Liquidity in the Liquidity Crisis
What can we learn from country level liquidity in the EMU?

Makram El-Shagi, Logan Kelly
Outline

1. Motivation
2. Divisia Monetary Aggregates
3. Data
4. Signaling crises
5. Forecasting monthly GDP
Motivation

- **Consensus**: The lack of liquidity in the banking system played a key role in the transmission of the crisis.
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- **But:** There is a surprising lack of research on the impact of liquidity on the macro level.
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- **Potential Reason:** Monetary aggregates commonly used do not capture liquidity
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- **But:** There is a surprising lack of research on the impact of liquidity on the macro level
- **Potential Reason:** Monetary aggregates commonly used do not capture liquidity

→ **Our solution:** Using Divisia monetary aggregates to capture liquidity
Our Contributions

- Providing liquidity proxies for several countries in the Euro area
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- Improving Divisia aggregation in times of financial turmoil
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- Providing liquidity proxies for several countries in the Euro area
- Improving Divisia aggregation in times of financial turmoil
- Showing that properly measured liquidity measures contain valuable information
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Why Divisia aggregation

How to measure money?
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How to measure money?

- **Option 1**: Narrow monetary aggregate
  
  **Advantage**: Considered assets are used almost exclusively due to liquidity provision.
  
  **Disadvantage**: Many assets providing liquidity are ignored.

- **Option 2**: Broad monetary aggregate
  
  **Advantage**: All assets providing liquidity are considered.
  
  **Disadvantage**: The main motivation for holding many of those assets is not liquidity provision.

- **Option 3**: Divisia Aggregation
  
  Measures the liquidity service provided by the selected stock of money.
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Measures the liquidity service provided by the selected stock of money.
What are Divisia monetary aggregates

A weighted sum of the components of broad monetary aggregates, where the weights depend on the degree of liquidity provision. Weighting based on revealed preferences. I.e. how much do people pay for the liquidity provision. Cost of liquidity is measured as opportunity cost through the loss of interest compared to asset with same risk.
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- **Common approximation 1:** Upper envelope curve + arbitrary liquidity premium
What is the benchmark rate

- Interest rate of completely illiquid, risk-free asset

- **Problem:** We do not have such an asset

- **Common approximation 1:** Upper envelope curve + arbitrary liquidity premium

- **Common approximation 2:** Upper envelope curve including 10yr bond
Our alternatives

- **Alternative 1**: 10 yr bond
Our alternatives

- **Alternative 1**: 10 yr bond
- **Alternative 2**: 10 yr bond shifted
Our alternatives

- **Alternative 1**: 10 yr bond
- **Alternative 2**: 10 yr bond shifted
- **Alternative 3**: Time variant liquidity premium
Motivation

Divisia Monetary Aggregates

Data

Signaling crises

Forecasting monthly GDP
Sample selection

- EMU12 - Luxembourg
- 2003M1 - 2013M3
Level of disaggregation

Data

Usually each asset is considered separately. Data on individual assets is not available. But:
Data on the seven asset classes composing M3 is available.

- M1 Currency in circulation (cash)
- M1 Overnight deposits
- M2 Deposits with agreed maturity ≤ 2 yrs
- M2 Deposits redeemable on notice ≤ 3 mnth
- M3 Repurchase agreements
- M3 Money market funds
- M3 Bank debt securities (maturity ≤ 2 yrs)

Data mostly available through EuroStat or ECB including interest rates

El-Shagi/Kelly (IWH) Liquidity in the Liquidity Crisis
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Liquidity in Europe

Germany

Abbildung: El-Shagi/Kelly (IWH)

Liquidity in the Liquidity Crisis

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Liquidity in Europe

Spain

Divisia M3 (Fixed Premium)
Divisia M3 (Variable Premium)
Simple Sum M3

Abbildung: El-Shagi/Kelly (IWH)

