Public Bank Guarantees and Allocative Efficiency

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After the 2007-09 financial crisis, many governments extended public guarantees to banks. Examples are:

- US: Indy Mac, Fannie Mae, Freddy Mac
- UK: Bradford Bingley, Northern Rock, RBS, HBOS, Lloyds
- Germany: IKB, Hypo Real Estate
- Belgium/Netherlands: Dexia, Fortis

There is ample evidence that guarantees lead to higher risk taking by banks (Boyd and Runkle (1993), Boyd and Gertler (1994), Sapienza (2004), Gropp, Hackenes and Schnabel (2011), Gropp, Gruendl and Guettler (2014))

But no evidence of the effects on the real economy.
This paper tries to fill this gap: How do public guarantees affect real economic outcomes?

Specifically, what are the effects of public guarantees on “allocative efficiency”? Following Bertrand, Schoar and Thesmar (2007), we define an intermediation allocative efficient if

- efficient firms are able to obtain the funding they need to finance their investments while inefficient firms are cut off from external funding, and ultimately exit the market.
Productivity, growth and finance

- Fast growing and fast shrinking firms are both important for productivity growth
- How quickly are resources channeled from unproductive to productive uses?
  - Efficient (productive) firms should be able to access sufficient funding.
  - Inefficient (unproductive) firms must exit the market
- Are efficient firms able to access the funding they need?
- Are unproductive firms cut off from funding? Or are they being kept alive? (“Zombie firms”)
- The financial system occupies a central allocative function in this process.
How do public guarantees affect the allocation of credit?

- on the banks side:

- on the borrowers side:

Both channels result in misallocation of credit.
Literature

- **Black and Strahan (2002):** deregulation increased allocative efficiency
- **Jayaratne and Strahan (1996):** bank branch restriction reduced efficiency and per capita growth
- **Bertrand, Schoar and Thesmar (2007):** deregulation in France increased allocative efficiency
Identification

- Tricky identification problem:
  - Guarantees are granted in the midst of a crisis.
    \[\Rightarrow\] difficult to disentangle the real effects of the crisis and the guarantees
  - Guarantees are granted to the big and systemically important banks.
    \[\Rightarrow\] difficult to find comparable control groups

\[\Rightarrow\] We use a natural experiment.

\[\Rightarrow\] We can form a meaningful control group.
In 2000, the EU filed a lawsuit against the government guarantees on German Savings Banks. (→ *exogenous*)

Subsequently, on July 17, 2001 the public guarantees were removed in two steps.

During the transition period (July 18, 2001 to July 18, 2005), newly contracted obligations continued to be secured if maturing by the end of 2015,

- We consider the transition period, hence we check the effect of *expectation* of the removal of the guarantees on *allocative efficiency*.

Experiment has been used frequently in the literature (Fischer, Hainz, Rocholl, and Steffen (2011), Schnabel and Koerner (2012) and Gropp, Gruendl, and Guettler (2014))
We have two sets of data:

- **Firm-level data**
  - The data cover balance-sheet information of savings banks borrowers, mostly SMEs, from 1995 until 2006.
  - Importantly, we know the amount of outstanding loans of each firm from savings banks and from all other banks.
  - We drop firms in finance sector, to focus on the real side of the economy.

- **Sector-by-state-level data:**
  - Exit data by sector and German state (Bundesland)
Intensive versus extensive margin

- Poor incentives by banks may have an effect on the “intensive margin” and the “extensive margin” of firms in the corporate sector.

- Intensive margin: Lack of monitoring may result in insufficient “restructuring” activities (Bertrand et al. (2007)), i.e., firms adopting new technologies, new internal processes etc.
  - We follow the same firm over time

- Extensive margin: Lack of screening may result in inefficient firms obtaining too much and efficient firms obtaining too little credit.
  - We examine the efficiency of firms that enter into and exit from savings banks’ loan portfolios with and without guarantees
  - We examine sectoral data on firm exit and entry
Empirical strategy: intensive margin

- We estimate treatment intensity of public guarantees on firms which are differentially dependent on savings banks, using the following model:

\[ Y_{it} = \beta_1 (\text{Guarantee}_t \times \text{SBDep}_i) + a_i + a_{st} + a_{jt} + \epsilon_{it} \]

- $Y_{it}$: Investment (as a share of total assets), Sales Growth and Total Factor Productivity
- $\text{Guarantee}$ is a dummy, equal to one for 1995-2000, and zero for 2001-2006.
- $\text{SBDep}$ is a ratio between zero and one and measures each firm’s pre-2001 reliance on savings banks’ credit relative to its total amount of loans.
- We control for firm ($a_i$), state-by-year ($a_{st}$), and industry-by-year ($a_{jt}$) fixed effects.
Our identification strategy is hinged upon two assumptions with regards to the measure of Savings Banks dependence:

- It is randomly assigned to borrowers
- It is persistent over time.

We examine the persistence and random assignment of Savings Banks dependence measure by forming portfolios, ranking firms based on their savings bank dependence.

