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The Impact of Government Assistance on Banks' Efficiency

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Abstract

This study investigates the impact of the Capital Purchase Program (CPP) on recipient banks' efficiency. While the related literature typically relies on the Difference-in-Differences (DiD) approach, which has considerable limitations in this context, we conduct Instrumental Variable analyses by adopting three innovative instruments based on the influence of donations to political campaigns on receiving government support. Using data from 2000 to 2017, we find that CPP assistance has a significant negative causal relationship with recipient banks' efficiency. Our results are robust to alternative sample specifications and estimation methods.

Keywords: Government assistance; bank efficiency; electoral donations

JEL codes: G21, G28

1. Introduction

Since the great economic depression of the 1930s, the financial crisis of 2007-09 can be treated as the worst scenario of global economic meltdown. To safeguard the U.S. financial system from a potential further collapse the U.S. government implemented the Capital Purchase Program (CPP) by means of capital injections into financial institutions. CPP was part of a broader effort, the Troubled Assets Relief Program (TARP), to reinstall the stability and the robustness of the U.S. financial system. CPP constituted more than 33% of total TARP funding, providing $218 billion to 707 financial institutions (Treasury, 2018).

While the extant literature has devoted much attention towards analyzing bank's lending and risk-taking behavior as a consequence of government assistance (Li, 2013; Dam and Koetter, 2012; Black and Hazelwood, 2013; Duchin and Sosyura, 2014; Vossmeyer, 2018), the bank's efficiency domain has received less attention. Harris et al. (2013) is perhaps the best exception to this although their study has limitations and room for improvements given that their conclusions are only based on a difference-in-differences (DiD) approach and on a relatively short period (18 months) around the CPP announcement.

In this context, we aim at investigating the impact of CPP on banks' efficiency with the support of methodological innovations. Understanding the impact of government assistance through the lens of efficiency will provide more insight into the debate about the consequences of governmental assistance and will help with the evaluations of such interventions.

As some of the DiD assumptions (notably, treatment randomness and independence of the entities' characteristics that can affect the outcome) are likely not valid in the CPP case, we provide methodological contributions to the literature in three ways. First, we propose instrumental variables (IVs) that overcome the limitations of DiD analyses. Our IVs are concerned with the influence of donations to political campaigns on receiving government assistance. The influence of campaign donations has been captured through three different

angles covering (i) the banking sector's donations to local representatives and overall financial sector's donation to (ii) local representatives that sat on the CPP committee and to (iii) the U.S. President. This contribution refers to the broad literature investigating the impact of government assistance on several aspects.

Second, we match CPP to non-CPP institutions by using a method (Propensity Score Matching with multiple covariates) more robust than that used in Harris et al. (2013), which is based on a single variable (book-to-market ratio).

Third, we investigate the evolution of efficiency in the long term. Our sample period (2000 to 2017) is much longer than that in Harris et al. (2013), who study 18 months before and after CPP implementation. Our approach is important because changes in efficiency may be long-term processes that take years not only to be noticed but also to be consolidated. Hence, we avoid the problem of observing a different efficiency level just after CPP that would revert to its earlier stages in a few years. In this respect, we are interested in capturing a possible long-lasting impact of the capital injections promoted by the U.S. government. Our second and third contributions are specific to the literature on government assistance and efficiency.

Our results show that CPP recipients have become less efficient because of the government assistance. We interpret this finding as evidence of moral hazard issues related to financial aid received by banks. That is, the expectation of future bailouts among managers of supported institutions may have increased because CPP worked as a signal of future bailouts. Hence, those managers may have invested in riskier assets with a view to trying to increase their return, which could result in high losses that would be covered by further government assistance.

The rest of the paper is organized as follows. Section 2 contains an overview of the pertinent literature and its limitations. Section 3 describes the methods and the data used. Our results are presented and discussed in Section 4. Section 5 concludes.

2. The impact of government assistance

Focusing on the specific case of CPP, recent studies have investigated the consequences of government assistance to financial institutions under the perspective of a number of issues, such as lending (Cornett et al., 2013; Duchin and Sosyura, 2014; Wu, 2015), risk taking (Dam and Koetter, 2012; Black and Hazelwood, 2013; Duchin and Sosyura, 2014), and benefits to the economy and financial stability (Jordan et al., 2011; Li, 2013; Berger et al., 2017).

Investigations on the effect of CPP on bank efficiency have been less usual. To our knowledge, Harris et al. (2013) is the main reference in this regard. Based on data for six quarters before and after CPP was announced, their findings suggest a significant reduction in the operational efficiency of banks who have received capital injection by means of CPP. This is attributed to moral hazards associated with governmental bailouts, and the lack of motivation for management to effectively manage the bank's assets. In addition, an argument can be made that the operational efficiency of trouble banks may worsen under CPP due to the irresponsible reliance on capital funds, without any real underlying change in bank management.

Harris et al. (2013) and some of the other studies mentioned above (e.g. Black and Hazelwood, 2013; Duchin and Sosyura, 2014; Berger et al., 2017) rely on a difference-in-differences approach to infer the impact of government support provided to financial institutions. Nonetheless, it is well known that, in the presence of time-varying unobserved factors (which is likely in the CPP scenario), this method delivers biased results. Hence, the use of instrumental variables becomes an alternative, which has also been employed in the literature. The rationale behind the use of such instruments and limitations of the instruments used in existing literature are briefly discussed below.

The stated CPP guidelines only provided three conditions for banks to avail government assistance, namely healthy financial status (as per regulator's definition), governance requirement on common stock dividends and conditions on bank executives' compensation

packages (Winkelvoss et al., 2014; Calomiris and Khan, 2015). The vague nature of such guidelines made it quite difficult to estimate a bank's possibility of being considered into the assistance program. Besides banks' financial health, local economy condition and, most importantly, allies with influential politicians were the factors most speculated as the trigger points of CPP assignment (Pana and Wilson, 2012; Blau et al., 2013; Duchin and Sosyura, 2014).

In line with this literature and other studies linking political connections to government assistance (e.g. Faccio et al., 2006; Wallison and Calomiris, 2009; Mian et al., 2010; McCarty et al., 2013; Acemoglu et al., 2016), some authors have proposed instruments regarding political ties to assess the potential consequences of CPP. Li (2013), for instance, considers the local political representatives' ideology (democrat/republican) as an IV for government support. Such choice of IV can be questioned as not all the local political representatives were involved in the CPP decision making given that these decisions were made by the Subcommittee of Financial Institutions and Consumer Credit, which only included some selected political representatives (Representatives, 2018b). Even considering the possibility that some local representatives took part in the CPP decision making as a committee member, the political ideology IV also falls short as the CPP committee had a combination of members from both political ideologies and, arguably, the committee members were most possibly selected not based on their political philosophy but due to their academic and professional qualifications aligned with the objective of the CPP committee.

