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# Global Liquidity, Risk Premiums and Growth Opportunities

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# 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)
- liquidity premiums and risk (e.g. Morris and Shin, 2003, Pastor and Staumbagh, 2003, Acharya and Pedersen, 2005, Brunnermeier and Pedersen, 2007)
- 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 sensitivity of risk premiums to global risk factors.

## Results (3)

- 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:

$$V_t = V_{t-1} + \lambda_t q_t + \sigma_t \varepsilon_t$$

$$P_t = V_t + c q_t$$

# 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  $E q_t q_{t-k} \neq 0$
- 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: 
$$\text{var}_t(R_t) = \lambda_t^2 + \sigma_t + (1 - E q_t q_{t-1}) 2c(\lambda_t + c)$$

$$\text{var}_t(VR_t) = \lambda_t^2 + \sigma_t$$

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

$$L_t = \frac{2(|\sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_-| + \sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_+)}{\sum_{s \in K} \text{var}_t(R_s) + 2(|\sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_-| + \sum_{i,j \in K, i \neq j} \text{cov}_t(R_i, R_j)_+)}$$

# 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

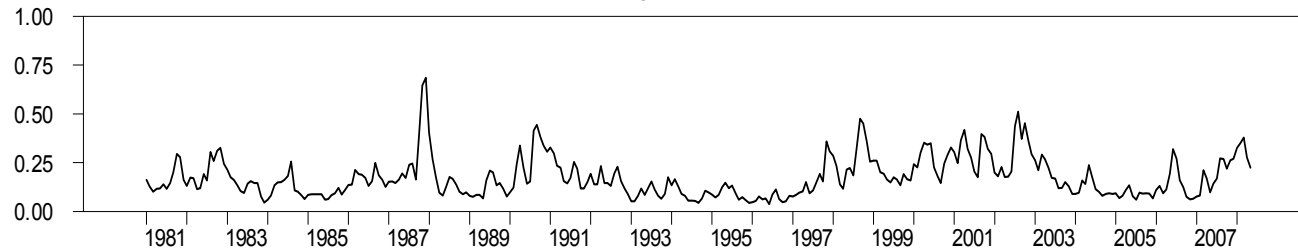
- Daily value-weighted price indexes/returns for all available equity, government bond and money markets in 30 countries
- Period: mid-80s-September 2007

# Dynamics and co-movements

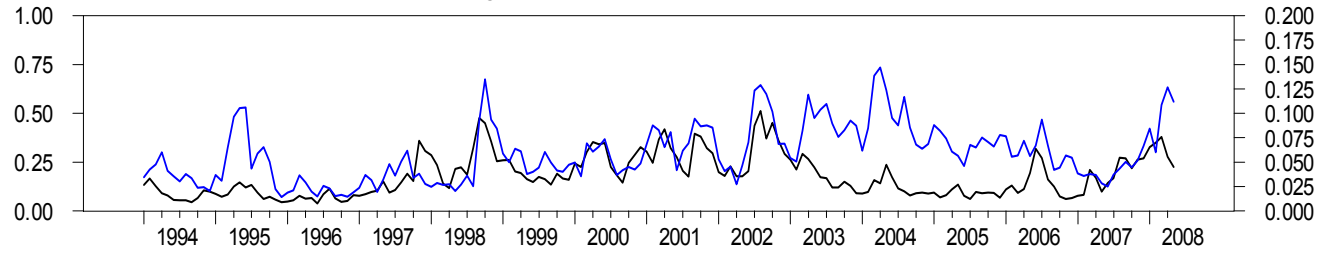
- Liquidity indicators exhibit significant fluctuations and track episodes of market turbulence very well (Figures 1-5).
- $L(\text{equity}) < L(\text{bond}) < L(\text{money market})$

