Did TARP Banks Get Competitive Advantages?

Allen N. Berger
University of South Carolina
Wharton Financial Institutions Center
CentER, Tilburg University

Raluca A. Roman
University of South Carolina

FDIC Banking Research Conference, 2013

October 25, 2013

Motivation

- Troubled Asset Relief Program (TARP): During 2008-2009, the US Treasury infused capital in a large number of banking organizations (709).
  - Goals: Improve the stability of the financial system and increase availability of credit.

- However, it may also have had unintended effects on bank competition and resource allocation, given that the literature on regulatory interventions in the banking sector often opines that public guarantees distort competition.
  - French et al. (2010), Gropp, Hakenes, and Schnabel (2011), Calderon and Schaeck (2012)).

Research Questions

- This paper conducts an empirical assessment of TARP on bank competition.

- Did TARP give recipient banks competitive advantages?
  - Market Share
  - Market Power

- Are these competitive advantages, if any, different for TARP banks that repaid early?

- We consider:
  - Full sample of commercial banks in US (2005-2012)
  - Bank-level difference-in-difference (DID) regressions

Literature

Determinants of TARP

- **Decisions to apply for and receive TARP**: Bayazitova and Shivdasani (2012), Duchin and Sosyura (2012), Cornett, Li, and Tehranian (2013)
- **Decision to exit TARP**: Bayazitova and Shivdasani (2012), Wilson and Wu (2012)

Effects of TARP

- **Returns/Valuation**: Ng, Vasvari, and Wittenberg-Moerman (2010), Veronesi and Zingales (2010), Norden, Roosenboom, and Wang (2012)
- **Risk Taking and Lending**: Black and Hazelwood (forthcoming), Duchin and Sosyura (forthcoming), Li (forthcoming)

Effects of Other Government Interventions

- **Risk Taking**: Berger, Bouwman, Kick, and Schaeck (2012), Brandao-Marques, Correa, and Sapriza (2012), Dam and Koetter (2012), Hryckiewicz (2012)
- **Competition**: Cordella and Yeyati (2003), Gropp, Hakenes, and Schnabel (2011), Calderon and Schaeck (2012)

Effects of Capital on Competition

- Calomiris and Mason (2003), Calomiris and Wilson (2004), Allen, Carletti and Marquez (2011), Mehran and Thakor (2012), Berger and Bouwman (2013)

Literature

Market Power Effect of TARP

- Koetter and Noth (Working Paper, 2012)

- ❑ Finds that a higher probability of bailout is associated with higher market power.
- ❑ Our approach is substantially different from theirs:
  1) We consider the actual TARP bailout, rather than the probability of bailout.
  2) We consider market share effects.
  3) We use a DID approach.
  4) We distinguish among seven different effects that bailouts may have on market share and market power.
  5) We draw a distinction between TARP banks that repaid early and those that did not.

Hypotheses: Market Share

- **Hypothesis 1a:** TARP banks **increased** their market shares relative to non-TARP banks.

- ***Predation Effect:*** TARP banks may use the capital infusions to compete more aggressively.
  - Examples: Some of the TARP recipients used the funds to acquire peers with poorer capital ratios.
    - MB Financial acquired in 2009 several failing institutions: Benchmark Bank, Corus Bank NA, InBank and Heritage Community Bank.
    - M&T Bank Corp, New York, acquired all the outstanding common stock of Provident Bankshares Corp in May 2009, and Wilmington Trust Corporation.
  - **=> higher market share**

- ***Safety Effect:*** TARP banks may be perceived as safer due to the bailout.
  - Customers take more loans and loan commitments from them because TARP banks are less likely to fail or become financially distressed.
  - Creditors are more likely to lend them money because TARP banks are more likely to pay back.
  - **=> higher market share**

- ***Cost Advantage Effect:*** TARP funds may be cheaper than non-TARP funds.
  - TARP banks have an incentive to expand their portfolios because they are more cheaply funded.
  - **=> higher market share**

