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TARP's Deadbeat Banks

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TARP's Deadbeat Banks

This paper tests whether poorly capitalized banks with troubled loan books are more likely to miss their bailout dividends. Privately held banks with weaker core capital ratios, more charged off loans, more allowances for loan losses, and more non-performing loans are more likely to miss their Troubled Asset Relief Program (TARP) dividends. Banks which are subject to regulatory orders and banks that issue non-cumulative preferred stock are also more likely to be TARP deadbeats. This study finds a high degree of dividend persistence. Thus, models taking into account past preferred dividend payment behavior correctly predict over 95 percent of the missed and made dividends.

Journal of Economic Literature Codes: G21, G28, G38

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1. Introduction

The Capital Purchase Program (CPP) was supposed to invest up to $250 billion in "healthy" banks. That program which was part of the Troubled Asset Relief Program (TARP) is likely to show a profit as many of the largest banks as documented by Wilson and Wu (2011) have chosen to exit the program early, paying back taxpayers in full.[1] Yet, smaller, privately held banks have been more reluctant to exit the program. These smaller banks make up the majority of banks receiving funds and a majority of the banks missing their promised dividends to taxpayers.[2]

This is a unique opportunity to look at the risks of investing in privately held banks. These privately held banks made up 372 of the 656 banks receiving preferred stock investments. Yet, the private preferred stock recipient received $4.27 billion out of the $204.9 billion passed out in the CPP. These privately held banks made up 61 of the 95 banks that missed their May 2010 bailout dividend and were responsible for 176 of 286 missed dividends between February 2009 and May 2010, according to the author's analysis. The largest bank in this sample had just over $4 billion in assets. In contrast, Bank of America had $2,338 billion in assets. The average bank-quarter observation

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[1] See Zachary Kouwe, August 31, 2009, "As Banks Repay Bailout Money, U.S. Sees a Profit," *New York Times*, A1, accessed online on August 14, 2010, at http://www.nytimes.com/2009/08/31/business/economy/31taxpayer.html. That study for the newspaper projected that the Capital Purchase Program would turn a profit largely due to early redemptions from massive commercial and investment banks. Congressional Budget Office (2010b) also believes that the CPP is likely to turn a profit even if the TARP as a whole will not.

[2] This fact has not gone unnoticed by the media. See David Cho, June 14, 2010, "Small banks are big problem in government bailout program," *Washington Post*, accessed online on August 13, 2010, at http://www.washingtonpost.com/wp-dyn/content/article/2010/06/13/AR2010061304513.html. Many similar stories appear each time the list of TARP deadbeats is made public. See this story after the November 2009 dividend skipper's names were released, David Goldman, December 24, 2009, "Bailout's Big Mistake: Loans to Small Banks," *CNN Money*, accessed online on August 14, 2010, at http://money.cnn.com/2009/12/24/news/economy/bailout_payback/index.htm.

studied by Georgieva and Wilson (2010), which only looked at the publically traded banks in the Compustat database, topped $22 billion in total assets.

Most TARP banks are not SEC filers and are not included in Compustat. Call report data is hard to use for larger banks in the Compustat universe because those holding companies hold several banks filing many different call reports. In contrast, most of the privately held TARP banks only have one bank which files call report data.

Using this new data set, the one-year, preferred dividend pass, or skipping, rates are estimated to be 12.6 percent in the first year. Relying on the work of Carty (1995) and Crabbe (1996), the author estimates that the appropriate yields for the average private bank issuing preferred stock would be between 7.8 and 12.0 percent. A new, non-TARP program the Small Business Lending Fund (SBLF) was passed by Congress and signed into law in fall 2010. Its first investments are due to be made in March 2011.[3] The SBLF will invest up to $30 billion of new preferred stock in small banks[4] such as those studied here in exchange for dividends as low as 1 percent. Thus, estimating the appropriate yield for preferred stock in privately held banks that opt for government capital is of concern for policy makers as well as bank managers and bank investors.

This paper focuses on the TARP dividend payment behavior of the smallest bailout recipients. We would expect that banks that have low capital ratios or troubled loan books would be reluctant to or be prevented by regulators from paying preferred stock dividends. Further, it seems likely that banks that have issued noncumulative

[3] This roll out date for the SBLF is based on statements of the Acting Deputy U.S. Treasury Secretary for Financial Stability in his written testimony to the Congressional Oversight Panel to the TARP on March 4, 2011, accessed online on March 5, 2011, at http://cop.senate.gov/documents/testimony-030411-massad.pdf.
[4] See July 30, 2010, "Son of TARP," *Wall Street Journal*, accessed online on August 2, 2010, at http://online.wsj.com/article/SB10001424052748703578104575397270802770004.html.

preferred stock to taxpayers will be more likely to skip dividends because they don't have to make up missed dividends.

The data supports these hypotheses. This study finds that privately held banks are more likely to be deadbeats on their bailout dividends if they have lower core capital ratios, higher allowances for loan losses, higher amounts of charged off loans in the quarter, and higher past due and non-accrual loans. Banks subject to regulatory orders and banks which pay non-cumulative TARP dividends are also more likely to skip their quarterly payments to taxpayers.

Unlike previous work by Georgieva and Wilson (2010), which only looked at publically held TARP recipients' dividend payment behavior, this study finds that smaller privately held TARP banks are no more likely to skip bailout dividends than larger TARP recipients. This may be in part due to the fact that the privately held TARP recipients were not as forcefully pushed to take part in the TARP as the larger publically held banks as recounted by Paulson (2010, pp. 362-366). (Banks that are forced into the program will be investments less subject to adverse selection problems.)

The literature on the preferred stock has primarily focused on tax issues in the context of optimal investment and capital structure decisions. See Engel *et al.* (1999), Bajaj *et al.* (2002), Harvey *et al.* (2003), and Pons-Sanz *et al.* (2007). Carty (1995), Crabbe (1996), and Georgieva and Wilson (2010) are the only academic studies to discuss skipped preferred stock dividends to the author's knowledge. This study is the only study to look at the dividend skipping behavior of privately held TARP banks.