Duchin and Sosyura (2014) use the presence of local representatives in the CPP committee as an IV for CPP approval. This choice can also suffer from fragility if explained from the perspective of motivation behind supporting a bank in the member's locality. Representatives are elected by the votes of people and not banks and therefore, they may have less accountability towards banks compared to people. Although it can be argued that local banks

are closely connected with local people's money and business, the connection between the political representative and the banks becomes somewhat indirect via the route of local people. Therefore, we reckon that a strong IV in this context would require a strong motivation for political representatives to act on behalf of banks. In this paper, we propose novel instruments (presented ahead) that aim at filling this gap in the literature investigating the effects of government assistance on financial institutions.

3. Data and method

3.1 Sample

The CPP program was committed to maintaining transparency and therefore, the data on institutions receiving CPP assistance were updated on a regular basis so that the taxpayers and Congress members can avail the latest information about how the funds were deployed and used by the US Treasury (Bayazitova and Shivdasani, 2011). The full list of CPP recipients, available on the US Treasury website (Treasury, 2018), includes several types of financial institutions such as public commercial banks, private commercial banks, investment banks, insurance firms, credit card companies, etc. that received government assistance in the form of CPP.

However, this study initially concentrates only on the banking sector and more specifically, on the public commercial banks. The motivation behind focusing on a single type of institution was that commercial banks comprised a significant share in the CPP recipient list both in numbers and funds allocated (Bayazitova and Shivdasani, 2011; Blau et al., 2013; Li, 2013). Public commercial banks (PCBs) encompassed about 50% (349) of all the 707 CPP recipients (Treasury, 2018) and about 92% ($188.2 billion) of total CPP fund ($204.9 billion) (Treasury, 2018; Bayazitova and Shivdasani, 2011). In addition, as this paper's core focus is to measure the impact of CPP on efficiency, taking a sample of heterogeneous types of institution may not

yield a generalizable result because each type of institution has its unique business models (Berger et al., 2000; Lin and Li, 2001) and therefore has inherent differences in the way of measuring efficiency and the variables that exert influences on efficiency (Berger and Mester, 1997).

We first retrieve annual data on all commercial banks (SIC codes from 6020 to 6029, i.e. commercial banks[1]) from Compustat database. We then match these banks with the CPP recipient list. 289 banks are matched but due to data limitations, 206 remain in our sample as treated (CPP) banks (all of them classified as SIC 6020). The 206 banks in the treated sample were granted $110.45 billion ($536.17 million on average), which is 54% of the total CPP fund ($204.9 billion) and 59% of the funds granted to public commercial banks ($188.2 billion). CPP capital infusion played an important role in the treated banks' capital structure. For example, CPP injections constituted about 28% (on an average) of the banks' pre-CPP total capital. Both the mean and median values of Tier 1 ratio improved considerably in the post-CPP period. Table 1 provides further details on the treated sample about CPP amount injected and its significance by analyzing the banks' pre-CPP and post-CPP capital structures. 1,091 banks do not match the CPP list but only 265 have sufficient data available on Compustat and compose our control (non-CPP) group (all with SIC 6020). The sample period goes from 2000 to 2017 and inactive or dead banks are included to avoid survival bias.

[Insert Table 1 here]

3.2. Method

3.2.1. Model

As said before, relying on DiD to infer causality would be misleading in the context of this study. DiD regression technique's major assumption is that the treatment (CPP assignment)

[1] As a robustness check, we also run our analyses considering all financial institutions (SIC codes 6000 to 6299) on the CPP list that have the necessary data available on Compustat (see Section 4.4).

should be random and independent of the control group's changes and outcomes in scenarios before and after the treatment (Angrist and Pischke, 2008). In our specific case, ascertaining this strong assumption is quite impossible as it is evident that the CPP assignment was not random and banks were preferred in terms of their political connections (Bayazitova and Shivdasani, 2011; Duchin and Sosyura, 2014). In addition, DiD regression assumptions also require that the treatment (CPP) assignment remains independent of the entities' (banks') characteristics that can influence the outcome (efficiency) (Angrist and Pischke, 2008). For this study, this particular assumption cannot be satisfied as well because banks were provided government assistance (CPP) by considering their financial health, the proportion of loan profile directed to corporates and industries, and the possibility to trigger systemic risk by the banks' failure (Bayazitova and Shivdasani, 2011). There is always a possibility that the variations in banks' efficiency may be explained by some other factors rather than CPP, which could lead to incorrect estimation due to endogeneity caused by omitted variable bias and/or model misspecification. In such instances, ordinary least square becomes incapable of providing consistent estimates for parameters and therefore, will cause DiD regression outputs to be invalid (Roberts and Whited, 2013; Wooldridge, 2015)

According to Lechner (2011), DiD regression technique is most suitable for studies with no pre-treatment information and/or no scope for using IV. Again, considering the nature of our study, such suitability attributes fall short as the sample data included pre-CPP information for banks and existing literature provides evidence regarding the usage of IVs in studies related to measuring the impact of government assistance (Li, 2013; Duchin and Sosyura, 2014).

Therefore, to overcome such possible limitations of the DiD approach and provide with a consistent answer to our research question, we adopt an instrumental variable (IV) estimation, employed through the two-stage least squares (2SLS) method (Angrist and Imbens, 1995). We create an estimated endogenous variable by regressing the considered IVs with the original

endogenous variable (CPP) in the first stage and then the estimated values from the first stage regression are used to explain the independent variable of interest (banks' efficiency), assuming that the instrument is correlated with the dependent variables but uncorrelated with the error term. The first and second stages are presented in Eqs. (1) and (2), respectively:

$$CPP_i = \gamma_0 + \gamma_1 IV_i + \sum_{n=2}^{10} \gamma_n C_{nit} + u_{it} \qquad (1)$$

$$ES_{it} = \delta_0 + \delta_1 \widehat{CPP_i} + \sum_{n=2}^{10} \delta_n C_{nit} + \vartheta_{it} \qquad (2)$$

where CPP_i is a dummy equal to 1 if bank *i* received CPP support and 0 otherwise. IV_i are the instruments associated with CPP_i and $\widehat{CPP_i}$ is the respective CPP_i value estimated in the first stage (1).

