JOURNAL ARTICLE

Why Don't All Banks Practice Regulatory Arbitrage? Evidence from Usage of Trust-Preferred Securities

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The Review of Financial Studies, Volume 29, Issue 7, July 2016, Pages 1821–1859,
https://doi.org/10.1093/rfs/hhw007
Published: 09 February 2016

Abstract

We investigate why only some banks use regulatory arbitrage. We predict that banks wanting to be riskier than allowed by capital regulations (constrained banks) use regulatory arbitrage, while others do not. We find support for this hypothesis using trust-preferred securities issuance, a form of regulatory arbitrage available to almost all U.S. banks from 1996 to Dodd-Frank. We also find support for predictions that constrained banks are riskier, perform worse during the crisis, and use multiple forms of regulatory arbitrage. We show that neither too-big-to-fail incentives nor misaligned managerial incentives are first-order determinants of this type of regulatory arbitrage.

Received November 27, 2014; accepted December 17, 2015 by Editor Philip Strahan.

Acharya and Richardson (2009) argue that the use of regulatory arbitrage by banks to "get[ting] around the capital requirements imposed by regulators" is what made the subprime crisis a financial crisis. Since the crisis, both economists and regulators have paid considerable attention to regulatory arbitrage. Concerns about regulatory arbitrage have played a central role in the design of Basel III, since regulators believe that the new Basel III leverage ratio is much more resistant to regulatory arbitrage than capital requirements using risk weights. While the literature has shown that certain banks used regulatory arbitrage to increase risk—for instance, by putting assets off-balance sheet (Acharya, Schnabl, and Suarez 2013)—it has not addressed why some banks engage in regulatory arbitrage and others do not. Addressing this issue is important in understanding bank behavior, as well as its relationship to the crisis. Without knowing why some banks choose to engage in regulatory arbitrage, it is difficult to predict which banks will use

regulatory arbitrage to take on more risk and when they will do so. In this paper, we develop hypotheses regarding the determinants of the use of regulatory arbitrage and test these hypotheses using banks' issuance of trust-preferred securities (TruPS)—a hybrid security used as a regulatory arbitrage vehicle—which were available to almost all bank holding companies in the United States from 1996 to 2010.

There is a general belief that a major determinant of regulatory arbitrage is the incentives of large banks to exploit too-big-to-fail (TBTF) subsidies (e.g., Acharya and Richardson 2009 ; Carbó-Valverde, Kane, and Rodriguez-Fernandez 2013). The relation between TBTF status and regulatory arbitrage cannot be investigated with forms of regulatory arbitrage, such as asset-backed commercial paper (ABCP) conduits, that are only available to TBTF banks. By contrast, we can investigate whether regulatory arbitrage is driven by TBTF status, since TruPS were available to almost all bank holding companies. We find strong evidence that TBTF status is not the main driver of regulatory arbitrage with TruPS. The determinants of TruPS usage are unchanged if we exclude banks with more than $50 billion of assets (potential TBTF banks) from our sample. Similarly, some argue that regulatory arbitrage is driven by misaligned managerial incentives that led banks to take on excessive risk (Bebchuk and Spamann 2010 ; Acharya and Richardson 2009). The widespread availability of TruPS enables us to investigate the excess risk-taking hypothesis in a sample with significant variation in managerial ownership. We find that the use of TruPS increases with managerial ownership. Our finding is not consistent with arguments that regulatory arbitrage results from excessive risk taking by managers with misaligned incentives—we would expect banks with higher managerial ownership to have better aligned incentives than banks with lower managerial ownership.

Our hypothesis to explain the variation in usage of regulatory arbitrage is that banks have optimally different levels of risk. The optimal risk level is tied to the bank's franchise value or business model. Some banks have business models that are more transactional and have low franchise value. These banks seek a higher level of risk to maximize shareholder wealth, but are constrained in doing so by capital requirements (constrained banks). Regulatory arbitrage enables constrained banks to take more risk. By contrast, banks with high franchise value (unconstrained banks) want to preserve that value and do not benefit from regulatory arbitrage and hence are not expected to use the regulatory arbitrage opportunities available to them. We find strong support for this hypothesis.