The TARP's Capital Purchase Program (CPP) is the subject of many academic studies. Several studies address many aspects of the returns from participating in TARP.

Examples are Kim (2010), Kim and Stock (2010), and Veronesi and Zingales (2010). A number of other studies look at which banks are selected for and accept CPP investments. See Duchin and Sosyura (2009), Cadman *et al.* (2010), Jordan *et al.* (2010), Li (2010), and Ng *et al.* (2010). In contrast, Wilson and Wu (2011) look at the characteristics of banks that exit the program early. Another group of papers look at the likely impact of the investments on bank lending. These studies are Bebchuck and Goldstein (2008), Bayazitova and Shivdasani (2009), and Taliaferro (2009), Philippon and Schnabl (2009), Wilson (2009a), and Wilson and Wu (2010). Warrants were issued as part of the CPP investments. Wilson (2011) and Wilson (2009b), for example, look into warrant negotiations and valuation issues, respectively.

The paper is organized in several sections. In section 2, the data set is explained in more detail. Then in section 3, the t-test results and discussed. Next in section 4, we attempt to predict dividend skipping, using the Logit model. Whether or not the bank missed the previous quarter's dividend is an important predictor of the next quarter's dividend behavior. In section 5, two different conditional logit models are used to explain a bank's propensity to miss dividends. The conclusion is in section 6. Nevertheless in appendix section 7, the author uses the sample's dividend pass rates to estimate an average cost of capital for the investments.

2. Data

Seven hundred and seven banks received capital infusions from the Troubled Asset Relief Program (TARP), according to SIGTARP (2010). The largest program by the amount of monies invested in the TARP was the Capital Purchase Program (CPP) for healthy banks. This paper obtained the names of the dividend skippers from transaction reports issued by the U.S. Treasury's, Office of Financial Stability. This study focuses on the privately held dividend skippers in contrast to Georgieva and Wilson (2010), which only studies publically held banks. This study selected banks that issued preferred stock or preferred stock and exercised warrants to taxpayers, according to transaction reports issued by the U.S. Treasury's Office of Financial Stability.[5] These issuers are, for the most part, privately held or have very thinly traded common shares. Georgieva and Wilson (2010) selected the 282 publically held banks that issued common stock warrants to taxpayers. This study focused on the 372 banks that issued preferred stock to the U.S. Treasury, but did not issue common stock warrants. The exercised warrants, which were issued by the privately held banks, were in the form of preferred stock equal to 5 percent of the amount the U.S. Treasury invested. The preferred stock from the "exercised warrants" paid a nine percent dividend in perpetuity.

The U.S. Treasury also invested in 51 banks organized as S-corporations, which issued subordinated debt to taxpayers. Those banks were excluded from the study because of the different terms of the TARP subordinated debt. According to the author's calculations, the CPP's subordinated debt investments totaled $541.6 million. Through the May 2010 quarterly interest payment, six of the 51 subordinated debt recipients had missed a total of twelve subordinated debt interest payment. There is little penalty for

[5] These "exercised warrants" are not warrants at all. They are additional grants of preferred stock. The TARP legislation required that warrants were issued by all bailout recipients which received more than a

banks that "defer" interest in the subordinated debt that taxpayers hold. Banks can defer interest for up to five years (twenty quarters) before this constitutes default.[6]

The author then matched by hand the names to unique identifiers of the banks used in Federal Financial Institutions Examination Council (FFIEC) call reports. The call reports contain extensive accounting data about all banks in the United States, regardless of whether or not they are publically traded or privately held. The author used the name of the bank holding company and its location to identify its IDRSSD number used in the call reports. The author was only able to identify IDRSSD for 365 of the 372 Capital Purchase Program recipients studied. For those seven banks dropped from the sample, it was impossible to uniquely identify the bank using its name and location. This study matches the accounting data in the quarter immediately proceeded by the scheduled dividend. For example, the May 2010 dividend was matched with the accounting data from the first quarter ended March 31, 2010. This study uses call report data from the first quarter of 2009 through the first quarter of 2010.

The author identified banks that missed their TARP dividends from monthly dividend and interest reports issued by the U.S. Treasury from May 2009 to May 2010. The author obtained dividend skipping behavior for February 2009 from dividend and interest lists in SIGTARP (2009, 196-201) and SIGTARP (2010, 77-80).

This study uses an unbalanced panel of quarterly observations of the 365 different banks for which the author had accounting data from the call reports. Yet, there were 1680 total bank-quarter observations. Banks were in the sample if they were due to pay a

[6] See sections 4.1 and sections 5.6 of the securities purchase agreements for banks that issued subordinated debt to taxpayers available at http://www.financialstability.gov/impact/contracts_list.htm. (This was accessed online on August 14, 2010.) The sections 4.1 and 5.6 say that banks issuing subordinated debt can avoid default while missing interest payments to taxpayers for up to twenty quarters.

dividend on a given payment date. Thus, only banks that had entered but not yet exited TARP were included in the sample.

Almost all banks paid their regularly scheduled quarterly dividends in the middle of the months of February, May, August, and November. The first quarterly dividend cycle in February 2009 was not used as the dependent variable. Yet, it was used as a lagged dividend payment. The dividends paid in May 2009, August 2009, November 2009, and February 2010 were used as both dependent variables in the logistic regressions and lagged dependent variable in some specifications. The last dividend in the sample, the May 2010 dividend, was only used as a dependent variable in the logistic regressions.

