Indicator

\[ L_t = \frac{2\left( \sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_- \right) + \sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_+)}{\sum_{s \in K} \text{var}_t(R_s) + 2\left( \sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_- \right) + \sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_+)} \]
Advantages of this measure

- Easy to compute
- It captures liquidity effects embedded in the entire autocovariance structure of within-period (month) returns
- It allows for time varying variances and covariances of returns
Computation

- Step 1: Fit GARCH(1,1) on daily data
- Step 2: Use estimated variances and covariances to compute 20x19 autocovariances over a 60 days window
- Step 3: Separate positive and negative auto-covariances, and compute the indicator
Data

- Daily value-weighted price indexes/returns for all available equity, government bond and money markets in 30 countries
- Period: mid-80s-September 2007
Dynamics and co-movements

- Liquidity indicators exhibit significant fluctuations and track episodes of market turbulence very well (Figures 1-5).

- \( L(\text{equity}) < L(\text{bond}) < L(\text{money market}) \)
Fig. 1: Global Liquidity Indicators

Equity Markets

Equity and Government Bond Markets

Government Bond and Money Markets
Fig. 2: G-7 Equity and Bond Liquidity Indicators

Equity (left) and Bonds (right)
Has market liquidity increased world-wide?

- Yes (Table 1: AR(1) process with time trend, Figure 7)

- Correlations within and across countries are high (Figure 8)
Have co-movements become stronger over time?

- Yes for equity markets
- Yes, for bond markets too, but evidence is weaker (Table 1)
An indicator of global systemic liquidity shocks

- Fraction of countries whose market had the liquidity indicator greater than the 90% percentile.

- The potential for liquidity shock contagion across markets has increased.
Fig. 9: Indicators of Global Systemic Liquidity Shocks

**Stock Markets**

![Graph of Stock Markets](image)

**Equity and Bond Markets**

![Graph of Equity and Bond Markets](image)
Liquidity and bond spreads (tables 4 and 5)

- A simple “factor model” for bond spreads and EMBIs
- Global liquidity indicators are significant determinants of bond premiums
- Changes in liquidity of a market relative to another market are significant (opposite sign)
Liquidity and PE ratios (table 6)

- National as well as global liquidity indicators are significant determinants of price-earnings ratios in advanced countries.
- Only global liquidity indicators are significant determinants of price-earnings ratios in emerging economies.
- Financial integration improves market liquidity. In turn, market liquidity improves countries’ growth opportunities.
Summary

- Market liquidity has improved worldwide, in part driven by financial integration, but economies have been increasingly exposed to liquidity shocks.
- Historical declines in risk premiums in part due to lower liquidity premia.
- **Real effects**: growth opportunities enhanced by improvements in market liquidity.
Open question

- Does the current turmoil represent a temporary reversal of progress in market liquidity witnessed in the past 15 years....
- Or is it a more permanent break?
End