Hypotheses: Market Share

- **Hypothesis 1b:** TARP banks **decreased** their market shares relative to non-TARP banks.
- ***Charter Value / Quiet Life Effect:*** Bailout may increase charter value and/or allow for a "quiet life," decreasing incentives for aggressive behavior and risk taking.
  - **=> lower market share.**
- ***Stigma Effect:*** TARP banks may be perceived as riskier due to the bailout.
  - Customers take less loans and loan commitments from them because TARP banks may be more likely to fail or become financially distressed.
  - Creditors are less likely to lend them money because TARP banks are less likely to pay back.
  - **=> lower market share**
- ***Cost Disadvantage Effect:*** TARP funds may be more expensive than non-TARP funds.
  - TARP banks decrease their portfolios because costs of funds are higher.
  - **=> lower market share**
- The ***stigma effect*** is the opposite of the ***safety effect***, the ***cost disadvantage effect*** is the opposite of the ***cost advantage effect***, and only one of each pair can hold for a given bank at a given time.

Hypotheses: Market Power

- **Hypothesis 2a:** TARP banks **increased** their market power relative to non-TARP banks (market power is proxied by the *Lerner Index* = *(P-MC)/P*).
- ***Safety Effect:*** TARP banks may be perceived as safer due to bailout.
  - Customers pay more for loans and loan commitments from them because TARP banks are less likely to fail or become financially distressed.
  - Creditors charge them lower interest rates because TARP banks are more likely to pay back.
  - **=> higher market power**
- ***Increased Moral Hazard Effect:*** Reductions in market & regulatory discipline result in shifts into riskier portfolios.
  - Customers pay more for loans and loan commitments because they are riskier pool of customers.
  - Creditors may charge higher interest rates if they perceive the TARP banks as riskier, but increase will be less than enough to compensate for the riskier asset portfolio.
  - **=> higher market power**
- ***Charter Value / Quiet Life Effect:*** Bailout may increase charter value and/or allow for a "quiet life," decreasing incentives for aggressive behavior and risk taking.
  - TARP banks maintain higher rates and fees for loans and loan commitments rather than going after business.
  - TARP banks maintain lower deposit and non-deposit funding rates rather than going after business.
  - **=> higher market power**
- ***Cost Advantage Effect:*** TARP funds may be cheaper than non-TARP funds.
  - TARP banks have a decline in MC and may reduce price (by a lesser amount) to attract more business.
  - **=> higher market power**

Hypotheses: Market Power

- **Hypothesis 2b:** TARP banks **decreased** their market power relative to non-TARP banks.
- ***Predation Effect:*** TARP banks may use the capital infusions to increase market share.
  - TARP banks offer loan and loan commitment customers lower rates and fees
  - TARP banks offer higher rates on deposits and non-deposit funds
  - **=> lower market power**
- ***Decreased Moral Hazard Effect:*** Increase in capital results in shifts into safer portfolios.
  - Customers pay less for loans and loan commitments because they are safer pool of customers.
  - Creditors may charge lower interest rates if they perceive the TARP banks as safer, but decrease will be less than enough to compensate for the safer asset portfolio.
  - **=> lower market power**
- ***Stigma Effect:*** TARP banks may be perceived as riskier due to the bailout.
  - Customers demand lower rates on loans and loan commitments from them because TARP banks may be more likely to fail or become financially distressed
  - Creditors charge TARP banks more for funds because TARP banks may be less likely to pay back
  - **=> lower market power**
- ***Cost Disadvantage Effect:*** TARP funds may be more expensive than non-TARP funds.
  - TARP banks have an increase in MC and may increase price (by a lesser amount)
  - **=> lower market power**
- The ***decreased moral hazard effect*** is the opposite of the ***increased moral hazard effect*** and only one can hold for a given bank at a given time.