ES_{it} stands for the efficiency score of bank *i* at time *t*. As in Sherman and Gold (1985), Halkos and Salamouris (2004), and Paradi and Zhu (2013), it is defined as a bank's relative capacity to produce outputs (income and loans) from inputs (expenses and deposits). Different approaches can be used to estimate efficiency, the most cited being data envelopment analysis (DEA), the stochastic frontier approach (SFA), and the distribution-free approach (DFA). The literature has pointed out some advantages of DEA, including its flexibility (as it does not require an explicit definition of the production function and can be used with multiple inputs and outputs), relatively good performance in small samples (which could be seen as our case), and capability of uncovering relationships not identified by other methodologies (Fethi and Pasiouras, 2010; Kumar and Singh, 2014). Moreover, tests comparing the results of the aforementioned methods have shown that, in many cases, their estimates are quite similar (Goddard et al., 2001, Weill, 2004; Kuchler, 2013). Besides these issues supporting the use of DEA, another reason for choosing this technique in our case is the fact that it has been often applied in the relevant empirical literature in this area (e.g. Das and Ghosh, 2006; Park and

Weber, 2006; Hsiao et al., 2010; Harris et al., 2013). Therefore, we use DEA to calculate our efficiency score *ES* not only due to its advantages but also to make our results more easily comparable to the findings in related studies.

The choice of inputs and outputs is a key issue when using DEA. As pointed out by Das and Ghosh (2006), different concepts or definitions of efficiency lead to different choices of variables, which ends up affecting the final results. In light of our discussion above, as a further attempt to ease the comparison between our findings and those in the pertinent literature, we follow studies closely related to ours (Hsiao et al., 2010 and especially Harris et al., 2013) and select the same outputs (interest income, non-interest income, and total loans granted) and inputs (interest expense, non-interest expense, and total deposits received) used therein. Further details on these outputs and inputs are presented in Table 2.

C_{nit} are nine control variables focused on bank size and CAMELS variables (capital adequacy, assets quality, management quality, earnings, liquidity and sensitivity to market risk), which are proxies for the CPP selection criteria (Duchin and Sosyura, 2014). These variables are presented and defined in Table 2. u_{it} and ϑ_{it} are the error terms in the first and second stages, respectively.

[Insert Table 2 here]

3.2.2. Instruments

Given the limitations on the choice of IVs used in the literature as proxies for government assistance (see Section 2), we propose instrument variables based on the strong role electoral donations play on political representatives' voting campaigns and their subsequent policy actions (Agrawal and Knoeber, 2001; Fisman, 2001; Claessens et al., 2008; Wang and Qian, 2011; Aggarwal et al., 2012; Boas et al., 2014). From a practical perspective, a political representative would be much accountable to the industrial sector (e.g. banking) from which

s/he received a significant donation for pre-election campaigns (Langbein, 1986; Austen-Smith, 1987; Grenzke; 1989; Milyo et al., 2000; Kalla and Broockman, 2016).

Our first instrument refers to political representatives of the CPP committee who had significant campaign funding from commercial banks. Here, the commercial banks' funding was considered as significant when it is in the top ten donors for a particular representative. Therefore, this IV dummy (*IV comm banks*) was assigned a value of 1 for a bank when it is headquartered in a region whose local representative participated on the CPP committee and s/he had commercial banks' donation within the top ten donors of his/her campaign funding.

To facilitate robustness tests with alternate scenarios, we consider two more innovative IVs. As CPP reached not only commercial banks but also other types of financial institutions, it might be interesting to find the impact of the overall financial industry's donation in the local representatives' campaign funding. The donation data of politicians also included other types of financial institutions besides commercial banks (Politics, 2018). Therefore, our second IV is concerned with the donation of the total financial sector such that the dummy is assigned a value of 1 for a bank when the bank is headquartered in an area whose local representative participated on CPP committee and s/he had financial sector's donation within the top five donors of his/her campaign funding.

These two IVs are similar to the instruments used in Li (2013) but each of our measures combines donations to politicians and participation of the representatives on the CPP committee while Li's (2013) instruments split these two aspects. Combining the two conditions is more appropriate because, in principle, either of them alone may have been insufficient to motivate CPP approval. The way we measure the importance of the donations is also different from the approach in Li (2013), which focuses on the percentage of campaign funding donated by financial institutions. We, on the other hand, use an ordinal classification indicating whether donations from banks or the financial sector are among the highest ones received by politicians.

Although these two approaches tend to be highly correlated, our measure aims at capturing the politicians' perception of the importance of the donations given that the relative position of donations (e.g. first or second among all contributions) could be remembered by politicians more often than the percentage they represent.

Our third IV attempts to capture the presidential influence in the CPP assignment. This innovates with respect to other instruments based on political campaigns used in the literature (Li, 2013; Duchin and Sosyura, 2014). Similar to the local representatives' election, campaign funding also plays a crucial role in the presidential election (Alexander, 1976; Samuels, 2001). With respect to the previous two IVs related to industries only, this IV takes a different perspective of donation combining geographical area and industry contexts. Extant literature discusses presidential influence (Yates and Whitford, 1998) and provides evidence that elected presidents are more likely to remain favorable to the geographical areas (e.g. states) that contributed to the campaign funding with a significant donation (Larcinese et al., 2006). As the CPP decisions took place in the regime of both President George W. Bush and President Barack Obama, deciding on which presidential election to consider was a challenge for the study. However, CPP contract dates on the US Treasury website confirmed that 82% of this study's sample went into CPP contracts after President Barack Obama took office (Treasury, 2018). Hence, we concentrate our analysis on the Barack Obama's presidential election of 2008. US election data show that, in 2008 presidential election, Barack Obama received the major part of his campaign fund from a handful of states and the financial sector was the topmost donor (Politics, 2018). In this context, we could assume that if a bank is headquartered in a high donating state, the approval of its CPP application would be more likely. Therefore, we consider an IV capturing the geographical basis of donation such that the IV dummy was assigned a value of 1 for a bank when the bank is headquartered in one of the top four most

donating states for Barack Obama's presidential campaign in 2008. The reason for choosing four states is explained ahead.

The three IVs are summarized in Table 2. The data on the CPP committee members were collected from the US House website, which contains information about the House of Representatives (Representatives, 2018a). In 2009, the Financial Services Committee consisted of 71 representatives. The Subcommittee on Financial Institutions and Consumer Credit, under the umbrella of the Financial Services Committee, consisted of 45 representatives (Representatives, 2018b). The information about the Congressional area for each of these 45 representatives was collected from the U.S. Government Publishing Office website (Office, 2018). The major data related to the areas were the representatives' Congressional District zip codes, which were matched with the zip codes of the sample banks' headquarters to identify if a bank was in the Congressional area of a particular representative who is also in the CPP committee.

Data on the CPP committee representatives' electoral funding and the contribution of different industries in the campaign funding in 2007-08 election cycle was collected from the Center for Responsive Politics (CRP) website[2], which publishes data on different electoral variables, mostly campaign finance, for each congress member. CRP publishes the campaign funding contribution of different industries for each congress member in ranked order in terms of money donated, which assisted checking if commercial banks' donation and total financial industry's donation met the criteria of the first two IVs. Bank specific campaign contribution data was collected from the website of the Federal Election Commission[3] of US government.