Most data accounting items are taken directly from the call reports. A few data items needed adjustments. Tangible common equity is defined as total equity less preferred stock minus goodwill and other intangible assets. That ratio is divided by total assets as are most of the other ratios. Income statement items, such as earnings, are reported as cumulative for the year. Return on assets is the quarterly earnings divided by total assets. To find quarterly earnings for the second, third, and fourth quarters of 2009, the author took the difference of second and first quarter earnings, third and second quarter earnings, and fourth and third quarter earnings, respectively. No adjustment was needed for the call report earnings from first quarter of 2009 and first quarter of 2010.

Ryan Holeywell, a reporter at Bailoutslueth.com, compiled data on banks within TARP, which were subject to regulatory orders from the various federal regulators.[7]

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[7] This data set is discussed further in Ryan Holeywell, June 17, 2010, "TARP Banks Face Rising Regulatory Issues -- At Least One in Nine Has Received Federal Enforcement Action Since Getting Public Funds, " *Bailoutslueth.com*, accessed online on August 3, 2010, at http://bailoutsleuth.com/10/06/710/more-than-one-out-of/

Bailoutslueth.com regularly reports on developments to the TARP program and the activities of the Federal Deposit Insurance Corporation (FDIC).

[*Insert table 1 about here.***]**

The summary statistics for the sample are in table 1. About nine percent of the bank-quarter observations, 152 observations, skipped the present quarter's dividend. Six percent of the bank-quarter observations, 103 observations, skipped the prior quarter's dividend. Seventy-nine percent of the banks paid cumulative dividends. Approximately 17, 19, 20, 22, and 22 percent of the bank-quarter observations came from May 2009, August 2009, November 2009, February 2010, and May 2010, respectively. Relatively few privately held banks exited TARP relative to their publically held peers. Thus, the number of observations generally climbed over time as more banks entered the program and few banks exited the program early.

The log total assets are measured in thousands. The sample had banks which ranged from $5.1 million in assets to $4,325.3 million in assets with median and average assets just over $250 million. This sample is much less highly skewed than the public filers' data set of Georgieva and Wilson (2010), in which the average assets were higher than the 90th percentile of the sample. The assets of the public filers are primarily made up of a handful of very large banks with over $100 billion in assets, according to Congressional Oversight Panel (2010).

Tier 1 capital, which is the core capital ratio according to the Basel international capital standards, was on average about 12.9 percent of risk-weighted assets. Common stock, TARP preferred stock, trust preferred stock, and noncumulative preferred stock count as tier 1 capital during this period. Subordinated debt and non-TARP cumulative preferred stock are types of tier 2 capital. On average, tier 2 capital was 1.2 percent. In contrast book common equity less intangible assets, tangible common equity, was about 9.3 percent. Past due and non-accrual, non-performing, loans accounted for about a third of common equity. Over 90 percent of total liabilities came from bank deposits. The average of net loans written off in a given quarter, net charge offs, was about 0.4 percent of a bank's total assets.

3. Univariate Tests

[*Insert table 2 about here.***]**

In table 2 we grouped the sample into TARP deadbeats, banks that missed their dividend in a given quarter, and TARP dividend payers. In general we would expect that smaller banks with worse accounting performance, weaker capital ratios, and regulatory orders pending, which were more dependent on deposits to fund their operations, would be more likely to skip dividends. Most of these predictions were supported in the univariate tests of means. Smaller banks and banks more dependent on deposits are more likely to have fewer financing options if they get in trouble. Lower earnings as measured by return on assets, greater allowances for loan losses, more loans charged off (net charge offs), more past due and non-accrual loans are all measures of poor quarterly performance and a troubled loan book. Capital ratios are a sign of strength that allows banks to eat into capital to pay dividends. Regulators routinely publicly or informally restrict the payment of dividends when they believe a bank is undercapitalized so as to lessen the likelihood and severity of bank failures on the Federal Deposit Insurance Corporation's deposit insurance fund. The presence of announced regulatory orders should be associated a higher propensity to miss TARP dividends. Banks that pay cumulative dividends to the U.S. Treasury are more likely to pay dividends because missing a dividend only defers payment to a later date, while noncumulative TARP preferred stock recipients need not pay back missed dividends.

In general, the dividend skippers were repeat offenders with weaker capital ratios and accounting performance. All but two independent variables were significantly different between the two groups of dividend skippers and dividend payers. Banks that had cumulative dividends were significantly less likely to skip their TARP dividends. Yet, banks that were more dependent on deposits were not significantly more likely to miss TARP dividends.

Unlike Georgieva and Wilson (2010), this sample finds that there was no relation between bank size and propensity to pay TARP dividends. Also in contrast to that study, which focused on publically traded banks, for the private banks in this sample a higher tier 2 capital ratio was associated with a lower propensity to pay TARP dividends. The tier 2 capital ratio is the only variable to have a significantly different sign than what was predicted. Nevertheless, the magnitude of the difference between the two groups' tier 2 capital ratios was relatively small.

4. Unconditional Logistic Results

It is standard to use the logistic regression, logit, for binary dependent variables. Since Cox (1970) it has been recognized that ordinary least squares (OLS) produces unsatisfactory results such as predicted probabilities which are less than zero and greater than one.

Suppose that p_i is the chance between 0 and 1 that a bank-quarter observation will skip its dividend. If the dependent variable at time t, $Y(t)$, equals one, then the bank-quarter observation missed its dividend payment. If $Y(t)$ equals zero, then the bank-quarter observation made its dividend payment. Let $\boldsymbol{x_i}$ be a row vector of independent variables of the i-th bank-quarter observation. β is defined as a column vector of the coefficients estimated from the model. From Johnston and Dinardo (1997, p. 424), the probability of the dependent variable being unity in the logistic model is

$$p_i = E(Y(t)=1|\mathbf{x}_i) = \frac{e^{\mathbf{x}_i\beta}}{1+e^{\mathbf{x}_i\beta}}. \tag{1}$$

With a little algebra the reader can demonstrate that the log-odds ratio below is linear.

$$\ln\left(\frac{p_i}{1-p_i}\right) = \mathbf{x_i}\beta. \tag{2}$$

The logit model is estimated using maximum likelihood techniques available in most commercially available regression software.