Effects May Influence Market Share & Market Power in the Same or Opposite Directions

Effect	Indicators of Competitive Advantage	
	Market Share	Market Power
Predation	↑	↓
Safety	↑	↑
Cost Advantage	↑	↑
Charter Value/Quiet Life	↓	↑
Stigma	↓	↓
Cost Disadvantage	↓	↓
Increased Moral Hazard	?	↑
Decreased Moral Hazard	?	↓

What happens to banks that repaid early?

- We expect that those that repaid early would have shed some of the ***cost disadvantage effect*** or the ***cost advantage effect*** of the program by leaving it.
- In addition, any ***stigma effect*** attached to the program would likely largely be lifted, and there may be an increase in any ***safety effect*** demonstrated by the ability to repay.
- We expect that for those that repaid early, the ***cost disadvantage effect*** and/or the ***stigma effect*** was likely in force encouraging the repayment.
  - Since the ***cost disadvantage effect*** and ***stigma effect*** have negative influences on both market share and market power, the reduction of these effects as well as any increase in the ***safety effect*** should make the overall impact of TARP more positive or less negative for those that repaid early.
  - **Hypothesis H3**: TARP banks that repaid early incurred more positive or less negative market share and market power outcomes.

	Indicators of Competitive Advantage	
Effect	**Market Share**	**Market Power**
Predation	↑	↓
Safety	⬆	⬆
Cost Advantage	↑	↑
Charter Value/Quiet Life	↓	↑
Stigma	↓	↓
Cost Disadvantage	↓	↓
Increased Moral Hazard	?	↑
Decreased Moral Hazard	?	↓

Preview of Main Results

- Our difference-in-difference (DID) analysis yields three important results:
  - TARP recipients did get competitive advantages and increased both their market shares and market power relative to non-TARP recipients.
    - Consistent with the empirical dominance of H1a over H1b and H2a over H2b.
  - Results point to the likelihood that the positive market share and market power findings may be driven primarily by the ***safety effect***, which is partially offset by the ***cost disadvantage effect***.
    - Thus, the ***safety effect*** and the ***cost disadvantage effect*** are the most important to explain the results.
  - The competitive advantages are primarily or entirely due to TARP recipients that repaid early, suggesting that these banks significantly reduced their ***cost disadvantage effect*** and increased their ***safety effect***, consistent with H3.

Sample Construction and Data

- TARP transactions data and TARP recipients list from the US Treasury's website (756 transactions for 709 unique institutions).
  - Match by name and location the institutions in the list with their corresponding RSSD9001 (Bank ID) where available.

- Match with bank data from quarterly Call Reports for the period 2005:Q1 to 2012:Q4.
  - Aggregate Call Report data of all the banks in the BHC at the holding company level if the BHC has more than 1 commercial bank owned.

- Other Data Sources: FDIC Summary of Deposits, List of Corrective Actions, House of Representatives website, Missouri Census Data Center, Execucomp, DEF 14A Filings from SEC Edgar website, Center for Responsible Politics, and Federal Reserve Bank of Philadelphia website.

- Final regression sample has 178,604 bank-quarter observations for 7,323 unique entities.

Regression Framework (DID)
All TARP Banks Considered Equally

$$Y_{it} = \beta_0 + \beta_1 \cdot \textit{TARP Recipient}_{it} + \beta_2 \cdot \textit{Post TARP}_{it} \times \textit{TARP Recipient}_{it} + \beta_3 \cdot X_{it-1} + \\ + \beta_4 \cdot \textit{Time}_t + \varepsilon_{it}$$

- Y_{it} is market share or market power.
- $\textit{TARP Recipient}_{it}$ is a dummy = 1 if the bank was provided TARP capital support.
- $\textit{Post TARP}_{it}$ is a dummy = 1 in 2009-2012, the period after the TARP program started following Duchin and Sosyura (forthcoming).
  - This is not included in the model by itself because it is subsumed by the time fixed effects.
- $\textit{Post TARP}_{it} \times \textit{TARP Recipient}_{it}$
  - DID term
  - Captures the effect of the treatment (TARP) on the treated (TARP recipients) compared to the untreated
    - A positive coefficient would show the presence of a competitive advantage
- X_{it-1} are control variables.
- $\textit{Time}_t$ are time fixed effects.