We then run savings bank dependence on observables (size, industry etc.) and re-form the portfolios
Persistence of SBDep. Measure

- Plotting this over time yields the following:

**PANEL A: SBRatio Portfolios**

**PANEL B: Unexplained SBRatio Portfolios**

Persistence of Savings Banks Ratio Measure
Firm Efficiency

We measure the efficiency of firms in two ways:

- **ex-post efficiency**: profitability (ROA)
- **ex-ante efficiency**: total factor productivity (TFP), following Levinsohn and Petrin (2003)
Matching

- We are not interested in a “continuous” effect of savings bank dependence, but rather would like to compare dependent firms to independent firms.
- We define $Dependent = 1$ if borrowers in the 4th quartile of $(\text{loans from savings banks}) / (\text{total loans})$ and zero otherwise (or alternatively, zero only for borrowers in the 1st quartile) of $(\text{loans from savings banks}) / (\text{total loans})$.
- Savings banks independent firms are about five times the size of savings banks dependent firms and differ in a number of other characteristics.
- Common support may be a problem (even though we use saturated set of fixed effects).
- We use propensity score matching to generate a matched sample.
- We match on total assets and fixed assets, within state-by-industry spells.
## Matching Quality

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Values</th>
<th>% Bias</th>
<th>Bias Reduction</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dep.</td>
<td>Indep.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Assets</td>
<td>Pre-match</td>
<td>1.0868</td>
<td>5.0197</td>
<td>-56.1</td>
</tr>
<tr>
<td></td>
<td>Post-match</td>
<td>1.0872</td>
<td>1.0783</td>
<td>0.1</td>
</tr>
<tr>
<td>Fixed Assets</td>
<td>Pre-match</td>
<td>0.4381</td>
<td>1.8857</td>
<td>-45.7</td>
</tr>
<tr>
<td></td>
<td>Post-match</td>
<td>0.4382</td>
<td>0.4232</td>
<td>0.5</td>
</tr>
<tr>
<td>ROA</td>
<td>Pre-match</td>
<td>0.1052</td>
<td>0.0578</td>
<td>27.5</td>
</tr>
<tr>
<td></td>
<td>Post-match</td>
<td>0.1052</td>
<td>0.1126</td>
<td>-4.3</td>
</tr>
<tr>
<td>Productivity</td>
<td>Pre-match</td>
<td>6.6012</td>
<td>7.0443</td>
<td>-58.1</td>
</tr>
<tr>
<td></td>
<td>Post-match</td>
<td>6.6014</td>
<td>6.6473</td>
<td>-6.0</td>
</tr>
</tbody>
</table>

Note: Significant difference is indicated by *** for a p-value < 0.001.
### Restructuring results: matching

#### Panel A

<table>
<thead>
<tr>
<th></th>
<th>Pre-2001 ROA Quartile</th>
<th>Full Sample</th>
<th>1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt;</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt;</th>
<th>4&lt;sup&gt;th&lt;/sup&gt;</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; - 4&lt;sup&gt;th&lt;/sup&gt;</th>
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</thead>
<tbody>
<tr>
<td><strong>Investment Ratio</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>0.0120</strong>***</td>
<td><strong>0.0216</strong>***</td>
<td><strong>0.0093</strong>**</td>
<td><strong>0.0058</strong></td>
<td><strong>0.0020</strong></td>
<td><strong>0.0223</strong>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.005)</td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>(0.005)</td>
<td>(0.009)</td>
<td></td>
</tr>
<tr>
<td><strong>Sales Growth</strong></td>
<td><strong>0.0398</strong>***</td>
<td><strong>0.0690</strong>***</td>
<td><strong>0.0487</strong>***</td>
<td><strong>0.0009</strong></td>
<td><strong>0.0116</strong></td>
<td><strong>0.0663</strong>*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.022)</td>
<td>(0.015)</td>
<td>(0.012)</td>
<td>(0.015)</td>
<td>(0.034)</td>
<td></td>
</tr>
</tbody>
</table>

#### Panel B

<table>
<thead>
<tr>
<th></th>
<th>Pre-2001 TFP Quartile</th>
<th>Full Sample</th>
<th>1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt;</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt;</th>
<th>4&lt;sup&gt;th&lt;/sup&gt;</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; - 4&lt;sup&gt;th&lt;/sup&gt;</th>
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<tbody>
<tr>
<td><strong>Investment Ratio</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>0.0115</strong>***</td>
<td><strong>0.0300</strong>***</td>
<td><strong>-0.0005</strong></td>
<td><strong>0.0062</strong></td>
<td><strong>0.0050</strong></td>
<td><strong>0.0187</strong>*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.007)</td>
<td>(0.005)</td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>(0.01)</td>
<td></td>
</tr>
<tr>
<td><strong>Sales Growth</strong></td>
<td><strong>0.0347</strong>***</td>
<td><strong>0.0733</strong>***</td>
<td><strong>0.0072</strong></td>
<td><strong>0.0271</strong>**</td>
<td><strong>-0.0065</strong></td>
<td><strong>0.0989</strong>**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.023)</td>
<td>(0.014)</td>
<td>(0.012)</td>
<td>(0.020)</td>
<td>(0.041)</td>
<td></td>
</tr>
</tbody>
</table>