CRP also publishes data on presidential elections. States donating 5% or more of the total campaign funding for Barack Obama were defined as high donating states and therefore, for

[2] https://www.opensecrets.org.
[3] https://www.fec.gov/data/

the last IV, four most donating states comply with this criterion: California (20%), New York (13%), Illinois (8%), and Massachusetts (5%). Most of the other states had similar donating ratios below 5% (Politics, 2018), which makes them indistinguishable in this regard. The state of each bank's head office was matched with the most donating states' names to define the value of the IV for a respective bank.

3.2.3. Validity of the instruments

Apart from the strong correlation between the instruments and the treatment (CPP approval) discussed above, a second condition for instruments' validity is whether they are uncorrelated with the outcome (banks' efficiency) in the future, i.e. exclusion restriction or external validity. In principle, efficiency is entirely an internal management strategy that accounts for how much output can be generated with a constant or lower input (Zhang et al., 2003; Coelli et al., 2005). A bank can be considered as efficient when it outperforms its competitors or its previous performance benchmarks with relatively better revenue and asset management (Yao et al., 2008; Schaeck and Cihák, 2014). Hence, by definition, efficiency is a micro-environment factor and belongs to the banks' internal day to day business practices. On the other hand, maintaining strong political connections to have favorable policy outcomes can be argued as a macro-aspect and, in principle, lacks association with a bank's everyday banking activities that define its efficiency. Therefore, it can be reasonably assumed that having political ties in terms of monetary donation is independent of a banks' future efficiency scores.

The third condition for IV's validity calls for no correlation between the IV and the unobserved variables that may influence the treatment (CPP approval) and/or the outcome (banks' efficiency). The list of possible unobserved variables is not exhaustive, nor all of the unobserved variables that possibly exist are identifiable (Wooldridge, 2015). Hence, it becomes impossible to comment on all the unobserved factors due to variables' identification problem

and potential immeasurability of some of the unobserved variables. An example of such unobserved variables can be banks' asset allocation as a bank with more assets concentrated on a particular sector would have a higher risk of failure, which could encourage seeking for approval of government assistance. On the other hand, more concentration may lead to more efficiency as banks become more specialized in a few markets/products or it may also cause inefficiency due to not having a diversified asset portfolio. However, based on the similar reasoning provided in previous paragraphs, political donations can be assumed to have no associations with a bank's asset allocation. The motivations for participating in political donations are essentially broad-ranging, mostly focused on policy perspectives, and are beyond the perimeter of regular banking business and management strategies that drive efficiency parameters.

The fourth condition for the IVs' validity requires that the IVs can only influence the outcome (efficiency) through the treatment (CPP approval). In this study's context, once it is understood that political influence has a strong association with CPP, the validity of such condition becomes reasonable as the usual economic rationale justifies that banks that received government assistance would have gone through a rigorous regulatory monitoring process and had to abide by certain regulatory principles for the periods after CPP (Shah, 2009). All these strict regulatory and monitoring practices can be expected to reduce banks' capricious actions and losses, which ultimately can influence banks' efficiency. Therefore, it can be assumed with adequate justification that political donation has no direct association with bank's efficiency, but such donations can influence favorable policy outcomes (CPP approval) that, in turn, can influence efficiency.

A final condition for instrument validity is to rule out a possible association in the opposite route, i.e. from the outcome (efficiency) to the IV (donation). It could be claimed that more efficient banks tend to be more profitable and would, therefore, be in a better position to donate,

which would cast doubt on the suitability of our IVs. Given this claim is considered true, efficient banks would perform relatively better than their peers and would not need government assistance such as CPP to help them survive. Moreover, efficient banks would not appreciate government interference in their managerial decision making related to business strategies. For example, some of the large banks were forced to take part in CPP even though these banks were reluctant to receive such assistance to avoid government control (Calomiris and Khan, 2015).

As for the case of less efficient banks, it could be claimed that these banks tend to be less profitable and therefore, more likely to be in financial distress. So, the less efficient banks would rely on donations to campaign funding for buying political influence to recover their financial situation through government assistance. However, this explanation may not hold in reality for two reasons. Firstly, the definition of a bank being less efficient is not equivalent to being in distress. Efficiency is always a relative term and banks can be called less efficient when they cannot perform at the same level compared to the peer banks or their prior performance. Nevertheless, banks can be termed as distressed when they are at the edge of bankruptcy and fighting for survival. Secondly, even if the strong assumption that being less efficient leads to being distressed holds, less efficient banks would not have enough funds to donate in the politicians' campaign due to lack of profitability and financial robustness. Moreover, stakeholders of a less efficient bank would put pressure on the bank's management to improve business conditions by reducing avoidable costs. In such a scenario, donating money in political campaigns may not be an adequately justified action for the less efficient banks' management.

To reinforce the theoretical reasoning with empirical evidence, we check the possible associations among efficiency, profitability, and political donations in two steps. First, we

regress a measure of profitability (Earnings[4], as defined in Table 2) on efficiency and then regress electoral campaign donations on lagged profitability (i.e. donations in 2008 and Earnings in 2007). The results of the first regression (see Table 3 - column (1)) indicate that efficiency is not related to profitability and the second regression (Table 3 - column (2)) shows that profitability is not associated with campaign contributions. These two results together support the unlikeliness of the channel going from efficiency to electoral donations via profits. This conclusion is robust to many combinations of controls. Hence, the hypothesis raised above does not seem to be plausible and our IV likely complies with this final condition. Combining the theoretical justifications and empirical evidence, political donations can be reasonably assumed to have no association, in either direction, with bank's efficiency.

[Insert Table 3 here]

3.2.4. Matching treated and control groups

We initially run our analyses using the whole sample. Nonetheless, it is possible that unobserved differences between CPP (treated) and non-CPP (control) banks could explain changes in their efficiency after the CPP assistance. Thus, we use Propensity Score Matching (PSM) to select more restricted samples in which the two groups would be more comparable. That is, it would be more reasonable to say that, in each pair of banks (a CPP and a non-CPP one), they are similar except for the fact that one received CPP support and the other did not. This practice is consistent with studies using econometrics techniques to investigate causal relationships (e.g. Heckman et al., 1997; Imbens and Wooldrige, 2009; Atanasov and Black, 2016).

As for the factors to define banks' similarity, we use the same control variables (C_{nit}) used in the IV regressions introduced in Section 3.2.1. Each non-CPP bank was matched to a CPP bank

[4] We also use return on assets (ROA) as a proxy of profitability and our results lead to the same conclusion.

(one-to-one matching[5]) under three conditions: no restriction (regarding maximum distance) between the propensity scores, maximum difference (caliper) in the propensity scores equal to 0.10 (which is equivalent to one standard deviation of all the scores calculated), and maximum difference between scores equal to 0.01. Naturally, among these specifications, the last criterion yields the most comparable groups but this is achieved at the cost of reduction in the sample size.

