



# Did capital infusions enhance bank recovery from the great recession? ☆



Wei Liu<sup>a,1</sup>, James W. Kolari<sup>a,\*</sup>, T. Kyle Tippens<sup>b,2</sup>, Donald R. Fraser<sup>a,3</sup>

<sup>a</sup>Texas A&M University, Department of Finance, College Station, TX 77843-4218, United States

<sup>b</sup>Abilene Christian University, College of Business Administration, Abilene, TX 79699, United States

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## ABSTRACT

This paper investigates the long-run recovery experience of US banks that received capital infusions under the Capital Purchase Program (CPP), a part of the Troubled Asset Relief Program (TARP). Based on a dynamic recovery model, our results show that recovering CPP banks tended to be in better financial condition than other CPP banks. Long-run event study analyses of common stock prices reveal that, in the quarter after repayment of TARP funds, CPP banks experienced economically large and significant buy-and-hold wealth gains of 14%, equivalent to approximately \$329 billion. We conclude that TARP was successful in fostering bank financial and stock price recovery.

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## 1. Introduction

“I certainly think that the TARP has mostly served its purpose and that it's time to start thinking about how we are going to unwind that program ... many banks are paying back the TARP and a lot of the money that was put out is now coming back to the Treasury”.

Chairman Ben Bernanke in a Senate Banking Committee hearing (December 3rd, 2009).

Unprecedented failures occurred in 2008 among large financial institutions engaged in the securitization of home loans. Bear Stearns and Merrill Lynch merged with commercial banks at fire-sale prices, Lehman Brothers was liquidated, government-spon-

sored mortgage lenders Fannie Mae and Freddie Mac were nationalized, and a number of megabanks became insolvent. Panic in financial markets caused collapses of capital asset prices on a global scale. In an effort to restore stability and liquidity to the financial system, the US government passed the Emergency Economic Stabilization Act on October 3, 2008 to mitigate systemic risk. Under this Act, the Troubled Asset Relief Program (TARP) provided the US Treasury with \$700 billion to bail out failing institutions<sup>4</sup> and prevent a repeat of the Great Depression banking collapse.<sup>5</sup>

Taking advantage of TARP funds, US Treasury Secretary Paulson on October 14, 2008 opened the Capital Purchase Program (CPP)<sup>6</sup> designed to inject cash into banks in exchange for preferred stock

<sup>4</sup> Although the Act stated that only relatively strong institutions would be eligible for TARP funding, the program was later aimed at rescuing troubled banks and automobile companies. See Ghosh and Mohamed (2010) and Broome (2011) for excellent overviews of TARP.

<sup>5</sup> About one-half of US banks (or approximately 15,000 banks) closed their doors in the Great Depression. Studies by Bernanke (1983) and Anari et al. (2005) show that credit contractions associated with large numbers of bank failures exacerbated the depth and duration of the economic downturn in the Depression years. See also Shimizu (2006) on efforts by the Japanese government from 1999 to 2001 to stabilize the economy by injecting capital into banks and requiring them to expand bank credit under the Business Revitalization Plan during the financial crisis at that time.

<sup>6</sup> TARP resources were committed by the Treasury to different programs as follows: Capital Purchase Programs (CPP) – \$250 billion, Public–Private Investment Program (PPIP) – \$100 billion, Term Asset-Backed Securities Loan Facility (TALF) – \$100 billion, Systematically Significant Failing Institutions (AIG) – \$70 billion, etc. (see the Treasury report to Congress, June 10, 2011).

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\* Corresponding author. Tel.: +1 979 845 4803.

E-mail addresses: [wliu@mays.tamu.edu](mailto:wliu@mays.tamu.edu) (W. Liu), [j-kolari@tamu.edu](mailto:j-kolari@tamu.edu) (J.W. Kolari), [kyle.tippens@acu.edu](mailto:kyle.tippens@acu.edu) (T. Kyle Tippens), [dfraser@mays.tamu.edu](mailto:dfraser@mays.tamu.edu) (D.R. Fraser).

<sup>1</sup> Tel.: +1 979 862 4248.

<sup>2</sup> Tel.: +1 325 674 4947.

<sup>3</sup> Tel.: +1 979 845 3610.

and warrants.<sup>7</sup> After implementing stress tests to gauge impending losses in large institutions, regulatory capital requirements were imposed by infusing capital to meet minimum common equity levels after projected losses. Over the course of the program, a total of 707 CPP institutions received \$205 billion in TARP funds. About \$190 billion was paid out to large banks with more than \$10 billion in assets. Hence, TARP funds were primarily intended to keep large banks afloat until the economy revived. Implicit in this strategy was the presumption that solvent institutions would act prudently to manage their financial condition, recover from their losses, and repay TARP funds within a reasonable period of time. As of June 1, 2011, 130 institutions had repaid \$180 billion with remaining balances outstanding at small bank participants.<sup>8</sup>

In this paper we examine the recovery experience of CPP banks receiving TARP funds. We define the recovery period as the time span from receipt to later repayment of TARP funds by participating banks. Small banks with less than \$500 million in assets are excluded from our analyses due to the lack of requisite accounting and financial data. We contribute to the growing TARP literature by providing evidence on the following research questions: What are the determinants of financial condition recovery among CPP banks that repaid TARP funds compared to other CPP banks? Can we use such information to predict future CPP bank recoveries? Did participating banks experience stock wealth gains during or after the period of repayment? Is there a relationship between financial condition and stock price recovery? Are there policy implications that would be useful to regulators and other government officials in terms of effectively managing systemic bank risk?

