Systemic Risk Pro-Cyclicality in the European Financial System

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Systemic risks and policies to address them in Non-Bank Financial Intermediation (NBFI)
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2 Main Objectives

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Introduction

- The build-up of excessive leverage within financial markets are at the heart of the 2007-2009 global financial crisis;
- A financial system is pro-cyclical. **Periods of exuberance**: financial intermediaries’s lending activity and stock debts are high. **Periods of turmoil**: asset prices decrease, the value of collateral diminishes and the borrowers’s profitability deteriorates (Bank for International Settlements, 2009; Financial Stability Board, 2009);
- Several papers point to a strongly positive relationship between leverage and balance sheet size (Gropp & Heider, 2010; Kalemli-Ozcan et al., 2012; Baglioni et al., 2013; Damar et al., 2013; Beccalli et al., 2015; Cincinelli et al., 2021);
- Higher financial leverage (short-term leverage) induces banks to engage in illiquid and risky lending as well as securities activities resulted in the widespread failures of these institutions (Adrian & Shin, 2010; Shleifer & Vishny, 2010; Mian & Sufi, 2011; Acharya et al., 2013; Acharya & Thakor, 2016).
Main Objectives

We test the following hypotheses:

1. **Hypothesis A**: The leverage of European Financial Institutions is pro-cyclical;
2. **Hypothesis B**: The leverage of European Non-Bank Financial Institutions (NBFIs) is pro-cyclical;
3. **Hypothesis C**: NBFIs are systemic risk-procyclical in addition to Traditional Banks (TBs).

We evaluate the stability of the leverage and systemic risk pro-cyclicality hypotheses considering five meaningful sub-periods:

1. **Pre-Crisis** (2006:1-2007:2);
2. **Subprime Crisis** (2007:3-2008:3);
3. **Global Financial Crisis** (2008:4-2010:2);
4. **Sovereign Debt Crisis** (2010:3-2012:4);
Data, Specifications and Main Results

We now deal with the following issues:

1. How to identify NBFIs;
2. How to measure leverage pro-cyclicality;
3. How to measure systemic risk pro-cyclicality;
4. How to measure systemic risk: $\Delta CoVaR$, $MES$, $SRISK$. 
Identify NBFIs

- The **Financial Stability Board (December, 2021)** defines non-bank financial intermediation as a broad measure of all non-bank financial intermediaries (NBFIs), composed of all financial institutions that are not central banks, banks or public financial institutions;

- NBFIs are involved in credit intermediation and have increased potential for posing risks to financial stability through liquidity/maturity transformation and/or leverage;

- NBFIs provide an alternative to bank financing and helps to support real economic activity. However, if such intermediation involves activities typically performed by banks, such as maturity/liquidity transformation and/or the creation of leverage, it can become a source of systemic risk.
European Data

- Our data sample: panel of 597 European listed financial institutions between 2005:4 - 2019:4 time period;
- We consider both Traditional Banks (TBs) and those entities fully or partially outside the regular banking system, such as Finance Services (FSs), that provides credit or credit guarantees, or performing liquidity and/or maturity transformation without being regulated like a bank;
- We also consider Real Estate Finance Services (REFs), entities involved in the real estate industry which provide real estate leasing investment services and investments. Real estate investment is considered as a “double-edge sword”, in that requires intensive financial resources, thus increasing the probability of excessive leverage (Beladi et al., 2021, p. 1);
- The sample contains 129 TBs, 287 FSs and 181 REFs. The data source is Refinitiv;
**Specification: Leverage Pro-Cyclicality**

\[ \Delta \text{Leverage}_{i,t} = \alpha_0 + \beta_1 \text{Leverage}_{i,t-1} + \beta_2 \Delta \text{Size}_{i,t} + \beta_{3,NBFI} \Delta \text{Size}_{i,t} \times \text{NBFI}_i + \]

\[ (\text{or } \beta_{3,FS} \Delta \text{Size}_{i,t} \times \text{FS}_i + \beta_{3,REF} \Delta \text{Size}_{i,t} \times \text{REFs}_i) + \]

\[ + \sum_{i=1}^{597} \text{Financial Institutions}_i + \sum_{t=2006:1}^{2019:4} \text{Time}_t + \varepsilon_{i,t} \]

- \( \Delta \text{Leverage}_{i,t} \): quasi-market leverage (market value of assets over market capitalization) or accounting leverage (total asset over total equity) growth;
- \( \Delta \text{Size}_{i,t} \): size (natural logarithm of total assets) growth;
- \( \text{Leverage}_{i,t-1} \): leverage level (natural logarithm) in the previous quarter \((t-1)\);
- \text{Financial Institutions} and \text{Time}: dummies capturing fixed effects for each institution (TBs, FSs, and REFs) and common effects for each quarter, respectively;
- Estimation: full sample and five sub-periods.
# Leverage Pro-Cyclicality: summary of the main results

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<tbody>
<tr>
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<td>Quasi-Market Leverage: YES</td>
<td>YES</td>
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<td>YES</td>
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<td></td>
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<td>Traditional Banks (TBs)</td>
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<td>NO</td>
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<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES (more than FSs)</td>
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</table>