Banks across the globe widely used various types of hybrid capital for the purpose of regulatory arbitrage before the crisis. In the United States, TruPS were the main form of hybrid capital that banks could use. In October 1996, the Federal Reserve Board authorized bank holding companies to include TruPS as Tier 1 regulatory capital up to a threshold level. As shown in Figure

1 , from 1996 to 2007, U.S. bank holding companies in the aggregate repurchased common stock and issued TruPS. TruPS are cumulative nonperpetual preferred securities issued by subsidiaries of bank holding companies whose sole asset is junior subordinated debt issued by the bank holding company. As with other debt, interest on TruPS is tax deductible to the bank holding company. Interest paid to the trust on the debt is used to pay quarterly dividends to TruPS investors. Interest payments are deferrable for up to twenty quarters without triggering default. Postcrisis regulatory changes eliminated this regulatory arbitrage opportunity.

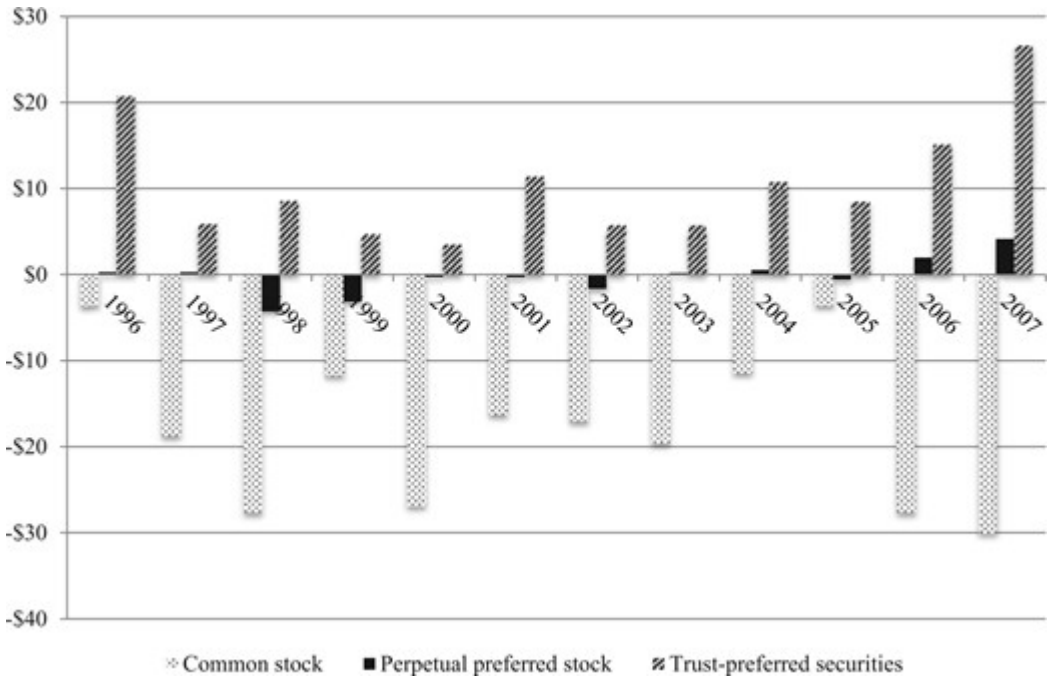


Figure 1 **Net issuance of common stock, perpetual preferred stock, and trust-preferred securities**

The figure shows the net issuance of common stock, perpetual preferred stock, and trust-preferred securities by sample banks between 1996 and 2007. The y -axis shows the net issuance amounts in billions of U.S. dollars. The figure is constructed from data provided by SnL Financial.

An unconstrained bank has no reason to issue TruPS. If it wants to become riskier through an increase in leverage, it can do so without using TruPS. The tax advantage of TruPS relative to equity is not valuable to such a bank because it could replace equity by debt to gain the same advantage. A constrained bank is one that would prefer to be riskier than capital requirements allow. Because TruPS are part debt and part equity, substituting TruPS for equity amounts to increasing the bank's leverage without changing its Tier 1 capital ratio. Hence, a bank that is otherwise constrained by capital requirements can effectively increase its leverage using TruPS. We therefore predict that constrained banks will issue TruPS because it allows them to be riskier, while still satisfying capital requirements.

