The Real Effects of Banks Nationalization – Evidence from the UK

by

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Abstract: How did the nationalization of UK operating banks as a result of the 2008 banking crisis impact their client firms' performance? We use unique firm-bank data and a propensity score matching technique and find that firms that borrowed from nationalized banks show a slight decrease in the growth of investment and innovation relative to firms that borrowed from non-nationalized banks. Interestingly, we find that firms that borrowed from nationalized banks slightly increase employment, short-term debt and cash holdings. Overall, these firms were able to maintain performance as a result of the policy intervention.

"The Government has begun nationalizing the British banking industry, pumping £37 billions of taxpayers' money into HBOS, Royal Bank of Scotland and Lloyds TSB.

…Together with Northern Rock and Bradford & Bingley, the move will mean the Government effectively has four of the country's biggest lenders under its control"

…it would "count as perhaps the most extraordinary day in British banking history" [1]

1. Introduction

Bank nationalizations in developed countries are rare events. 167 years after the last bank nationalization, that is exactly what the British Government did during the Great Recession. The massive government intervention managed to stabilize the banking sector[2], though it is unclear what was the effect on the nationalized banks' client firms. To the best of our knowledge this paper is the first to quantify the effects of UK banks' nationalization on firms' performance. We focus on firms' employment, investment, patenting activity, leverage and cash holdings and show how they were affected. We also separately analyze the performance of highly leveraged firms[3]- firms that would have likely failed, absent the support of their relationship banks.

The severe banking crisis in the UK began with the run on Northern Rock in late 2007. The collapse of Lehman brothers in September 2008 in the USA crystalized into a global systemic banking crisis due to counterparty risk fears (Eichengreen et al. 2012, Bernanke, 2018) and demanded coordinated action to prevent widescale economic collapse. The crisis led to the government recapitalisation of major parts of the UK banking system at a significant cost. The UK Government acquired 83 per cent of RBS Plc and 41 per cent of Lloyds Bank Plc. A 'Credit Guarantee Scheme' was introduced from October 2008 – 2012 to help restore investor confidence in UK banks' wholesale funding through guarantees on certain unsecured debts. The 'Asset Protection Scheme', which started in January 2009, to protect assets on banks' balance sheets were

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[1] www.telegraph.co.uk/finance/financialcrisis/3187946/Financial-crisis-Banks-nationalised-by-Government.html
[2] The objective of the government intervention as presented in HM Treasury (2009), were to consolidate the banking sector, to provide greater protection for banks' customers and "[to] ensure banks are more willing to lend". Arguably, these interventions restarted the flow of credit to firms, possibly resulting in improvements in, or at least stopping the decline in firms' performance.
[3] Highly leveraged firms before the crisis are defined in more details in Section 2.

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taken up by RBS alone. In total £133 bn was provided in cash to the UK banks and all guarantees, liquidity and asset protection provision totalled £1.029 Trillion [4] (National Audit Office, 2016)

One string of the relevant literature focuses on analyzing the effects of government interventions on the banking industry. Liu et al. 2013, Hakenes and Schnabel, 2010 and Mehran and Thakor, 2011 show that government actions may result in the recovery of troubled banks. Conversely, Dam and Koetter, 2012 argue that government interventions may lead to an increase in moral hazard, as banks expect further government help. Brei and Schclarek, 2015 and 2013 use a theoretical model and show empirically that state owned banks increase the volume of loans to firms during crises, relative to private banks which reduce commercial lending. Black and Hazelwood, 2013, and Iannotta et al. 2013 find that due to governmental protection, nationalized banks have higher operating risk. Puddu and Walchli, 2015 find that TARP banks lend more to small businesses than non-TARP banks.

Few papers focused on the effects of banks bailouts on their client firms - Sheng, 2016 and Chodorow-Reich, 2013 investigate the effect of US TARP program on bank lending and on firms' employment.

This paper investigates the extent to which UK's recent bank nationalization impacted firms' performance. The identification relies on a propensity score matching technique. Our results show that, even if there were some expectations that banks' bailouts may restart the economy, the firms borrowing from the affected banks used the loans to increase the precautionary cash holdings and to slightly increase the employment, with a light decrease in investment and innovation. The effects are more pronounced for firms that were highly leveraged before the crisis. These firms took on more debt and marginally increased cash holdings while reducing employment, investment and innovation.

1. Data and Empirical strategy

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[4] This is a total value of peak provisions when summed, not a temporal peak in the total value of the guarantees

We use Amadeus (firms-banks linkages), Orbis and Fame (firm level information), and Bankscope (bank information) databases.[5] We hand-match the bank names from the Amadeus and Bankscope databases to produce a matched firm-bank dataset[6] for 2006-2014.

We carefully document all UK banks that were nationalized during the 2008/2009 financial crisis and received government guarantees[7]. We define 'bank nationalization' as government ownership of 50% or more of the equity in a bank. Out of the 343 banks in our sample, 48 banks were nationalized[8]. If a bank was nationalized, its subsidiaries are considered nationalized as well.