[*Insert table 3 about here.***]**

In table 3, the author presents six different logistic models of dividend skipping behavior. In model 1, the most potential independent variables are included in the regression. Two variables that are missing from model 1 are the lagged dependent variable, $Y(t-1)$, and the tangible common equity (TCE) ratio. Since tier 1 capital ratios and the TCE ratio are similar measures of core capital, the author only puts one of those two capital ratios in a given regression. In models 2 to 6, ln(Total Assets) and the quarterly dummies are dropped. In addition, either past-due loans are dropped completely from models 4, 5, and 6, or they are combined with non-accrual loans in models 2 and 3.

Several empirical regularities emerge in the logit regressions in table 3. In general, cumulative dividends, tangible common equity, and tier 1 capital are significantly negatively related to dividend skipping. In contrast, larger allowances for loan losses, net charges offs, and non-accrual loans and the presence of regulatory orders are statistically significant and positively related with missing TARP preferred stock dividends.

Surprisingly, in the multivariate regressions return on assets (ROA) has the opposite of the expected sign in table 3. In models 2, 3, 4, and 5 ROA's coefficient is positive and significant. That means a higher ROA is associated with a greater propensity to miss bailout dividends. This contradicts the univariate test in table 2, which said that banks missing bailout dividends had a significantly lower ROA than banks paying their TARP obligations. After controlling for other factors, it appears that TARP deadbeats have higher quarterly returns on assets. Their earnings may be boosted by the fact that many of them missed their bailout dividends in the prior quarter.

In model 6, the missed prior dividend variable is added. This is positive and significant, and model 6 has by far the highest pseudo R-squared of any of the models. Yet, model 6 introduces a time series specification to the regression. In models 7 to 12 we propose several specifications to account for the dividend payment behavior persistence.

An alternative way to look at the performance of the models is to look at the percent of time the models make correct calls and incorrect calls about whether a bank will skip or make scheduled dividends. If the predicted value, p_i in equation (1), is greater than 50 percent, then a skipped dividend is predicted. If the predicted value of p_i is less than 50 percent, then a made dividend is expected. In table 4, models 1 to 6 are judged by their percent correct predictions.

[*Insert table 4 about here.***]**

Models 1 to 6 do very well when the bank makes it TARP dividend, and, thus, $Y = 0$. In almost all cases, over 98 percent of the time, they correctly predict that the bank will make its dividend when that bank-quarter observation meets its obligations. Yet, models 1 to 5 only correctly predict bank’s payment behavior about 20 percent of the time when a bank-quarter observation missed this quarter's dividend. Model 6, which includes prior dividend payment history, does better. It correctly predicts a missed dividend about 60 percent of the time, and a made dividend is correctly predicted about 99 percent of the time.

5. Conditional Logistic Regressions

In tables 5 and 6 we attempt to better control for the fact that dividend payment history affects the probability that a given quarter's dividend will be paid. In table 5, models 7 and 8 and models 9 and 10, respectively, should be grouped together. The sample is split conditional on prior dividend payment. In models 7 and 9 there are 1577 observations which did not miss their prior dividend. In models 8 and 10 there are 103 bank-quarter observations that skipped their prior dividend. For models 7 and 9, cumulative dividend issuers that have not missed the prior dividend are significantly less likely to miss dividends. The other coefficients for the independent variables in models 7 and 9 are also similar to prior regressions. Higher capital ratios are negatively associated with dividend skipping. Alternatively, higher levels of net charged off loans and higher allowances for loan losses are significant and positively related to missed dividends.

In the smaller sample models 8 and 10, which are contingent on a prior missed dividend there are no significant coefficients for the independent variables. Nevertheless, the coefficient for past due and non-performing assets is positive and about ten times larger for prior TARP deadbeats than for prior TARP dividend payers.

One of the drawbacks of splitting the sample is that we give up some information. Suppose that this quarter's dividend payment outcome is $Y(t) = 0$ or 1, and the prior quarter's dividend payment is $Y(t-1) = 0$ or 1. To make the model conditional on the past dividend history, let us define p_{jk} as

$$\begin{aligned} &p_{jk} = \text{Prob}(Y(t) = k \mid Y(t-1) = j), \\ &\text{where } j, k \in \{0,1\} \end{aligned} \tag{3}$$

In this setup the probability of dividend payment depends on prior dividend history. The four possibilities are

$$\begin{pmatrix} p_{00} & p_{01} \\ p_{10} & p_{11} \end{pmatrix}. \tag{4}$$

In essence, we are assuming that the probability of dividend payment is a Markov chain process that depends on the previous dividend payment and some other factors which do not include past payment history. Let α and γ below be column vectors of coefficients. Diggle *et al.* (1994, 195)[8] propose that the logistic regression be formulated so that it estimates the log odds ratio of the *i*-th observation missing a dividend according to the following model:

$$\ln\left(\frac{p_i}{1-p_i}\right) = \mathbf{x_i}\alpha + Y_{t-1}\mathbf{x_i}\gamma = \mathbf{x_i}\beta \tag{5}$$

[8] Jackman (1998) also has a good discussion and application of this approach.

When $Y(t-1)$ for the i-th bank is 0, then equation (5) simplifies to

$$\ln\left(\frac{p_i}{1-p_i}\right) = \mathbf{x_i}\alpha = \mathbf{x_i}\beta. \tag{6}$$

. Yet, when $Y(t-1)=1$, then equation (5) becomes

$$\ln\left(\frac{p_i}{1-p_i}\right) = \mathbf{x_i}(\alpha+\gamma) = \mathbf{x_i}\beta. \tag{7}$$

In table 6, we estimate the Markov chain logistic model. The alpha terms are estimated normally. The γ terms are the coefficients for $Y(t-1)$ and interactions of the dependent variable with $Y(t-1)$. In model 11 and 12, only the independent variable coefficients for cumulative dividends, capital, allowances for loan losses, and net charge offs are significant, given the observation made its prior dividend.