Indicators of Competitive Advantage

1. **Market share** is proxied by local market asset share (Metropolitan Statistical Area (MSA), New England County Metropolitan Area (NECMA), or rural county).
   - In the cases of multimarket banks, we use weighted average local market asset share, where the weights are the proportions of deposits in the different markets (deposits are the only banking variable for which location is available).

2. **Market power** is proxied by Lerner Index for Gross Total Assets (GTA).

$$\boxed{Lerner\,GTA_{it} = \frac{Price_{it} - MC_{it}}{Price_{it}}}$$

$$Price_{it} = \frac{Total\,Bank\,Revenue}{GTA} = \frac{Interest\,Income + Noninterest\,Income}{GTA}$$

$$\ln(Cost_{it}) = \theta_0 + \theta_1 \ln GTA_{it} + \frac{\theta_2}{2} \ln GTA_{it}^{\;2} + \sum_{k=1}^{3} \gamma_k \ln W_{k,it} + \sum_{k=1}^{3} \phi_k \ln GTA_{it} \ln W_{k,it}$$
$$+ \sum_{k=1}^{3} \sum_{j=1}^{3} \gamma_{kj} \ln W_{k,it} \ln W_{j,it} + \theta_3 Time_t + \mu_{it}$$

$$MC_{it} = \frac{Cost_{it}}{GTA_{it}} \left[\hat{\theta}_1 + \hat{\theta}_2 \ln GTA_{it} + \sum_{k=1}^{3} \hat{\phi}_k \ln W_{k,it} \right]$$

Control Variables

- **Proxies for CAMELS** (the declared set of financial criteria used by regulators for evaluating banks, following Duchin and Sosyura (forthcoming))
  - *Capital Adequacy*
  - *Asset Quality*
  - *Management Quality*
  - *Earnings*
  - *Liquidity*
  - *Sensitivity to Market Risk*

- **Other bank characteristics** (following Bayazitova and Shivdasani (2012), Berger, Bouwman, Kick and Schaeck (2012), Berger and Bouwman (2013), and Duchin and Sosyura (forthcoming))
  - *Bank Size* (log of GTA)
  - *Bank Age*
  - *Merger* (dummy which takes a value of 1 from the time that the bank acquired another institution and 0 otherwise)
  - BHC (whether bank is part of a BHC)
  - *Listed* (whether public or not),
  - *Metropolitan* (whether the majority of their deposits are in Metropolitan Statistical Areas)
  - *Weighted HHI Deposits* (local deposits concentration)
  - *Branches/GTA*

Regression Framework (DID)
Breaking Out TARP by Early Repayment

$$Y_{it} = \delta_0 + \delta_1 \cdot TARP\ Recipient_Not\ Repaid_{it} + \delta_2 \cdot TARP\ Recipient_Repaid_{it} + \\ + \delta_3 \cdot Post\ TARP_{it} \times TARP\ Recipient_Not\ Repaid_{it} + \delta_4 \cdot Post\ TARP_{it} \times TARP\ Recipient_Repaid_{it} + \\ + \delta_5 \cdot X_{it-1} + \delta_6 \cdot Time_t + \eta_{it}$$

- $TARP\ Recipient_Not\ Repaid_{it}$ is a dummy = 1 if the bank did not repay in 2009-2010.
- $TARP\ Recipient_Repaid_{it}$ is a dummy = 1 if the bank repaid in 2009-2010.
- $Post\ TARP_{it} \times TARP\ Recipient_Not\ Repaid_{it}$ & $Post\ TARP_{it} \times TARP\ Recipient_Repaid_{it}$
  - DID terms
  - Capture the effects of the treatment (TARP) on the treated (TARP banks that did not repay early and TARP recipients that repaid early) compared to the rest

Effect of TARP on Bank Competition (Main Evidence)