Table 1. Summary Statistics

Variables	Observations	Mean	Standard deviation	Min	Max
ΔEmployment	39,339	0.0125	0.2918	-7.0542	5.4765
ΔInvestment	39,339	0.0018	1.2789	-2.8029	2.1953
ΔInnovation	39,339	0.0004	0.1692	-2.3979	3.3673
ΔLT debt	39,339	-0.0026	1.4938	-25.1019	25.1785
ΔST debt	39,339	0.0021	0.3529	-12.6819	16.5430
ΔLeverage	39,339	-0.0005	1.6097	-34.4506	34.4216

The econometric specification links changes in bank status (nationalization) with variation in firms' performance. We use propensity score matching to alleviate the possible selection concerns (see Reeb et al, 2012 and Roberts & Whited, 2012). We match firms whose banks were nationalized (the treatment group) with firms whose banks were not nationalized (the control group). We use the treatment group dummy as the dependent variable in a logit model to generate

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[5] All these databases are provided by Bureau van Dijk and have yearly detailed information about firms and banks.

[6] We compare our data with the distribution of firms in different industries from the Annual Business Survey, 2018 Revised Results, Office for National Statistics, UK. We use Wilcoxon matched-pairs signed-rank test for our distribution of firms and the distribution of firms from the Annual Business Survey and we cannot reject the hypothesis that both distributions are the same (for ex., for the year 2009, the Z statistics from Wilcoxon matched-pairs signed-rank test is 0.1719, significantly greater than 0.05, therefore we cannot reject that the samples were selected from populations having the same distribution).

[7] Our identification strategy is robust to post nationalization government schemes that gave banks additional funding for lending to UK businesses and households. From 2011-12 both 'Project Merlin' and the subsequent 2012-15 'Funding for Lending' schemes did impact lending across both other banks and nationalized banks. Our identification simply tracks whether nationalized banks performed differently, inclusive of these schemes.

[8] The number of banks in the initial sample was high (reflecting the relationship between firms and subsidiary banks or even foreign banks). In the PSM sample that we use, the number of banks is reduced to 74 banks out of which 27 are nationalized banks.

the propensity score using the age, the size, employment, tangible assets, cash and investment as independent variables. With the predicted probabilities from the logit model we then perform a propensity score match procedure, with replacement, matching each firm from the treatment group with a firm from the control group in the same industry, and the same pre-sample starting year. We therefore separate the sample into two groups of firms with similar characteristics before the sample period that differ only in the nationalization status of their relationship bank. The comparative summary statistics for the control and the treatment sample of firms are presented in Table 2. What is telling is that the summary statistics show remarkable similarity in the characteristics unrelated to bank distress and give us confidence that for each firm in a relationship with a nationalized bank we are able to find a very similar firm having a relationship with a private (non-nationalized) bank.[9].

Table 2. Comparison of firm variables means from the treatment group (firms borrowing from nationalized banks) and the control group (firms borrowing from non-nationalized banks)

Variables	Firms borrowing from nationalized banks	Matching firms (from PSM process)
Employment	224	213
Size (Total assets)	83126	83584
Tangible Assets/Total Assets	0.288	0.283
Cash/Total Assets	0.101	0.091
Age	19.482	19.037
Investment /Total Assets	0.259	0.261

In Table 2 we present summary statistics for the control and the treatment sample of firms used in PSM We match firms whose banks were nationalized (the treatment group) with firms whose banks were not nationalized (the control group). We use the treatment group dummy as the dependent variable in a logit model to generate the propensity score using the age, the size, employment, tangible assets, cash and investment as independent variables. What is telling is that the summary statistics show remarkable similarity in the characteristics unrelated to bank distress and give us confidence that for each firm in a relationship with a nationalized bank we are able to find a very similar firm having a relationship with a private (non-nationalized) bank.

We use the following econometric approach to estimate the impact of the financial shock on firm performance:

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[9] In our dataset there are 1.2% firms with multiple lending relationship. The results presented in paper are for firms with a single lending relationship. As a robustness check, we reestimate the regressions including firms with multiple lending relationships (as long as the firms do not belong simultaneously to the control and the treatment group). The results are similar with the previous results (and available upon request).

$$\Delta Y_{i,t} = \beta_0 + \beta_1 \, BankNationalization_{k,t} + industry_j * year_t + \varepsilon_{i,t}$$

where $Y_{i,t}$ is firm's *i* performance at the year *t*, captured by: investment, short term debt, long term debt, and cash, all normalized by total assets; logarithm of the number of employees; innovation measured as the logarithm of (1+number of granted patents)[10]. The dependent variables are changes in the above measures of firm performance. *BankNationalization$_{k,t}$* represents the change in bank *k* status, from privately owned to nationalized, and is described above. We include industry*year fixed effects to account for any industry *j* specific trends that affect firms' demand for credit, and firms' performance. The use of industry*time fixed effects control for all macro and industry shocks to identify only the effects of bank nationalization on the performance of firms. In all regressions, errors are robust and clustered at bank level.