None of the γ coefficients of the independent variables when a bank missed its prior dividend are significant. Nevertheless, capital ratios and past due and non-performing loans become more important predictors of future missed dividends for banks which were deadbeats in the prior quarter. Yet, it appears that more transitory measures of asset quality such as net charge offs and allowances for loan losses become less important for prior dividend skippers. The pseudo-R-squared values in table 6 are much larger than for any of the individual specifications in table 5.

In table 7, we look at the predictive power of the split sample and Markov models in tables 5 and 6. Whether one uses the split sample models 7, 8, 9, and 10 or the Markov models of 11 and 12, the logistic regressions only correctly predict dividend payment and skipping behavior correctly 95 to 96 percent of the time. This is not much of an improvement over the more parsimonious model 6 in table 4, which correctly predicted 95.3 percent of the made and missed dividends.

6. Conclusion

Most of the banks that issued preferred stock to taxpayers as part of the Troubled Asset Relief Program (TARP) were privately held. This is the only study to look at which privately held banks fail to pay their bailout dividends. Banks which issued cumulative preferred shares to taxpayers and banks that had stronger core capital ratios were significantly more likely to make their scheduled dividends. In contrast, banks that charged off more assets, held more allowances for loan losses, and held more non-accrual and past due loans were significantly more likely to be TARP deadbeats. Banks under the threat of a published regulatory order also were more likely to miss dividends.

This paper finds a strong persistence in dividend behavior. Banks that miss dividends are likely to continue doing so and banks making dividends are more likely to make the next scheduled payment. This paper uses several different models conditional on lagged dividend payment to predict future dividend payment behavior. The highest predictive power is obtained when the prior dividend payment is used to predict whether or not the bank will make its next dividend payment.

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7. Appendix: Dividend Impairment Rates and the Cost of the TARP Preferred Stock

Most banks in the Capital Purchase Program do not have actively traded preferred stock or bonds. Thus, determining the appropriate yield, or discount rate, for the TARP investments takes some estimation. In this section, the author uses dividend pass rates of the taxpayers' preferred stock investments to estimate the appropriate yield for new investments. These yields are used to estimate the subsidy rate of a new $30 billion investment program to buy preferred stock in small banks beginning in 2011.[9] This so-called Small Business Lending Fund (SBLF) will buy preferred stock issued by banks with less than $10 billion in assets. The preferred stock from the fund will pay dividends as low as 1 percent if lending targets are met.

The author estimated the incidence of dividend impairment, skipping dividends, on an annualized basis. This was done from the year period from February 16, 2009, to February 15, 2010. The author calculated the net number of different private banks skipping dividends in a quarter over the first four quarters of dividends. In total 42 privately held banks skipped dividends. We had 1332 bank-quarter observations or 1332/4 = 333 bank-year observations. The annualized preferred stock impairment rate was 42/333 = .1261 or 12.61 percent. A similar, one-year, preferred dividend impairment rate of 11.68 percent was found for the publically held banks in the CPP.

Carty (1995) says that the one-year dividend impairment rate for speculative grade preferred stock *b-rated* preferred stock was 11.2 percent. The minimum

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[9] See Daniel Wagner, August 1, 2010, "Program Risks $30B to Save Weak Banks," *Associated Press*, accessed online on August 14, 2010, at http://www.forbes.com/feeds/ap/2010/08/01/general-us-bank-bailouts_7814915.html.

investment grade preferred stock which was rated *baa* by Moody's had a one-year dividend impairment rate of 1 percent. Carty (1995) provides 95 percent confidence intervals of the impairment rates of preferred stock ranging from *aaa* to *b*. The 12.61 percent dividend impairment rate only falls in the *b* confidence interval of 7.3 percent to 15.0 percent. The next highest speculative grade 95 percent confidence interval of *ba* has a 2.5 to 8.3 percent annual dividend skipping rate in the first year. Thus, it seems that the preferred stock investments made by the U.S. Treasury are consistent with a Moody's *b* rating. S&P's roughly equivalent B-rated preferred stock yielded 7.84 percent on June 15, 2010, according to Preferreds Online.

Crabbe (1996) calculates the yield that a risk-neutral investor should demand for preferred stock that has a constant annual impairment rate, δ. The preferred stock trades at a steep discount after impairment occurs. According to Carty (1995) the average discount was 43 percent of par after a missed dividend. This fraction is denoted μ. Let i be the yield on a 10-year Treasury note, which yielded at 3.32 percent on June 15, 2010. Given the issue is priced at par, it should yield the following:

$$\text{Yield} = \frac{\text{par}(i + \delta - \mu\delta)}{1 + \mu\delta - \delta} \tag{8}$$

If we insert a 12.61 percent dividend impairment rate for preferred stock, the 43 percent post-impairment price, and the 3.32 percent risk-free rate into equation (8), we get a yield of 11.99 percent for the TARP preferred stock.

$$\text{Yield} = \frac{100\%(.0332 + .1261 - .43 * .1261)}{1 + .43 * .1261 - .1261} \approx 11.99\% \tag{9}$$

Thus, based on the dividend impairment rates on the TARP investments, these securities should have market yields between 7.84 to 11.99 percent based on June 15, 2010, prices.

This finding supports the contention of the Congressional Oversight Panel (2009) that taxpayers received preferred stock and warrants worth 78 percent of par for the U.S. Treasury's early CPP investments. Taxpayers' recoveries were boosted by the stigma attached to TARP funds, which encouraged early redemptions for those large banks with ready access to capital markets and an implicit government backstop. Further, the TARP preferred stock investments have been boosted by huge rally in the market for preferred stock as documented by Dash (2009). According to Dash (2009), the S&P Preferred Stock Index tracks the yield of about seventy of the largest and most liquid preferred stocks issues. Most of the issuers of the preferred stocks on the index are superregional banks, money center banks, or major investment banks. The yields in that index have ranged from just below 6 percent to over 18 percent in the financial crisis of 2008 to 2009. The value of preferred stock moves in the opposite directions of yields. In June 2010, the average yields for the S&P Preferred Stock Index stood at 6 to 7 percent as opposed to a record high yield of 18 percent during 2009. A comparable rally would need to see preferred stock yields drop to 2 to 3 percent. Such yields are probably impossible unless there is large-scale deflation. Large scale deflation is close to impossible with paper money and an activist central bank such as the Federal Reserve.