4. Empirical results

4.1. Descriptive statistics

The summary statistics of the main variables in the whole sample used in this study are reported in Table 2. Our full data set comprises 6,956 bank-year observations. We focus our attention on the Efficiency Score (*ES*) because it is the dependent variable in our models (potentially impacted by CPP assistance) while the other variables are only used as controls. Efficiency presents a considerable variation in the sample as its standard deviation (0.3163) is around 75% of its mean (0.4230). This indicates that it may have substantially changed after CPP and/or that there was a significant difference between efficiency in CPP and non-CPP banks even before the CPP assistance took place. Our analyses ahead will help us disentangle these possibilities.

[Insert Table 4 here]

In fact, comparing the values of this variable in our data set between the two groups of banks and between the two periods (pre and post CPP) would be much more insightful. This is done in Table 5. In what follows, we only comment on the statistically significant differences. In Panel A, we compare the values for CPP banks before and after CPP. We observe that

[5] We also tested one-to-many matching (i.e. one CPP bank matched to two or more non-CPP banks). See section 4.3.

efficiency in these banks decreased after CPP. Capital adequacy (in terms of total equity), earnings, and return on assets also decreased. On the other hand, assets quality, liquidity, capital ratio (Tier 1), and size increased. In Panel B, we see that, as in CPP banks, efficiency and return on assets in non-CPP banks also decreased after CPP. Nevertheless, capital adequacy regarding total equity, assets quality, liquidity, and size increased. Although efficiency fell in both groups, the reduction in the CPP group was higher (around 9.2%) than the reduction in the non-CPP group (around 7.2%). At this point, we cannot draw any conclusion on this difference in magnitudes and further analyses are necessary to understand if capital injections via CPP had any impact on the larger reduction observed in the CPP banks.

Panels C and D show that CPP banks had higher asset quality but were less efficient and smaller than the non-CPP peers both before and after CPP assistance, respectively. Capital adequacy (in terms of total equity) in CPP banks was higher before CPP but became smaller after it. The lower efficiency of CPP banks compared to non-CPP banks in the whole period indicates that the former group has a tendency for being less efficient anyway and it could be claimed that the CPP support was not the cause of that lower efficiency. However, on top of that tendency, it could also be the case that the capital injections contributed to reducing those banks' efficiency even more (i.e. beyond what they would be without CPP). Our analyses ahead will investigate this possibility.

[Insert Table 5 here]

We check for potential collinearity issues among the variables included in our models. Table 6 shows that correlation coefficients are relatively low and, therefore, we should not expect any problems due to high collinearity in the data. Two pairs of covariates, nevertheless, present correlations (in terms of magnitude) considerably above the average of the values seen in the matrix. These pairs (ROA-AQ and CET1-CA) have absolute correlations between 0.55 and 0.61, which are still at an acceptable level. We also calculate the Variance Inflation Factor

(VIF) of the independent variables for detecting possible multicollinearity issues. Following the rule of thumb mentioned in Studenmund (2017, p. 252), we conclude that our data is not affected by this problem as the VIFs of all variables are below 5 (see Table 7).

[Insert Tables 6 and 7 here]

4.2. Main results

4.2.1. Regression results

We run 2SLS regressions (1) and (2) using the three IVs described in Section 3.2.2 regarding locations with most donations from commercial banks (*IV comm banks*), from the financial sector (*IV fin sector*), and for the presidential campaign (*IV president*). For each of these instruments, we consider four sample specifications (whole sample and three samples matched according to different restriction criteria on the distance between the propensity scores of the treatment and control groups as explained in Section 3.2.4).

The *comm banks* and *fin sector* IVs are highly correlated (correlation coefficient > 0.90) and therefore could not be used together due to multicollinearity issues. *IV president* could be analyzed with either of the other two variables but, in order to minimize the bias in the 2SLS results[6], we opt for analyzing each instrument separately.

The results of the first stage regressions are reported in Table 8 – Panel A. All the highly significant positive coefficients provide evidence that the three IVs are strongly associated with CPP approval, cementing the idea that political influence, driven by monetary donations, remains a strong predictor for a bank to receive government assistance.

Panel B shows the outputs of the second stage regressions, according to which the CPP predicted in the first stage is negatively related to bank efficiency. These results are statistically

[6] As explained, for example, in Angrist and Krueger (2001, p. 79), the bias in 2SLS IV estimates is proportional to the difference between the number of instruments and the number of endogenous variables. When these numbers are equal, the bias is approximately zero.

significant at the 1% level in eight out of the 12 specifications tested. In three of the scenarios, the significance is at the 5% level while only in one case (*IV fin sector* for sample matched with caliper 0.10) that coefficient is not significant.

[Insert Table 8 here]

Concerning statistical significance, the IVs are relatively similar across the different sample specifications. The samples matched following more restricted conditions (caliper 0.01) yield results at the highest significance level for all the three IVs - see columns (10) to (12). This suggests that, as the similarity between the treatment (CPP) and the control (non-CPP) groups increases, the negative impact of government assistance on efficiency becomes more evident, which corroborates our overall conclusions.

In sum, our IVs, capturing political campaign donation, provide significant evidence that CPP assistance has a negative causal influence on banks' efficiency. These results support the findings in Harris et al. (2013) and indicate that CPP funds may have reduced the incentives of managers in recipient commercial banks to continuously search for profitable strategies that would not compromise their institutions' stability. In other words, this refers to potential moral hazard consequences of government assistance, which would create or reinforce the belief that those banks would be rescued again in case of distress.

4.2.2. Post-estimation tests for the validity of the instruments

Besides economic rationale, logical arguments, and literature support, this study's considered IVs are also tested for validity through statistical procedures. A test of endogeneity is conducted to validate that the instrumented variable is suffering from endogeneity bias and therefore, the approach of two-stage least square regression through the chosen IVs is required over OLS to derive an appropriate conclusion. Table 9 reports the instrumented variable's (CPP) test of endogeneity for all the three IVs. Two different test results are reported namely the Wu-

Hausman and Durbin tests, which consider the same null hypothesis that the instrumented variable is exogenous (Baum et al., 2007). The test results for all the corresponding IVs reject the null hypothesis at 1% significant level, except for commercial banks' and financial sector's donation in matched sample with caliper 0.10. Therefore, the instrumented variable (CPP) can be claimed as suffering from endogeneity for most of the cases.

[Insert Table 9 here]

Moreover, Table 8 – Panel A reports the summary statistics for all the IVs' first-stage regression, which aided the understanding of the IVs' explanatory power. The joint significance, as noted by the F statistic, can be regarded as a test for the explanatory power of IVs. As a rule of thumb, the F-test statistic needs to be greater than 10 for the IVs to be reliable (Stock et al., 2002). In this study's case, all the IVs' F-test statistic were much higher than the acceptable threshold of 10 and significant at 1% significance level, indicating strong IVs.