2. Results

Table 3 presents the results. The coefficients of the bank nationalization variable are statistically significant and negative in the regressions on the variation of investment and innovation, although very small. The coefficients of employment, cash and short-term debt are all positive and statistically significant, suggesting that firms whose banks were nationalized experienced higher growth in cash holdings, in short-term borrowing and employment. For firms borrowing from nationalized banks, employment increases by 1% relative to the rest of the firms and the increases on the variation of cash holding by 50%.

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[10] We use the application year of granted patents since it is closer to the actual date of innovation (Griliches, 1990)

Table 3. The effect of bank nationalization on firm's performance

VARIABLES	ΔEmployment	ΔInvestment	ΔInnovation	ΔCash	ΔLT debt	ΔST debt
Bank Nationalization	0.00154**	-0.000179*	-0.00114***	0.00108***	0.000563	0.00113***
	[3.406]	[-2.111]	[-5.145]	[9.729]	[0.950]	[4.284]
Industry*Year fixed effects	yes	yes	yes	yes	yes	yes
Errors robust, clustered at bank level	yes	yes	yes	yes	yes	yes
Observations	39,339	39,339	39,339	39,339	39,339	39,339
R-squared	0.012	0.021	0.011	0.002	0.024	0.013

Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

This table reports the results on firm performance using propensity score matching of treated group (firms whose banks were nationalized) and control group (similar firms in terms of size, age, industry in pre-sample year 2006). The dependent variables are changes in employment, investment, innovation, cash, long and short-term debt. Industry*Year fixed effects are included.

The overall results indicate that the nationalization of distressed banks did not improve borrowing firms' activity relative to peers, except for a marginal increase in employment. These firms also decreased their innovation and investment.

As our findings suggest that firms tend to increase their debt without significant improvement in their productive capacity, we next explore lending to highly leveraged firms by bailed out banks. We construct a dummy variable (*Zombie)* which takes the value 1 for firms in the top quarter of the leverage distribution before the crisis (2006)[11]. We next re-estimate the regressions by adding an interaction term between the *Zombie* variable and bank nationalization.

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[11] Classifying highly leveraged firms as firms in the top *third* of the leverage distribution before the crisis (2006) does not change the results.

Table 4. The effect of bank nationalization and firm's high leverage on firm's performance

VARIABLES	ΔEmployment	ΔInvestment	ΔInnovation	ΔCash	ΔLT debt	ΔST debt
Bank Nationalization	0.00436***	-0.000519***	-0.000704**	-0.00216***	-0.0219***	-0.0158***
	[6.714]	[-5.183]	[-2.749]	[-6.867]	[-65.04]	[-81.96]
Bank Nationalization x Zomb	-0.0387***	0.000467***	-0.00598***	0.00388***	0.309***	0.232***
	[-6.563]	[11.79]	[-14.49]	[4.150]	[33.29]	[46.74]
Constant	0.0136***	0.00195***	0.000470***	0.00190***	-0.00368***	0.00177***
	[136.8]	[58.96]	[4.673]	[68.41]	[-27.01]	[23.26]
Industry*Year fixed effects	yes	yes	yes	yes	yes	yes
Errors robust, clustered at bank level	yes	yes	yes	yes	yes	yes
Observations	39339	39339	39,339	39,339	39,339	39,339
R-squared	0.050	0.008	0.130	0.007	0.020	0.140

Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels

This table reports the results on firm performance using propensity score matching of treated group (firms whose banks were nationalized) and control group (similar firms in terms of size, age, industry in pre-sample year 2006). The dependent variables are changes in employment, investment, innovation, cash, long-term debt, short-term debt. We add an interaction term between bank nationalization and a dummy for "zombie" firms (Zomb). The variable Zomb has the value 1 if a firm was high leveraged in 2006, 0 in rest. Industry*Year fixed effects are included. respectively.

The results of these regressions, presented in Table 4, show that highly leveraged firms' growth of employment and innovation is reduced, and growth of short and long-term debt and cash holdings increase post bank nationalization.

3. Conclusions

We ask how the bailouts of UK banks impacted client firms' performance, relative to peer. We use unique firm-bank data and a propensity score matching technique and find that firms that borrowed from nationalized banks show a slight decrease in the growth of investment and innovation relative to firms that borrowed from other banks. Interestingly, we find that firms that borrowed from nationalized banks slightly increased employment, cash holdings and short-term debt. These effects are even more pronounced for highly leveraged firms.

The Northern Rock Bank run threatened to create a chain reaction in the British banking system possibly associated with cascades of firm failures in the real economy. Our results suggest that the

UK government's substantial and unprecedented policy intervention to shore up the banking system did mitigate the worst of the shock for firms and allowed them to maintain reasonable performance.

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