The Small Business Lending Fund (SBLF), which will announce its first investments in early 2011, proposes to inject into community banks preferred stock that pays as low as a one percent dividend for the first four-and-a-half years and a nine percent dividend for the remaining five-and-a half-years. After year ten, the preferred stock must be redeemed at par. Qualifying banks with less than $10 billion in assets pay a five percent dividend initially. Then they can qualify for a one percent dividend in the quarters leading up to the second anniversary of the investment if they increase their small business lending by ten percent from 2009 levels.

Let us assume that all banks reach the lending target after the first year. Further, let us assume that they redeem the government preferred stock when the dividend rate exceeds their cost of preferred stock. If the banks' cost of preferred stock exceeds 9 percent, then the author assumes that the preferred stock is redeemed in year 10. Under those assumptions, we can expect that the program's subsidy will be $6.6 billion to $13.0 billion. In the higher estimate, the present value of the subsidy is $11.3 billion in years 1 to 5, while in the lower estimate all the preferred stock is returned before the end of the fifth year. This is in sharp contrast to the five-year loss estimates from the bipartisan Congressional Budget Office (2010a), which puts the dollar subsidy from the program at between $1.366 billion to $3.4 billion for the first five years.

Table 1: Summary Statistics

Variable	Min-imum	Max-imum	Median	Average	Standard Deviation	10th Percentile	90th Percentile
Skipped Dividend Dependent Variable	0.00	1.00	0.00	0.09	0.29	0.00	0.00
Missed Prior Dividend Dummy	0.00	1.00	0.00	0.06	0.24	0.00	0.00
Cummulative Dividend Dummy	0.00	1.00	1.00	0.79	0.41	0.00	1.00
Total Missed Dividends	0.00	5.00	0.00	0.11	0.50	0.00	0.00
May 2009 Dividend Dummy	0.00	1.00	0.00	0.17	0.38	0.00	1.00
August 2009 Dividend Dummy	0.00	1.00	0.00	0.19	0.40	0.00	1.00
November 2009 Dividend Dummy	0.00	1.00	0.00	0.20	0.40	0.00	1.00
February 2010 Dummy	0.00	1.00	0.00	0.22	0.42	0.00	1.00
Regulatory Order Dummy	0.00	1.00	0.00	0.03	0.18	0.00	0.00
Ln(Total Assets)	8.52	15.28	12.44	12.45	0.97	11.28	13.67
Return on Assets (ROA)	-6.22%	5.90%	0.05%	-0.12%	0.64%	-0.62%	0.24%
Basel Tier 1 Capital Divided by Risk-Weighted Assets	1.78%	125.64%	11.98%	12.89%	6.57%	9.74%	16.19%
Basel Tier 2 Capital Divided by Risk-Weighted Assets	0.00%	6.30%	1.25%	1.23%	0.37%	0.97%	1.28%
Allowance for Loan Losses Divided by Total Assets	0.00%	5.52%	1.13%	1.29%	0.68%	0.67%	2.09%
Past Due Loans Divided by Total Assets	0.00%	11.45%	0.91%	1.31%	1.37%	0.04%	3.09%
Non-Accrual Loans Divided by Total Assets	0.00%	35.39%	1.56%	2.20%	2.54%	0.13%	4.76%
Past Due and Non-Accrual Loans Divided by Total Assets	0.00%	42.72%	2.72%	3.51%	3.37%	0.66%	7.11%
Tangible Common Equity Divided by Total Assets	-2.89%	93.77%	8.86%	9.28%	4.88%	6.79%	11.53%
Net Charge Offs Divided by Total Assets	-0.22%	8.56%	0.18%	0.46%	0.78%	0.00%	1.24%
Deposits Divided by Total Liabilities	0.00%	99.93%	92.22%	90.73%	9.48%	82.31%	99.16%

The sample contains 1680 bank-quarter observations from February 2009, May 2009, August 2009, November 2009, February 2010, and May 2010.

Table 2: T-test of means of dividend skippers (Y = 1) and dividend payers (Y = 0)

Missed Dividend? $Y(t)$ = 1 means "yes," and $Y(t)$ = 0 means "no".	$Y(t)$ = 1	$Y(t)$ = 0				
Number of Observations	152	1528				
Control Variable	**Mean of Dividend Skippers**	**Mean of Dividend Makers**	**Difference**	**t-statistic**	**p-value**	**Predicted Sign**
Cummulative Dividend Dummy	0.5724	0.8089	-0.2365	**-6.890**	0.000	-
Ln(Total Assets)	12.523	12.440	0.083	0.946	0.344	-
Tangible Common Equity Divided by Total Assets	7.48%	9.46%	-1.98%	**-4.794**	0.000	-
Basel Tier 1 Capital Divided by Risk-Weighted Assets	11.06%	13.08%	-2.02%	**-3.618**	0.000	-
Basel Tier 2 Capital Divided by Risk-Weighted Assets	1.29%	1.23%	0.06%	**2.019**	0.044	-
Return on Assets (ROA)	-0.51%	-0.08%	-0.43%	**-8.065**	0.000	-
Allowance for Loan Losses Divided by Total Assets	2.02%	1.22%	0.80%	**14.611**	0.000	+
Past Due Loans Divided by Total Assets	1.69%	1.27%	0.42%	**3.570**	0.000	+
Non-Accrual Loans Divided by Total Assets	4.21%	2.00%	2.21%	**10.534**	0.000	+
Past Due and Non-Accrual Loans Divided by Total Assets	5.90%	3.28%	2.62%	**9.394**	0.000	+
Net Charge Offs Divided by Total Assets	0.97%	0.35%	0.62%	**10.540**	0.000	+
Regulatory Order Dummy	0.1250	0.0249	0.1001	**6.582**	0.000	+
Deposits Divided by Total Liabilities	90.91%	90.71%	0.20%	0.252	0.801	+

If the t-statistic is significant at greater than the 90 percent level, then it is in bold. The grouping variable, Y refers to $Y(t)$. Y denotes whether or not the bank made the current period's divided (Y = 0) or not (Y = 1).