# Fig.1: Global Liquidity Indicators

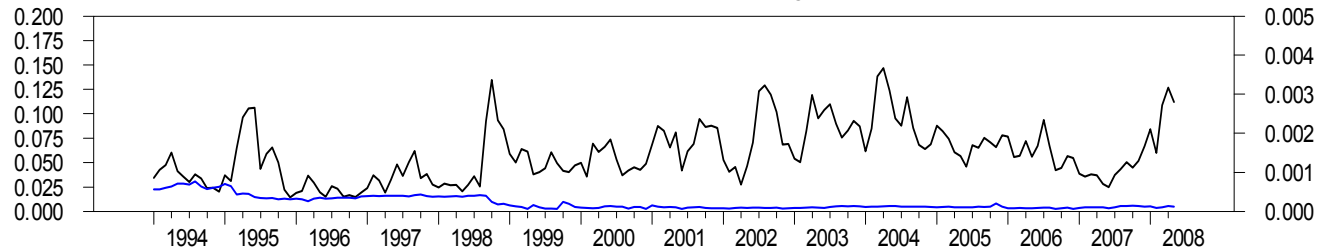
## Equity Markets



## Equity and Government Bond Markets



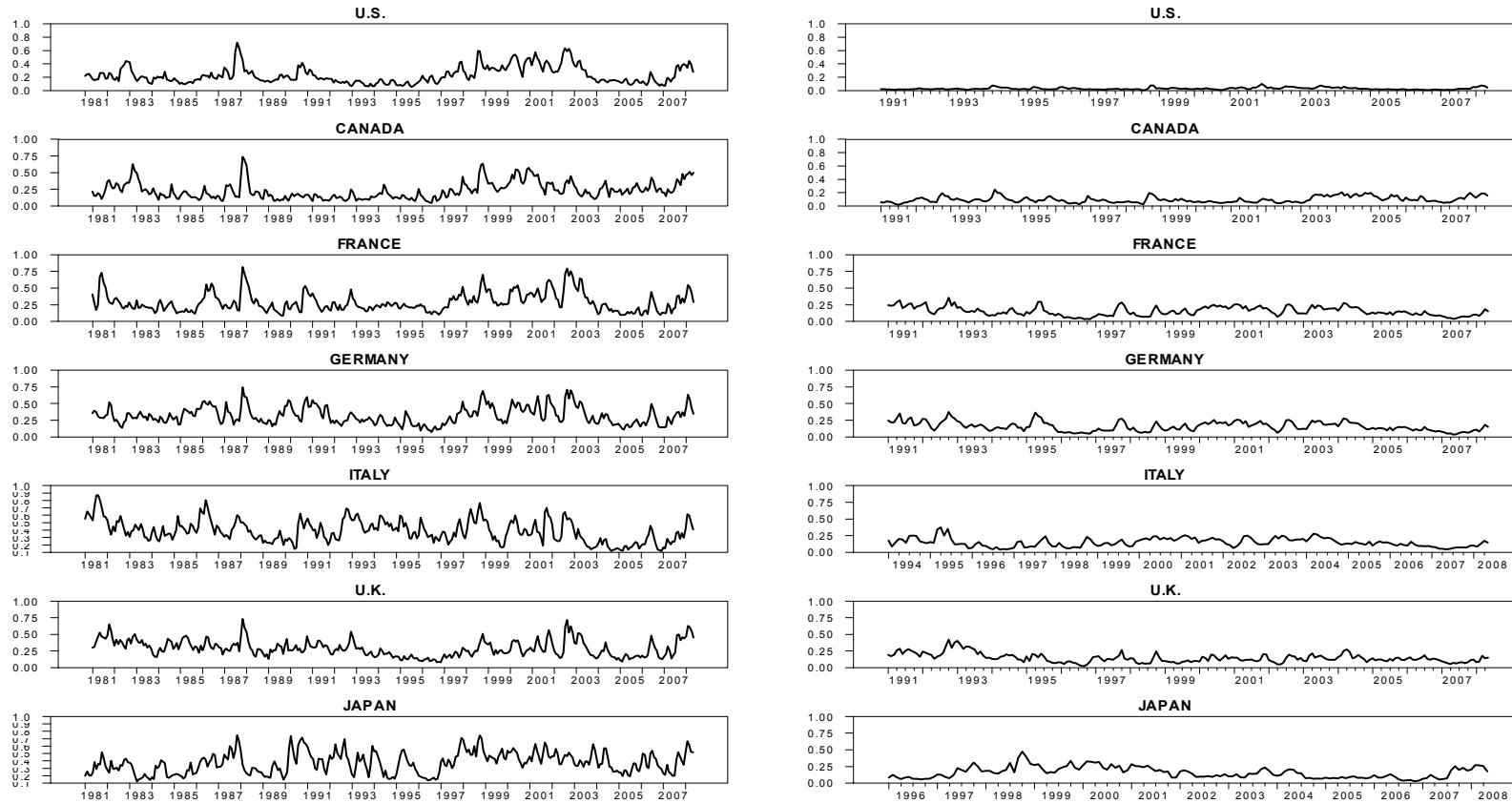
## Government Bond and Money Markets





## 