Dependent Variable:	*Market Share*		*Market Power*	
Independent Variables:	**(1)**	**(2)**	**(3)**	**(4)**
TARP Recipient	-0.013***		-0.026***	
	(-15.345)		(-7.632)	
Post TARP x TARP Recipient	0.005***		0.039***	
	(4.098)		(9.200)	
TARP Recipient_Not Repaid		-0.014***		-0.026***
		(-16.533)		(-7.076)
TARP Recipient_Repaid		-0.007***		-0.017***
		(-3.150)		(-2.783)
Post TARP x TARP Recipient_Not Repaid		0.003***		0.029***
		(2.968)		(6.053)
Post TARP x TARP Recipient_Repaid		0.011***		0.084***
		(3.245)		(10.789)
Controls	**Yes**	**Yes**	**Yes**	**Yes**
Time Fixed Effects	**Yes**	**Yes**	**Yes**	**Yes**
Observations	178,604	178,604	178,604	178,604
Adjusted R-squared	0.219	0.219	0.451	0.451

Robust t-statistics in parentheses: *** p<0.01, ** p<0.05, * p<0.1

- TARP banks gained a competitive advantage: increased market shares and market power when compared to the non-TARP banks after TARP capital injections (columns 1 & 3).
  - These results are consistent with the empirical dominance of H1a over H1b and H2a over H2b.
- The competitive advantage is predominantly for the TARP banks that repaid early (columns 2 & 4) consistent with H3.
- Results are economically significant.

Lerner Components

Dependent Variable: Lerner Components				
	Price		*MC*	
Independent Variables:	**(1)**	**(2)**	**(3)**	**(4)**
TARP Recipient	0.00026***		0.00066***	
	(12.860)		(16.551)	
Post TARP x TARP Recipient	-0.00023***		-0.00069***	
	(-8.057)		(-13.836)	
TARP Recipient_Not Repaid		0.00031***		0.00074***
		(14.371)		(17.116)
TARP Recipient_Repaid		0.00005		0.00023***
		(1.057)		(2.771)
Post TARP x TARP Recipient_Not Repaid		-0.00031***		-0.00069***
		(-10.013)		(-12.519)
Post TARP x TARP Recipient_Repaid		0.00011*		-0.00074***
		(1.679)		(-6.727)
Controls	**Yes**	**Yes**	**Yes**	**Yes**
Time Fixed Effects	**Yes**	**Yes**	**Yes**	**Yes**
Observations	178,604	178,604	178,604	178,604
Adjusted R-squared	0.540	0.540	0.507	0.507

Robust t-statistics in parentheses: *** p<0.01, ** p<0.05, * p<0.1

- To shed light on the sources of the competitive advantages, we decompose our main measure of market power, *Lerner GTA*, into its components: *Price* and *Marginal Cost (MC)*.
- Main finding is primarily due to *MC* going down, suggesting that the market power gain is mainly on the input side (lower prices for deposits and/or other sources of funding).
- When splitting the banks, we find that both groups had an increase in their market power on the input side, Banks that repaid also had an increase in market power on the output side, but those that did not repay had a decrease in market power on the output side.

Effect of TARP on Bank Competition (Disentangling the Effects)

Effect	Indicators of Competitive Advantage: Market Share	Indicators of Competitive Advantage: Market Power
Predation	↑	↓
Safety	↑	↑
~~Cost Advantage~~	~~↑~~	~~↑~~
Charter Value/Quiet Life	↓	↑
~~Stigma~~	~~↓~~	~~↓~~
Cost Disadvantage	↓	↓
~~Increased Moral Hazard~~	~~?~~	~~↑~~
~~Decreased Moral Hazard~~	~~?~~	~~↓~~

- ***Moral hazard effects*** seem unimportant because *Price* does not change nearly as much as *MC* and goes in two different directions for those that did not repay and those that repaid.
- ***Cost disadvantage effect*** dominates the ***cost advantage effect***, at least for the banks that repaid early, because when the cost effects are reduced by early repayment, the competitive advantages are amplified.
- ***Safety effect***, the only other one with positive influences on both market share and market power appears to dominate the ***stigma*** and ***cost disadvantage effects***, which have negative influences on both.
- ***Safety effect*** and ***cost disadvantage effect*** are the most important to explain the results.