To test our hypotheses, we must determine whether a bank is constrained by capital requirements. We use two proxies for whether a bank is constrained. The first proxy is a bank's franchise value. An important finding in the banking literature is that banks with higher franchise value hold more capital because these banks have more to lose if they fail (see, for instance, Marcus 1983 ; Marcus 1984 ; Keeley 1990 ; Demsetz, Saidenberg, and Strahan 1996). High franchise value could arise from a number of factors, such as valuable relationships, a profitable deposit base, and so on. We expect banks with high franchise values to be less constrained by capital requirements and to hold little or no TruPS. We find strong support for this prediction. Our second proxy is a measure of how close a bank is to its regulatory capital threshold. In a world in which raising capital quickly is costly, banks will hold a buffer stock of capital to cope with adverse shocks and to avoid the cost of having to raise capital unexpectedly. We consider a bank as constrained by regulation if its buffer stock of capital is low. [1] Using the second proxy, we also find evidence consistent with our hypotheses. Banks are more likely to use TruPS if they are more constrained, that is, if their excess regulatory capital levels are low.

Alternative reasons can be advanced for the issuance of TruPS by banks that are unrelated to regulatory arbitrage. In particular, as a hybrid capital instrument, TruPS could allow the issuing bank holding company to avoid inefficient liquidations or help resolve debt-equity conflicts. Further, TruPS interest is tax deductible. However, bank holding companies could have obtained the same benefits by directly issuing deeply subordinated debt prior to and after 1996. Such subordinated debt issues would have been nearly economically equivalent to the TruPS structure of issuing deeply subordinated debt to a subsidiary trust which then issues TruPS. Yet we find that over 85% of bank holding companies in our sample never issue subordinated debt unless it is related to TruPS issuance, and we view this as evidence in favor of the regulatory arbitrage motive.

A constrained bank can use TruPS to increase the numerator of its Tier 1 capital ratio. [2] However, it can also take actions that affect the denominator of the ratio, that is, the risk-weighted assets. Under our hypotheses, we would expect constrained banks to do both. Since the denominator of the capital ratio involves risk weights, banks cannot simply increase asset risk. Rather, we expect constrained banks to arbitrage these risk weights. Acharya, Schnabl, and Suarez (2013) examine such an arbitrage. They study how banks use asset-backed commercial paper (ABCP) conduits to reduce risk-weighted assets on their balance sheets and note that these conduits transfer the assets, but not the underlying risk, from bank balance sheets. Because this type of regulatory arbitrage entailed high fixed costs, it was only available to the very largest bank holding companies, and almost all of them used it. While TruPS were available to many more banks than ABCP, those banks that used ABCP also used TruPS, confirming our hypothesis.

With our hypotheses, banks that meet capital requirements with TruPS rather than equity should be riskier and hence more vulnerable to adverse shocks because these banks choose to take on more risk than other banks. We investigate our predictions and show that they hold. First, we find that banks with more TruPS in Tier 1 capital have a lower distance to default during our sample period. Second, we find that banks with more TruPS in Tier 1 capital were significantly more likely to receive funds from the Capital Purchase Program, the part of the Troubled Asset Relief Program through which the Treasury purchased newly issued preferred stock of banks, and were also more likely to borrow from other Fed facilities. Third, banks with more TruPS have significantly lower return on assets and return on equity during the crisis. Fourth, during the crisis, the equity of banks with more TruPS performed substantially worse than the equity of other banks, and the result is even stronger for banks that had both a significant amount of TruPS and a significant amount of risky mortgage lending going into the crisis. Finally, for the subset of bank holding companies with traded CDS contracts, banks with more TruPS in their regulatory capital have higher CDS spreads during the financial crisis period.