Our empirical analyses investigate CPP banks' health from two perspectives: (1) we develop a dynamic recovery model to capture the time series characteristics of CPP banks' financial recovery and (2) we perform a long-run event study using CPP banks' common stock prices to measure wealth effects over time. Our dynamic recovery model utilizes quarterly bank holding company data from December 2007 to December 2010 to identify the determinants of bank recovery. Financial health is proxied in terms of the recovery probability of repaying CPP banks relative to nonrepaying CPP banks. Our main contribution in this respect is to document the determinants of changes in financial health among CPP banks after the implementation of TARP. In brief, our results show that recovering CPP banks that repaid TARP obligations tended to have stronger overall financial condition, as reflected in higher capital, asset quality, profits, dividends, liquidity, and size, than nonrecovering CPP banks. Further out-of-sample tests based on forecasted probabilities of bank recovery derived in the present paper support the reliability of the dynamic recovery model. These new forecasted probabilities contribute to the emerging dynamic hazard literature (e.g., see Shumway, 2001; Duffie et al., 2007; Duffie et al., 2009) by enabling bank regulators, academic researchers, and others to more readily utilize dynamic models as early warning systems (EWSs).

Our long-run event study investigates CPP common stock reactions in the following well-defined event windows: before the receipt of TARP funds, within the interim from receipt to later repayment of TARP funds, and after repayment. We use a variety of event study methodologies. Stock prices should reflect the full information effects of capital infusions on banks' recovery. Throughout the post-TARP announcement period, investors were

able to gauge the long-run economic effects of capital infusions on individual institutions and the banking system as a whole. If stabilization of the system was successful, troubled institutions should have been beneficiaries of increased public confidence. In this respect, unlike most long-run event studies that focus on underreaction or overreaction to a specific information announcement (i.e., market inefficiency), we are interested in the total economic impact of capital infusions on the banking industry. Referring to the buy-and-hold reference portfolio results, CPP banks that repaid TARP funds by year-end 2010 had significant abnormal returns of about 4.7% in the interim between receiving and repaying funds. More importantly, in the quarter after repayment of TARP funds, CPP banks experienced economically large and significant buy-and-hold wealth gains of 14%, equivalent to approximately \$329 billion. Linking our dynamic-recovery/event-study results, cross-sectional analyses show that long-run abnormal returns were significantly related to recovering financial condition over time.

Based on the empirical evidence, we conclude that TARP was instrumental in fostering the financial and stock price recoveries of CPP banks. A major policy implication is that troubled banks exposed to potential debt losses could benefit from capital infusions.

### 1.1. Related literature

TARP literature can be divided into studies of CPP banks' financial health and stock price performance. Related to our dynamic recovery analyses, previous studies examine the financial condition of CPP banks from a comparative static perspective. Compared to non-recipients, Bayazitova and Shivdasani (2012) find that CPP banks tended to be larger with greater funding uncertainties and weaker capital ratios, stronger asset quality, and higher commercial and industrial loans. Taliaferro (2009) reports evidence that CPP banks normally used TARP funds to improve their capital positions, rather than support lending.<sup>9</sup> Some characteristics of banks likely to participate in the CPP were: high leverage, high commitments and other opportunities for new lending, and exposure to troubled asset classes such as real estate loans. Duchin and Sosyura (2012) show that CPP funding was more probable among banks with political connections, lower capital adequacy, earnings, and liquidity, and larger size. Li (2012) also finds that political connections were a determinant of TARP funding and that most of this funding was used to bolster capital ratios as opposed to increase lending. Finally, Jordan et al. (2010) observe that the market-to-book ratios of CPP banks were lower than other banks. Lower market-to-book ratios were associated with higher expenses, nonaccrual assets, and real estate investments but lower non-interest and interest income. In general, these studies suggest that CPP banks were more financially distressed than non-recipients.

By contrast, evidence by Ng et al. (2010) indicates that CPP banks had higher profitability, as well as lower ratios of non-performing loans to total loans, book-to-market, capital, and cash-to-deposits, than other banks. They infer that CPP participants generally had stronger financial condition than non-CPP banks prior to and during the initiation of TARP.

Some recent papers have documented the financial condition of recipient CPP banks after the receipt of TARP funds. Wilson and Wu (2012) show that early TARP exit by the end of 2009 was associated with higher CEO pay, bank size, capital, and financial condition compared to other CPP banks. Empirical analyses by Cornett et al. (2013) employ probit models to demonstrate that pre-crisis

<sup>7</sup> Originally, TARP funds were intended to purchase "toxic" assets from troubled institutions and address liquidity and credit flow problems in large institutions, but this approach was later abandoned by the Treasury in favor of capital infusions to avoid zombie banks with negative net worth and increased moral hazard risk.

<sup>8</sup> The government implemented a Small Business Lending Program from July to September 2011 to raise capital at smaller banks lending more heavily to small businesses. As of October 6, 2011, among 332 recipient banks, 137 banks used some of these funds to repay TARP obligations.

<sup>9</sup> For an in-depth analysis of the lending activities of CPP banks, see Contessi and Francis (2011).

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