To further test the IVs' strength, we conduct the minimum eigenvalue procedure suggested by Cragg and Donald (1993). Table 10 presents the results of minimum eigenvalue statistic and the critical values of both "2SLS Size of nominal 5% Wald test" and "LIML Size of nominal 5% Wald test". Given that the minimum eigenvalue static is fairly higher than the critical values for most of the cases, the null hypothesis (the IVs are weak) is rejected, except for donation to president in the whole sample (10% and 15% value), matched sample with no restriction (10%) and caliper 0.10 (10%). Therefore, the IVs of this study are robust enough to produce reliable results for almost all the cases.

[Insert Table 10 here]

4.3. Robustness tests

We run our regressions without the nine largest institutions that took part in the program compulsorily. The basic relationship originally found remains the same; the only difference is

that, for the IVs regarding donations from the financial sector to members of the CPP committee and to the presidential campaign, the significance level of the main variable in the second stage (predicted CPP) is 5% whilst the 1% level is not observed as in the baseline tests. This reveals the importance of those large institutions to our results but the overall conclusions are still valid for the whole sample of commercial banks.

We also extend our sample by including in our analyses all the financial institutions for which we could get the necessary data. 170 institutions are added to our sample (33 CPP and 137 non-CPP; all of them savings institutions, SIC codes 6035 and 6036). This data set expanded with savings institutions gives the same results as the ones obtained for commercial banks alone. In one of the specifications (matched sample with caliper 0.01, the most similar pairs among our criteria) for two IVs (donations from commercial banks and to the presidential campaign), we find a negative relationship between CPP and efficiency significant at the 10% level. This is valid for the sample with and without the aforementioned nine largest institutions. For the other specifications, the results are not significant.

To confirm the robustness of our findings in terms of the approach used to estimate the coefficients in the IV regressions, we re-estimate all the regressions (including the new specifications described in the two previous paragraphs) by means of limited information maximum likelihood (LIML). In general, the results do not change in any of the specifications. The only noticeable difference is that, for the IV regarding donations from the financial sector, the relationship for all commercial banks (i.e. without matching), which was strongly significant based on the 2SLS estimation (at the 1% level), becomes insignificant under the LIML estimation. We also try different matching criteria (one-to-many) and no significant difference in the results is observed.

In general, we can state that our main conclusion according to which CPP support had a negative impact on commercial banks' efficiency is robust to a number of alternative model

and sample specifications. Additionally, we find evidence that such relationship is somehow valid to savings institutions.[7] Due to space constraints, the results described in this section are not reported but are available upon request.

5. Conclusions

The core objective of this paper is to document empirical evidence regarding the impact of CPP capital infusion on the recipient banks' efficiency. Given that the Difference-in-Differences (DiD) approach normally used in the literature in this area is not appropriate in this context, we use instrumental variables (IVs) analyses by proposing three instruments regarding electoral donations to represent CPP approval in Two-Stage Least Square (2SLS) regression models. Our instruments satisfy all the conditions of IVs through both economic and statistical lenses. Moreover, the second contribution of this paper refers to the fact that we focus on a long-term view of efficiency while the main reference in this topic (Harris et al., 2013) is limited to a short period (18 months) around the CPP announcement.

Our results indicate that the efficiency of CPP recipients decreased due to the government support. This suggests that the managers of banks receiving government assistance would prioritize assets' potential profitability over risk when making their decisions. This would be explained by the impression that their institutions would receive additional aid if they suffer excessive losses in the future. Our results hold under a number of alternative sample designs and a different estimation method for the IV regressions.

The sample considered in this study covered only listed commercial banks in the baseline analyses (apart from savings institutions in the robustness tests). Future studies in this area could include a number of institution types with different sample groups to allow

[7] We are not able to conduct separate analyses for savings institutions because the number of those institutions that received CPP assistance for which we have the necessary data is relatively low (33).

comprehensive results. The IVs proposed in this study could possibly open doors to undiscovered dimensions of research in government assistance. In particular, they could be used in investigations regarding the impact of CPP or similar government interventions on aspects other than banks' efficiency.

As limitations of this study, we note that the source used for collecting campaign donation data does not contain granular data regarding the amount donated by individual banks. Therefore, it was assumed that the sample banks donated proportionally to the total campaign fund for the respective political figures. Also, due to limited availability of data, this study's institutions of interest are only the listed commercial banks and savings financial institutions in the US and cannot be generalized to other types of financial institutions that participated in CPP.

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Data sharing information: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Table 1 – Details on CPP injections in the treated sample

	Obs.	Mean	Median	25%	75%	Min	Max
CPP amount, $mill	206	536.17	38.6	17.39	112.09	3.67	25000
CPP injection/Total capital (pre-CPP)	198	0.28	0.27	0.20	0.33	0.002	0.90
CPP injection/Total capital (post-CPP)	199	0.24	0.22	0.16	0.28	0.001	1.63
Pre-CPP Tier 1 ratio	198	10.4	10.14	9.31	11.36	6.8	17.02
Post-CPP Tier 1 ratio	199	12.21	12.04	10.53	13.50	4.89	23.54

We use yearly values to calculate total capital and Tier 1 ratio. As CPP injections were started in the 4th quarter of 2008, we consider year 2007 as pre-CPP and year 2009 as post-CPP. Total capital represents the common equity, preferred equity and nonredeemable noncontrolling interest of a company. As 'Total capital (post-CPP)' derives its value from the post-CPP period, it includes the CPP injections. Tier 1 ratio represents equity capital plus minority interests less portion of perpetual preferred stock and goodwill as a percent of adjusted risk-weighted assets.