Table 3: In the logistic regression the dependent variable, *Y*, equals 1 when the observation does not pay its dividend in the calendar month it is due, and the dependent variable equals 0, *Y* = 0, when the observation made its scheduled dividend.

The dependent variable equals 1 if the dividend is missed, and it equals 0 if the dividend is made.

Intercept or Independent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Predicted Sign
Intercept	-1.367	**-1.133**	**-1.118**	**-1.120**	**-1.113**	**-2.171**	none
	0.373	*0.038*	*0.006*	*0.039*	*0.006*	*0.003*	
Cummulative Dividend Dummy	**-1.686**	**-1.589**	**-1.184**	**-1.587**	**-1.184**	**-0.810**	-
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.004*	
Ln(Total Assets)	0.107						-
	0.351						
Tangible Common Equity Divided by Total Assets			**-26.329**		**-26.116**		-
			0.000		*0.000*		
Basel Tier 1 Capital Divided by Risk-Weighted Assets	**-14.899**	**-15.253**		**-15.073**		**-14.496**	-
	0.000	*0.000*		*0.000*		*0.003*	
Basel Tier 2 Capital Divided by Risk-Weighted Assets	-14.766						-
	0.591						
Return on Assets (ROA)	21.425	**31.036**	**40.255**	**30.925**	**40.130**	23.111	-
	0.169	*0.036*	*0.008*	*0.035*	*0.008*	0.202	
Allowance for Loan Losses Divided by Total Assets	**67.378**	**82.888**	**94.495**	**80.911**	**93.501**	**63.419**	+
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	
Past Due Loans Divided by Total Assets	-0.412						+
	0.956						
Non-Accrual Loans Divided by Total Assets	4.956			**5.871**	3.846	5.149	+
	0.197			*0.084*	*0.274*	*0.232*	
Past Due and Non-Accrual Loans Divided by Total Assets		3.810	2.614				+
		0.155	*0.340*				
Net Charge Offs Divided by Total Assets	**57.328**	**46.825**	**50.852**	**45.703**	**50.066**	**43.268**	+
	0.000	*0.000*	*0.003*	*0.000*	*0.000*	*0.006*	
Regulatory Order Dummy	**1.198**	**1.411**	**1.358**	**1.417**	**1.455**	**0.833**	+
	0.001	*0.000*	*0.000*	*0.000*	*0.000*	*0.100*	
May 2009 Dividend Dummy	**-1.203**						-
	0.002						
August 2009 Dividend Dummy	**-1.129**						-
	0.001						
November 2009 Dividend Dummy	**-0.728**						+
	0.012						
February 2010 Dividend Dummy	**-0.995**						+
	0.002						
Missed Prior Dividend or Y(t-1)						**4.668**	+
						0.000	
Number of Observations	1680	1680	1680	1680	1680	1680	
Number of Dependent Variables Equal to 1	152	152	152	152	152	152	
Psuedo R-squared	0.141	0.130	0.141	0.131	0.141	0.257	

P-values are reported under the coefficients in italics. The coefficients are in bold font if the p-values are less than 0.1. The dependent variable, *Y* refers to *Y*(*t*). *Y* denotes whether or not the bank made the current period's divided (*Y* = 0) or not (*Y* = 1). Psuedo R-squared is reported using the Cox and Snell (1992) method.

Table 4: Model Predictions v. Actual Dividend Payment
The dependent variable, *Y*, equals 1 when the observation does not pay its dividend in the calendar month it is due, and the dependent variable equals 0, *Y* = 0, when the observation made its scheduled dividend.

The dependent variable, *Y*, equals 1 if the dividend is missed, and it equals 0 if the dividend is

Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(1) Predicted $Y = 1$ when $Y = 1$	28	27	35	27	35	91
(2) Predicted $Y = 0$ when $Y = 1$	124	125	117	125	117	61
Percent Correct Predictions when $Y = 1$	18.4%	17.8%	23.0%	17.8%	23.0%	59.9%
(3) Predicted $Y = 1$ when $Y = 0$	16	14	19	14	19	18
(4) Predicted $Y = 0$ when $Y = 0$	1512	1514	1509	1514	1509	1510
Percent Correct Predictions when $Y = 0$	99.0%	99.1%	98.8%	99.1%	98.8%	98.8%
Overall Percent Correct Predictions	91.7%	91.7%	91.9%	91.7%	91.9%	95.3%

The dependent variable, Y refers to $Y(t)$. Y denotes whether or not the bank made the current period's divided ($Y = 0$) or not ($Y = 1$).

Table 5: Conditional Logistic Regressions

In the logistic regression the dependent variable, *Y*, equals 1 when the observation does not pay its dividend in the calendar month it is due, and the dependent variable equals 0, *Y* = 0, when the observation made its scheduled dividend. The sample is split in two by prior dividend payment behavior.