#### Panel C

<table>
<thead>
<tr>
<th><strong>Productivity</strong></th>
<th>Full Sample</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>-0.0161</strong>***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Entry to and exit from banks’ portfolios: Extensive margin

- We look at the portfolio rebalancing activity of banks by checking the likelihood of a new firm entering a bank’s pool of borrowers, and alternatively, how often a bank stops lending to an existing borrower.
- We identify observations where the firms is observed for the first (last) time in the bank’s portfolio.
- We then estimate:

\[
Pr(Y_{it}) = \beta_1(Guarantee_t \times Dependent_j) + a_j + a_{st} + \varepsilon_{it}
\]

where \(Y_{it}\) represents the dummy variables for entering firms, exiting firms, and turnover.
**Entry to and exit from banks’ portfolios: Results**

<table>
<thead>
<tr>
<th></th>
<th>Entering Firm</th>
<th>Exiting Firm</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guarantee×Dependent</td>
<td>-0.0530**</td>
<td>-0.0610***</td>
<td>-0.0726***</td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.020)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>Industry FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>State-by-year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pseudo/Adj. R-squared</td>
<td>0.024</td>
<td>0.069</td>
<td>0.027</td>
</tr>
<tr>
<td>Number of Obs.</td>
<td>611339</td>
<td>580418</td>
<td>552384</td>
</tr>
</tbody>
</table>
We estimate the differences in productivity of firms entering into a credit relationship with savings banks in each year with those that exit such a relationship with and without guarantees.

Hence, we estimate

\[ TFP_{it} = \beta_1 Enterin_{it} + \beta_2 Enterin_{it} \times Guarantee_t + a_{jt} + a_{st} + \varepsilon_{it} \]
### Efficiency differences between entering and exiting firms

<table>
<thead>
<tr>
<th></th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entering Firm</td>
<td>0.0245***</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
</tr>
<tr>
<td>Entering Firm × Guarantee</td>
<td>-0.0380***</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
</tr>
</tbody>
</table>

- Industry-by-year FE: Yes
- State-by-year FE: Yes
- Adj. R-squared: 0.153
- Number of Obs.: 198,840
Exit: Data and estimation

\[ \log(\text{Exit}_{jt}) = \beta_1 (\text{Guarantee} \times \text{Dependent})_{jt} + a_t + a_j + \varepsilon_{jt} \]

- For each sector we define Savings Banks dependence as the Savings Banks dependence level of the median firm.
- Sectors in the 4\textsuperscript{th} quartile of Savings Banks dependence measure are classified as \textit{Dependent}.
- We have two yearly datasets, both from Germany’s Federal Statistical Office (Destatis):
  - The number of firms in each industry that exit the market from 1996 until 2006,
  - The number of firms in each industry-state combination that file for bankruptcy from 1999 until 2006.
### Differences in firm exits

<table>
<thead>
<tr>
<th></th>
<th>Log(Exit)</th>
<th>Log(Exit)</th>
<th>Log(BF)</th>
<th>Log(BF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guarantee × Dependent</td>
<td>-0.367***</td>
<td>-0.280***</td>
<td>-0.313*</td>
<td>-0.321*</td>
</tr>
<tr>
<td></td>
<td>(0.136)</td>
<td>(0.082)</td>
<td>(0.155)</td>
<td>(0.173)</td>
</tr>
<tr>
<td>Log(Total No. Firms)</td>
<td></td>
<td></td>
<td>0.762***</td>
<td>0.604</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.255)</td>
<td>(0.495)</td>
</tr>
<tr>
<td>Industry FE</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Industry-by-State FE</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.986</td>
<td>0.989</td>
<td>0.954</td>
<td>0.955</td>
</tr>
<tr>
<td>Number of Obs.</td>
<td>143</td>
<td>143</td>
<td>1033</td>
<td>1033</td>
</tr>
</tbody>
</table>
Robustness

- Instrumental variable estimates as in Lewbel (2012)
- Relationship lending: effects are unrelated to different measures of firm opacity
- Labor market reforms in Germany (Agenda 2010)
- Business cycle effects: using variation in state business cycles across Germany
- Collapse of the dot.com bubble
- Financing of the R&D-intensive industries
- Introduction of the €
Conclusion

- Public bank guarantees reduce allocative efficiency,
- This hinders the “creative destruction process”,
- Consequently, public guarantees may result in lower long-term growth, by keeping the unproductive firms in the market and by allocating “too much” resources to unproductive firms and “too little” resources to productive new firms.
- Public guarantees not only distort the competitive conduct within the banking sector (Gropp et al. (2011)), but also in the corporate sector.