Table 2 - Variables notations and definitions

Variable	Notation	Definition/Calculation
Efficiency Score	ES	Bank's relative capacity to produce outputs (income and loans) from inputs (expenses and deposits). The outputs considered are Loans, Interest Income and Non-interest Income. The inputs are Total Deposits, Interest Expense and Non-interest Expense. All the six items are divided by Total Assets. Loans include all loans granted by the respective banks. Interest Income refers to interest received on loans, bonds and any other assets yielding this type of income. Non-interest income consists of services fees, commissions and other operating income. Deposits are all deposits received by the respective banks. Interest Expense is the summation of all expenses paid on resources borrowed. Non-interest Expense is the amount paid as salaries, fees, commissions and other expenses. For simplifying the efficiency score calculation process, equal weights were assigned for each variable in inputs and outputs category. Data Envelopment Analysis (DEA) was used for the calculations.
CPP dummy	CPP	1 if bank received CPP funds; 0 otherwise
Capital Adequacy	CA	(Common Stock + Preferred Stock) divided by Total Assets
Assets Quality	AQ	Nonperforming Assets divided by Total Assets
Management Quality	MQ	Cost-to-Income Ratio = (Interest and Related Expense + Non-Interest Expense) divided by (Interest Income + Non-Interest Income)
Earnings	E	Return on Equity = Net Income divided by (Common Stock + Preferred Stock)
Liquidity	L	Cash and Due from Banks divided by Total Assets
Sensitivity to Market Risk	SMR	(Assets Held for Sale + Loans Held for Sale + Mortgage Backed Securities Held for Sale + Securities Held for Sale + Other Assets Held for Sale) divided by Total Assets
Return on Asset	ROA	Net Income divided by Total Assets
Risk Adjusted Capital Ratio Tier 1	CET1	Common Equity Tier 1 divided by Risk-Weighted Assets
Size	Size	Logarithm of Total Assets
IV donation commercial banks	IV comm banks	1 if the bank is headquartered in an area whose local representative sat on CPP committee and commercial banks were among the top ten donors of her/his campaign; 0 otherwise.
IV donation financial sector	IV fin sector	1 if the bank is headquartered in an area whose local representative sat on CPP committee and the financial sector is in the top five donors of her/his campaign; 0 otherwise.
IV donation president	IV president	1 if the bank is headquartered in one of the four states that had the highest donations to Barack Obama's presidential campaign in 2008; 0 otherwise.

Table 3 - Relationship among efficiency, profitability and campaign donations

Dependent variable	Earnings	Campaign donations
	(1)	(2)
Efficiency	0.0244	
	(0.0924)	
Earnings $_{t-1}$		-29723.22
		(122896.60)
Capital Adequacy	-0.2488	-401121.30
	(1.3520)	(391520.60)
Assets Quality	-1.4553	-354020.70
	(4.5243)	(259778.00)
Management Quality	-0.0121	11304.12
	(0.0351)	(8250.27)
Liquidity	-0.7849	65286.95
	(1.0461)	(511041.60)
Sensitivity to Market Risk	3.3714	62991.49
	(2.3791)	(169645.40)
Size	-0.0609	213098.90**
	(0.0521)	(103436.00)
constant	0.2936*	-615589.10**
	(0.1601)	(293554.20)

The variables mentioned in this table are defined in Table 2. The subscript t-1 in Earnings indicates it is lagged one year in comparison with the independent variable (campaign donations) in column (2). The main independent variables of interest are Efficiency in column (1) and Earnings$_{t-1}$ in column (2). Numbers in parentheses are robust standard errors (in column (1), clustered by banks). ** and * indicate statistical significance at the 5% and 10% levels, respectively.

Table 4 - Summary statistics

	Obs	Mean	Std. Dev.	25th pct	Median	75th pct	Min	Max
Efficiency Score	6,956	0.4230	0.3163	0.2297	0.3200	0.4662	0.0415	3.2156
Capital Adequacy	6,956	0.0965	0.0377	0.0794	0.0933	0.1095	-0.2532	0.9693
Assets Quality	6,956	0.0139	0.0216	0.0031	0.0069	0.0155	0.0000	0.4474
Management Quality	6,956	0.7845	0.6922	0.6898	0.7542	0.8222	-18.1894	43.6736
Earnings	6,956	0.0766	2.0677	0.0530	0.0881	0.1225	-48.8242	157.4393
Liquidity	6,956	0.0442	0.0444	0.0217	0.0314	0.0496	0.0000	0.9507
Sensitivity to Market Risk	6,956	0.0173	0.0582	0.0000	0.0013	0.0102	0.0000	1.2769
ROA	6,956	0.0062	0.0126	0.0051	0.0084	0.0112	-0.2532	0.0686
Risk Adjusted Capital Ratio Tier 1	6,956	12.3162	6.6210	10.1050	11.8600	13.9000	0.0300	384.0000
Size	6,956	3.2410	0.7176	2.7583	3.0857	3.5852	0.1252	6.4105

Table 5 - Comparison of CPP banks and Non-CPP banks before and after CPP

	Panel A - CPP banks			Panel B - Non-CPP banks			Panel C - Before CPP			Panel D - After CPP		
	Before CPP (1)	After CPP (2)	(1) - (2)	Before CPP (3)	After CPP (4)	(3) - (4)	CPP banks (5)	Non-CPP banks (6)	(5) - (6)	CPP banks (5)	Non-CPP banks (6)	(5) - (6)
Efficiency Score	0.4815	0.4374	0.0441***	0.4077	0.3783	0.0294***	0.4077	0.4815	-0.0739***	0.3783	0.4374	-0.0592***
Capital Adequacy	0.0890	0.1022	0.1022***	0.0959	0.0980	-0.0021*	0.0959	0.0890	0.0069***	0.0980	0.1022	-0.0042***
Assets Quality	0.0055	0.0205	-0.0150***	0.0060	0.0221	-0.0161***	0.0060	0.0055	0.0005**	0.0221	0.0205	0.0015*
Management Quality	0.7853	0.7541	0.0312	0.7792	0.8155	-0.0363	0.7792	0.7853	-0.0061	0.8155	0.7541	0.0614**
Earnings	0.1078	0.0142	0.0936***	0.1046	0.0805	0.0241	0.1046	0.1078	-0.0033	0.0805	0.0142	0.0663
Liquidity	0.0368	0.0495	-0.0128***	0.0378	0.0514	-0.0136***	0.0378	0.0368	0.0010	0.0514	0.0495	0.0019
Sensitivity to Market Risk	0.0177	0.0186	-0.0010	0.0191	0.0143	0.0048**	0.0191	0.0177	0.0014	0.0143	0.0186	-0.0044**
ROA	0.0092	0.0036	0.0056***	0.0094	0.0029	0.0065***	0.0094	0.0092	0.0002	0.0029	0.0036	-0.0007
Risk Adjusted Capital Ratio Tier 1	10.6185	12.7650	-2.1465***	12.6056	12.9975	-0.3919	12.6056	10.6185	1.9871***	12.9975	12.7650	0.2325
Size	3.2857	3.5923	-0.3066***	2.9382	3.1802	-0.2420***	2.9382	3.2857	-0.3475***	3.1802	3.5923	-0.4121***