Robustness Tests & Other Analyses

- Endogeneity Treatments
  - Propensity Score Matching Analysis
  - Instrumental Variable Analysis
- Alternatives Measures of Key Variables
  - TARP (Bailout Amounts instead of Dummies)
  - Market Shares (Deposits and Loans instead of Assets)
- Alternative Econometric Approaches
  - Bank FE
  - Bank RE
  - Clustering at the Bank Level
- Differences by Bank Size Classes
- Subsample Analysis
  - Exclude involuntary participants (8 original large participants).
  - Exclude banks subject to the Stress Tests (SCAP).
  - High and low capital ratios before the TARP program started (2008:Q3)
  - Local market concentration: unconcentrated (HHI ≤ 1,000), moderately concentrated (1000 < HHI ≤ 1,800), and highly concentrated (HHI >1,800).
- The results are qualitatively similar to our main findings, except that:
  - In some instances, only TARP recipients that repaid early show a competitive advantage.
  - Results are stronger as the size of the bank increases.
  - Only banks with high capitalization ratios obtain competitive advantages.
  - Banks in more concentrated local markets gain greater competitive advantages.

Conclusions

- We investigate whether TARP may have given its recipients competitive advantages.
  - TARP recipients did get competitive advantages and increased both their market shares and market power relative to non-TARP recipients, consistent with the empirical dominance of H1a over H1b and H2a over H2b.
  - Results point to the likelihood that the positive market share and market power findings may be driven primarily by the ***safety effect***, which is partially offset by the ***cost disadvantage effect***.
    - Thus, the ***safety effect*** and the ***cost disadvantage effect*** are the most important to explain the results.
  - The competitive advantages are primarily or entirely due to TARP recipients that repaid early, suggesting that these banks significantly reduced their ***cost disadvantage effect*** and increased their ***safety effect***, consistent with H3.
- Results suggest that TARP may have resulted in a possible distortion in competition, which might have misallocated resources.

Conclusions

- Our results may help explain other findings in the literature on the effects of TARP.

- Our findings may help explain the results in the literature that TARP increased risk for the large banks and decreased risk for the small banks.
  - Black and Hazelwood, forthcoming; Duchin and Sosyura, forthcoming

- Other results in the literature suggest that a nonmonotonic effect of market power on risk may have been in effect during the crisis period.
  - Higher market power may be associated with higher risk for banks at high levels of market power, while higher market power may be associated with lower risk at low levels of market power.

- Given that large (small) banks typically have higher (lower) levels of market power, TARP may have led to an increase (decrease) in risk for large (small) banks.

Conclusions

- Our results also may help explain the findings in the literature that TARP resulted in reduced or no change in lending by large banks and increased lending by small banks.
  - Black and Hazelwood, forthcoming; Duchin and Sosyura, forthcoming; Li, forthcoming

- Small banks specialize in relationship lending and may have an increase in lending associated with an increase in market share and market power because limits on competition help banks enforce implicit contracts with relationship borrowers that result in greater credit availability.
  - Sharpe, 1990; Petersen and Rajan, 1995

- Large banks more often engage in transactional lending, where the increase in market share and market power may decrease the supply of credit under the standard structure-conduct-performance hypothesis.

  - These may help explain the increase in lending by small banks and the decrease or no change in lending by the large banks.

Policy Implications

- Our results suggest that in order to limit any distortion in competition, avoid increases in risk, and promote lending, any bailouts be focused primarily on small banks, where the increase in market share and market power is the least, risk may be decreased, and lending may be increased.
  - We cannot say that there are no benefits to bailing out the large banks in terms of rescuing the financial system, just that the effects seem to be less distortionary and more toward the public interest in terms of risk-taking and lending when small banks are bailed out.