YES = pro-cyclicality  
NO = no pro-cyclicality
**Specification: Systemic Risk Pro-Cyclicality**

\[
\Delta \text{Systemic Risk}_{i,t} = \alpha_0 + \beta_1 \text{Systemic Risk}_{i,t-1} + \beta_2 \Delta \text{Size}_{i,t} + \beta_{3,NBFI} \Delta \text{Size}_{i,t} \times \text{NBFI}_i + \\
(\text{or } \beta_{3,FS} \Delta \text{Size}_{i,t} \times \text{FS}_i + \beta_{3,REF} \Delta \text{Size}_{i,t} \times \text{REF}_i) + \\
\sum_{i=1}^{597} \text{Financial Institutions}_i + \sum_{t=2006:1}^{2019:4} \text{Time}_t + \varepsilon_{i,t} \tag{2}
\]

- \(\Delta \text{Systemic Risk}_{i,t}\): growth in each systemic risk measure (\(\Delta \text{CoVaR}, \text{MES}, \text{SRISK}\));
- \(\Delta \text{Size}_{i,t}\): size (natural logarithm of total assets) growth;
- \(\text{Systemic Risk}_{i,t-1}\): level (natural logarithm) of each systemic risk measure;
- \(\text{Financial Institutions}\) and \(\text{Time}\): dummies capturing fixed effects for each institution (TBs, FSs, and REFs) and common effects for each quarter, respectively;
- Estimation: full sample and five sub-periods.
# Systemic Risk Pro-Cyclicality: summary of the main results

## Table 2: Systemic Risk Pro-Cyclicality: summary of the main results.

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<td>SRISK</td>
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<tr>
<td><strong>Finance Services (FSs)</strong></td>
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<tr>
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<td><strong>Real Estate Finance Services (REFs)</strong></td>
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<td>SRISK</td>
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<td>NO</td>
<td>NO (in addition to TBs)</td>
</tr>
</tbody>
</table>

YES = pro-cyclicality
NO = no pro-cyclicality
Sensitivity Analysis

We undertake robustness checks of our findings:

1. We implement the Hansen (1999) model to study potential asymmetric effects in the level of leverage;
2. We replicate our analyses after excluding financial institutions belonging to Portugal, Ireland, Italy, Greece, and Spain (PIIGS) countries;
3. We validate the relevance of explanatory variables to alternative systemic risk measure with Bonferroni adjusted p-value (Bonferroni, 1936);
4. We test for causality relationship between assets growth, leverage and systemic risk measures via an extensive Granger causality in heterogeneous panels analysis (Dumitrescu & Hurlin, 2012).
Conclusions and Policy Implications

- Overall, we find strong evidence of leverage and systemic risk procyclicality;
- NBFIs is pro-cyclical in periods of stress and contribute significantly to systemic risk;
- Starting from the Global Financial Crisis, excessive leverage leads to severe threats for the financial stability;
- To ameliorate financial stability risks, there is a need to carefully monitor:
  - bank-like activities involving maturity and/or liquidity transformation and leverage, and their interconnections with the banking system;
  - non-bank financial entities involved in credit intermediation process which may be less likely (or be seen to be less likely) to have appropriate control in place, leading to potential risks within the financial system.
We are also investigating whether the Intermediary Capital Ratio ($\eta$) of a financial institution may be considered a counter-cyclical driver of systemic risk;

Define $\eta$, as proxy of an intermediaries’s net worth, as *He et al.* (2017):

$$\eta_{i,t} = \frac{Mkt\ Equity_{i,t}}{(Mkt\ Equity_{i,t} + Book\ Debt_{i,t})} \quad (3)$$

An interesting question to address is: do NBFIs intermediary net capital ratio differ from traditional banks? (Some first evidence is below.)
**Looking Ahead**

**Figure 1:** Systemic Risk ($\Delta CoVaR$) and Intermediary Capital Ratio ($\eta$).
Figure 2: Systemic Risk ($\Delta CoVaR$) and Intermediary Capital Ratio ($\eta$) across financial intermediaries.
Looking Ahead: Summary of the Results

- When the intermediaries’s net worth falls, their risk-bearing capacity is impaired and they require higher compensation to take on risk;
- $\eta_{i,t} > \Delta \text{CoVaR}_{i,t}$ during tranquil market periods such as Pre-Crisis (2006:1-2007:2) and Post-Crisis Period (2013:1-2019:4);
- $\eta_{i,t} < \Delta \text{CoVaR}_{i,t}$ during financial market turmoil such as Subprime Crisis (2007:3-2008:3), Global Financial Crisis (2008:4-2010:2), and Sovereign Debt Crisis (2010:3-2012:4);
- A similar trend for $\eta_{i,t}$ is evident for TBs and REFs, while for FSs is slightly different in particular during the ECB’s Asset Purchase Programme;
- These differences may depend on the different balance sheet structures and composition.
Thank you for the attention! We are available for Q&A.