Scenario	***Y*** **(*t-1*) = 0**	***Y*** **(*t-1*) = 1**	***Y*** **(*t-1*) = 0**	***Y*** **(*t-1*) = 1**	
Independent Variable	**Model 7**	**Model 8**	**Model 9**	**Model 10**	**Predicted Sign**
Intercept	**-2.217**	2.196	**-2.158**	2.389	none
	0.000	*0.175*	*0.006*	*0.250*	
Cummulative Dividend Dummy	**-0.651**	0.353	**-0.974**	-0.062	-
	0.033	*0.613*	*0.001*	*0.931*	
Tangible Common Equity Divided by Total Assets	**-20.306**	-24.319			-
	0.001	*0.127*			
Basel Tier 1 Capital Divided by Risk-Weighted Assets			**-12.971**	-14.362	-
			0.013	*0.270*	
Allowance for Loan Losses Divided by Total Assets	**62.669**	34.845	**61.141**	3.971	+
	0.000	*0.569*	*0.001*	*0.944*	
Past Due and Non-Accrual Loans Divided by Total Assets	1.808	18.996	2.027	23.114	+
	0.658	*0.199*	*0.625*	*0.122*	
Net Charge Offs Divided by Total Assets	**39.135**	9.944	**37.440**	10.579	+
	0.008	*0.812*	*0.011*	*0.790*	
Regulatory Order Dummy	0.786	18.461	0.740	18.594	+
	0.185	*0.998*	*0.203*	*0.998*	
Number of Observations	1577	103	1577	103	
Psuedo R-squared	0.046	0.146	0.044	0.131	

P-values are reported under the coefficients in italics. The coefficients are in bold font if the p-values are less than 0.1. The dependent variable, Y refers to $Y(t)$. Y denotes whether or not the bank made the current period's divided ($Y = 0$) or not ($Y = 1$) given the prior dividend payment was equal to $Y(t-1) = j$, where j is the realization, 0 or 1, of $Y(t\text{-}1)$ in the top row of the table. Psuedo R-squared is reported using the Cox and Snell (1992) method.

Table 6: Markov Chain Logistic Regressions
In the logistic regression the dependent variable, *Y*, equals 1 when the observation does not pay its dividend in the calendar month it is due, and the dependent variable equals 0, *Y* = 0, when the observation made its scheduled dividend. In this model interaction terms are used to condition on prior dividend payment behavior.

	Model 11			Model 12			
Scenario	**$Y(t-1) = 0$**	**$Y(t-1) = 1$**	**$Y(t-1) = 0$ or 1**	**$Y(t-1) = 0$**	**$Y(t-1) = 1$**	**$Y(t-1) = 0$ or 1**	
Independent Variable	**$\alpha = \beta$ when $Y(t-1) = 0$**	γ	**$\alpha + \gamma = \beta$ when $Y(t-1) = 1$**	**$\alpha = \beta$ when $Y(t-1) = 0$**	γ	**$\alpha + \gamma = \beta$ when $Y(t-1) = 1$**	**Predicted Sign**
Intercept	**-2.217**	**4.412**	2.195	**-2.158**	**4.547**	2.389	none
	0.000	*0.011*		*0.006*	*0.041*		
Cummulative Dividend Dummy	**-0.651**	1.004	0.353	**-0.974**	1.036	0.062	-
	0.033	*0.188*		*0.001*	*0.179*		
Tangible Common Equity Divided by Total Assets	**-20.306**	-4.012	-24.318				-
	0.001	*0.815*					
Basel Tier 1 Capital Divided by Risk-Weighted Assets				**-12.971**	-1.391	-14.362	-
				0.013	*0.921*		
Allowance for Loan Losses Divided by Total Assets	**62.669**	-27.824	34.845	**61.141**	-57.170	3.971	+
	0.000	*0.662*		*0.001*	*0.338*		
Past Due and Non-Accrual Loans Divided by Total Assets	1.808	17.188	18.996	2.027	21.087	23.114	+
	0.658	*0.262*		*0.625*	*0.174*		
Net Charge Offs Divided by Total Assets	**39.135**	-29.190	9.945	**37.440**	-26.861	10.579	+
	0.008	*0.511*		*0.011*	*0.403*		
Regulatory Order Dummy	0.786	17.676	18.462	0.740	17.854	18.594	+
	0.185	*0.999*		*0.203*	*0.999*		
Number of Observations	1577	103	1680	1577	103	1680	
Psuedo R-squared	0.262			0.259			

P-values are reported under the coefficients in italics. The coefficients are in bold font if the p-values are less than 0.1. The dependent variable, *Y* refers to *Y*(*t*). Psuedo R-squared is reported using the Cox and Snell (1992) method.

Table 7: Model Predictions v. Actual Dividend Payment

The dependent variable, *Y*, equals 1 when the observation does not pay its dividend in the calendar month it is due, and the dependent variable equals 0, *Y* = 0, when the observation made its scheduled dividend.

The dependent variable equals 1 if the dividend is missed, and it equals 0 if the dividend is made.								
Model	**Model 7**	**Model 8**	**Combined Model 7 and 8 Predictions**	**Model 9**	**Model 10**	**Combined Model 9 and 10 Predictions**	**Model 11**	**Model 12**
(1) Predicted $Y = 1$ when $Y = 1$	0	90	90	2	90	92	93	92
(2) Predicted $Y = 0$ when $Y = 1$	62	0	62	60	0	60	59	60
Percent Correct Predictions when $Y = 1$	0.0%	100.0%	59.2%	3.2%	100.0%	60.5%	61.2%	60.5%
(3) Predicted $Y = 1$ when $Y = 0$	0	11	11	6	13	19	18	19
(4) Predicted $Y = 0$ when $Y = 0$	1515	2	1517	1509	0	1509	1510	1509
Percent Correct Predictions when $Y = 0$	100.0%	15.4%	99.3%	99.6%	0.0%	98.8%	98.8%	98.8%
Overall Percent Correct Predictions	96.1%	89.3%	95.7%	95.8%	87.4%	95.3%	95.4%	95.3%

The dependent variable, Y refers to $Y(t)$. Y denotes whether or not the bank made the current period's divided ($Y = 0$) or not ($Y = 1$).