***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6 - Correlation matrix

	ES	CA	AQ	MQ	E	L	SMR	ROA	CET1	Size	CPP
ES	1										
CA	0.0758***	1									
	(0.0000)										
AQ	-0.1370***	-0.1093***	1								
	(0.0000)	(0.0000)									
MQ	-0.0417***	0.1976***	0.0683***	1							
	(0.0005)	(0.0000)	(0.0000)								
E	0.0067	-0.0155	-0.0228*	-0.0096	1						
	(0.5766)	(0.1969)	(0.0577)	(0.4222)							
L	-0.0426***	0.0146	0.1142***	0.206***	-0.0139	1					
	(0.0004)	(0.2225)	(0.0000)	(0.0000)	(0.2464)						
SMR	-0.0414***	-0.0758***	-0.0073	0.004	0.0279**	0.0104	1				
	(0.0006)	(0.0000)	(0.5423)	(0.7389)	(0.0202)	(0.3868)					
ROA	0.1371***	0.1033***	-0.5564***	-0.4234***	0.0142	-0.2069***	0.0045	1			
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.2377)	(0.0000)	(0.7072)				
CET1	0.1073***	0.6128***	-0.0377***	0.2046***	-0.0041	0.0383***	-0.0458***	0.0588***	1		
	(0.0000)	(0.0000)	(0.0017)	(0.0000)	(0.7349)	(0.0014)	(0.0001)	(0.0000)			
Size	0.5792***	0.0277**	-0.0592***	-0.116***	-0.0043	0.0531***	0.0036	0.1088***	-0.0956***	1	
	(0.0000)	(0.0211)	(0.0000)	(0.0000)	(0.7208)	(0.0000)	(0.7624)	(0.0000)	(0.0000)		
CPP	0.1037***	-0.0136	-0.0203*	-0.0209*	-0.0081	-0.0146	0.0135	0.0081	-0.0798***	0.267***	1
	(0.0000)	(0.2584)	(0.0912)	(0.081)	(0.4993)	(0.2222)	(0.2607)	(0.4979)	(0.0000)	(0.0000)	

The variables mentioned in this table and their notations are defined in Table 2. Numbers in parentheses are p-values. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7 - Variance Inflation Factor (VIF)

	Collinearity Statistics	
	VIF	Tolerance (=1/VIF)
Capital Adequacy	1.760	0.569
Assets Quality	1.660	0.604
Management Quality	1.460	0.684
Earnings	1.000	0.998
Liquidity	1.090	0.919
Sensitivity to Market Risk	1.010	0.990
ROA	1.990	0.502
Risk Adjusted Capital Ratio Tier 1	1.790	0.557
Size	1.200	0.832
CPP dummy	2.180	0.458
Mean VIF	1.514	

Table 8 - 2SLS Instrumental Variables results

	Whole sample			Matched (Propensity Score)								
				No restriction			Caliper 0.10			Caliper 0.01		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Panel A – First Stage											
IV comm banks	0.5204***			0.4038***			0.4304***			0.4531***		
	(0.0116)			(0.0275)			(0.0283)			(0.0293)		
IV fin sector		0.5428***			0.4248***			0.4488***			0.4683***	
		(0.0105)			(0.0250)			(0.0256)			(0.0264)	
IV president			0.0364**			0.0538***			0.0480***			0.0838***
			(0.0145)			(0.0158)			(0.0159)			(0.0173)
Bank-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	6,952	6,952	6,952	5,422	5,422	5,422	5,393	5,393	5,393	4,767	4,767	4,767
F	98.18	110.82	59.99	63.69	71.54	41.81	64.97	73.11	41.13	58.74	66.92	35.70
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Adjusted R^2	0.1227	0.1364	0.0782	0.1037	0.1151	0.0700	0.1061	0.1180	0.0693	0.1081	0.1215	0.0679
	Panel B – Second Stage											
CPP dummy predicted	-0.0952***	-0.0668***	-1.1668**	-0.1127***	-0.0728**	-0.8588***	-0.0798**	-0.0469	-0.9495***	-0.1402***	-0.0987***	-0.4476***
	(0.0276)	(0.0235)	(0.5070)	(0.0363)	(0.0313)	(0.2850)	(0.0345)	(0.0300)	(0.3445)	(0.0334)	(0.0289)	(0.1323)
Bank-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	6,952	6,952	6,952	5,422	5,422	5,422	5,393	5,393	5,393	4,767	4,767	4,767
Wald χ^2	4390.13	4436.22	759.7	3770.29	3826.02	1100.88	3500.38	3515.82	856.91	2848.33	2918.31	1764.17
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.3810	0.3880	-	0.4045	0.4139	-	0.3938	0.3970	-	0.3589	0.3757	-

This table shows the results of the IV analyses based on Eqs. (1) and (2). The main variables mentioned in this table, including the bank-level controls, are defined in Table 2. Detailed results are available upon request. Numbers in parentheses are robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 9 - Tests of endogeneity

Whole sample	IV comm banks	IV fin sector	IV president
Durbin (score) chi2 (1)	6.12268 (0. 0133)**	2.76388 (0.0964)*	32.6844 (0.000)***
Wu-Hausman F(1,6940)	6.1175 (0.0134)**	2.76021 (0.0967)*	32.7821 (0.000)***

Matched (Propensity Score) (No restriction)	IV comm banks	IV fin sector	IV president
Durbin (score) chi2 (1)	4.34887 (0.0370)**	1.24154 (0.2652)	29.7061 (0.000)***
Wu-Hausman F(1,5410)	4.34273 (0.0372)**	1.23907 (0.2657)	29.8036 (0.000)***

Matched (Propensity Score) (Caliper 0.10)	IV comm banks	IV fin sector	IV president
Durbin (score) chi2 (1)	1.18164 (0.2770)	0.019711 (0.8883)	29.2733 (0.000)***
Wu-Hausman F(1,5381)	1.17927 (0.2776)	0.019667 (0.8885)	29.3676 (0.000)***

Matched (Propensity Score) (Caliper 0.01)	IV comm banks	IV fin sector	IV president
Durbin (score) chi2 (1)	9.73304 (0.0018)***	4.45785 (0.0347)**	16.2955 (0.0001)***
Wu-Hausman F(1,4755)	9.72841 (0.0018)***	4.45079 (0.0349)**	16.3102 (0.0001)***

Numbers in parentheses are p-values. ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Table 10 - Test of instrument strength by minimum eigenvalue

Minimum eigenvalue statistic	Instrumented variable: CPP_Dummy		
	IV comm banks	IV fin sector	IV president
Whole sample	358.986	475.837	6.59874
Matched (Propensity Score) (No restriction)	215.62	288.975	11.6965
Matched (Propensity Score) (Caliper 0.10)	231.911	308.225	9.0946
Matched (Propensity Score) (Caliper 0.01)	239.237	316.208	23.5247
2SLS Size of nominal 5% Wald test			
10%	16.38	16.38	16.38
15%	8.96	8.96	8.96
20%	6.66	6.66	6.66
25%	5.53	5.53	5.53
LIML Size of nominal 5% Wald test			
10%	16.38	16.38	16.38
15%	8.96	8.96	8.96
20%	6.66	6.66	6.66
25%	5.53	5.53	5.53