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)

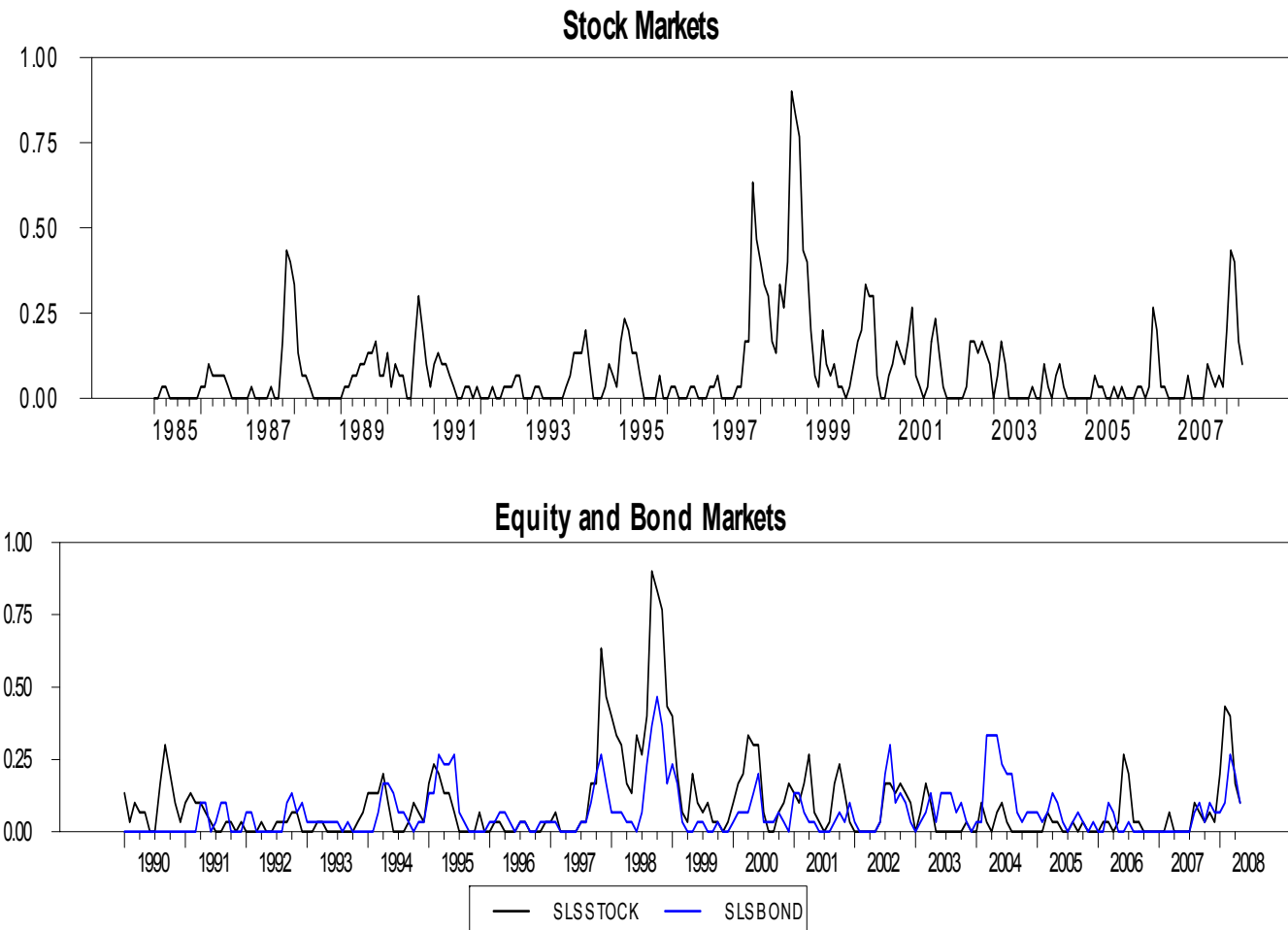
Have co-movements become stronger over time?

- 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**



# 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**