Liquidity in the Liquidity Crisis
Crisis prediction

- Embed our liquidity indicator(s) in a simple crisis prediction
Crisis prediction

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Crisis prediction

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- Signals approach by Kaminsky/Reinhart (1999) AER
- Extension by Bussiere/Fratscher (2006) JIMF
The signals approach
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Maximization problem
Bussiere/Fratscher(2006) JIMF

Utility:

\[ U(\theta) = \min(\theta, 1 - \theta) - \theta \frac{C}{A + C} - (1 - \theta) \frac{B}{B + D}. \]  

(1)
Interpretation

Significance and excess utility

Assessing significance

- Traditional signals approach does not include a measure of significance
- Following El-Shagi/Knedlik/von Schweinitz (JIMF 2013) we use a bootstrap to resample data with the same dynamic properties and cross sectional correlation based on a factor augmented panel model.

Excess utility

- Bootstrap distribution of observed utility - utility under the null
## Results

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Lower Bound</th>
<th>Excess Utility</th>
<th>Upper Bound</th>
<th>Total Utility</th>
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<tbody>
<tr>
<td>DomDem</td>
<td>0.09</td>
<td>0.24</td>
<td>0.28</td>
<td>0.25</td>
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<tr>
<td>GovDef</td>
<td>0.07</td>
<td>0.19</td>
<td>0.36</td>
<td>0.36</td>
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<td>Divisia (EC-TVLP)</td>
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<td>0.18</td>
<td>0.28</td>
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<td>Unempl</td>
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<td>0.18</td>
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<td>Simple Sum</td>
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<td>0.17</td>
<td>0.24</td>
<td>0.21</td>
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<td>Divisia (EC-FLP)</td>
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<td>0.16</td>
<td>0.25</td>
<td>0.22</td>
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<tr>
<td>Divisia (Bond)</td>
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<td>0.14</td>
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<td>0.23</td>
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<tr>
<td>Divisia (Bond Shift)</td>
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<td>0.23</td>
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<tr>
<td>LabPart</td>
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<td>-0.01</td>
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The model

Backward looking IS curve (Rudebusch, 2002; Nelson 2002)

\[ \Delta y_{i,t-1+h} = \alpha_i + \sum_{p=1}^{k} \beta_{i,p} \Delta y_{t-p} + \sum_{p=1}^{k} \gamma_{i,p} i_{t-p} + \sum_{p=1}^{k} \phi_{i,p} \Delta \ell_{t-p} + u_{i,t} \quad (2) \]
Monthly GDP

Monthly GDP is interpolated using a state space model describing GDP as an ARMAX(1,1) process that is augmented using monthly data on industrial production.

\[
\Delta y^Q_t = \Delta \bar{y}^M_t + \Delta \bar{y}^M_{t-1} + \Delta \bar{y}^M_{t-1}
\]

\[
\Delta \bar{y}^M_t = \alpha_0 + \alpha_1 \bar{y}^M_{t-1} + \alpha_2 \Delta p^M_t + v_t
\]

\[
v_t = \beta v_{t-1},
\]
Forecast comparison

- It is established that money/liquidity is not a good predictor of real activity.
- However, it is acknowledged that liquidity provision plays a major role for real activity.

→ We need to test whether liquidity *sometimes* adds information.

→ Giacomini/Rossi(2010)-test on time variant relative forecast performance.
Forecasting monthly GDP

An Example - Germany
### Results

<table>
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<tr>
<th>Horizon</th>
<th>1</th>
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<th>1</th>
<th>3</th>
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<tr>
<td>Germany</td>
<td>1.27</td>
<td>1.13</td>
<td>2.73</td>
<td>3.12*</td>
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<td>1.13</td>
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<td>1.52</td>
<td>3.73**</td>
<td>1.83</td>
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<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
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<td>3</td>
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<tr>
<td>Reverse $H_0$ TS</td>
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<td>3</td>
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