We contribute to three strands of the literature. First, we contribute to the literature on the determinants of bank capital. Second, we add to the literature on the impact of capital requirements on banks and on the determinants of regulatory arbitrage. Third, we contribute to the literature on TruPS and other hybrid securities. A large body of research examines the determinants of bank capital (see Berlin 2011 and Thakor 2014 for reviews). A common finding in the empirical literature is that banks tend to hold significantly more capital than necessary to meet regulatory requirements. For example, Flannery and Rangan (2008) find that banks had capital levels that were 75% over the regulatory minima in the early 2000s. Berger et al. (2008) note that banks actively manage their capital ratios, set target levels above well-capitalized regulatory minima, and make rapid adjustments toward their targets. Our paper adds to this literature by showing that banks manage not only the level but also the composition of their regulatory capital when capital requirements are binding.

Other literature focuses on the relationship between bank capital and performance. Berger (1995) finds that banks with higher capital had better earnings in the 1980s. More recently, Mehran and Thakor (2011) also provide evidence that better capitalized banks perform better. Demirguc-Kunt, Detragiache, and Merrouche (2013) find that before the crisis bank capital was not related to performance, but that during the crisis, higher capital was positively related to stock performance. Beltratti and Stulz (2012) and Fahlenbrach, Prilmeier, and Stulz (2012) document a positive relationship between bank performance and Tier 1 capital during the recent crisis. Berger and Bouwman (2013) show a positive relationship between capital and market share during crises. All these papers focus on either Tier 1 capital or

the ratio of book equity to assets, but none of them examine the influence of TruPS. Our paper contributes to this literature by showing that, holding the amount of capital constant, banks with more TruPS in their regulatory capital perform worse and are more likely to need government assistance during the crisis. Acharya et al. (2012) show that the quality of bank capital in large international banks deteriorated prior to the crisis.

There is also a literature documenting that banks engage in regulatory arbitrage. In fact, the first working paper of the Basel Committee on Banking Supervision concluded "banks have learnt how to exploit the broad brush nature of the requirements [...]. For some banks, this has probably started to undermine the meaningfulness of the requirements." (Jackson 1999). However, most literature on regulatory arbitrage has focused on showing the prevalence and types of regulatory arbitrage rather than understanding which banks engage in arbitrage. In contrast, with TruPS, hundreds of bank holding companies in our sample of 857 banks never issued TruPS. Because so many banks did not issue TruPS, its usage is ideally suited to study why some banks use regulatory arbitrage and others do not. Finally, while there is a small literature on TruPS, it only partially addresses the issues we focus on in this paper. [3]

1. The Background of Trust-Preferred Securities

Trust-preferred securities (TruPS) are cumulative nonperpetual preferred securities issued by subsidiaries (special purpose entities, or SPEs) of bank holding companies (BHCs) whose sole asset is junior subordinated debt issued by the BHC. The bank holding company typically purchases 100% of the common equity of the SPE (which typically represents about 3% of the total assets of the trust). The SPE then issues preferred securities to investors. The SPE loans the offering proceeds of both the common and preferred securities to the bank holding company. In turn, the bank holding company issues deeply subordinated deferrable interest debentures to the SPE. The SPE is structured as a statutory business trust and is taxed as a partnership. Quarterly interest paid to the trust is used to pay dividends to holders of TruPS. BHCs may defer this interest for up to twenty quarters without triggering default. If the BHC exceeds this deferral period, the note is considered in default and becomes immediately due and payable. Interest paid on the notes issued to the trust is tax deductible for the BHC. Most TruPS are callable after 5 or 10 years, and all TruPS are mandatorily redeemable after 30 or 40 years.

This type of security has been used by nonbank corporations since 1993 and is also known as monthly income preferred stock (MIPS) or quarterly income preferred stock (QUIPS) (see, e.g., Engel, Erickson, and Maydew 1999). The first TruPS issue by a BHC did not occur until after October 21, 1996, when the Board of Governors of the Federal Reserve System (FRB) announced that bank holding companies may include trust-preferred securities up to 25% of core capital in Tier 1 regulatory capital. Core capital is a grossed up version of

Tier 1 capital that does not reflect deductions for disallowed intangible assets, goodwill, and disallowed deferred tax assets. Importantly, these securities would not qualify as Tier 1 capital if the BHC were to directly issue cumulative nonperpetual preferred stock. Therefore, the TruPS structure facilitates regulatory arbitrage.

From our discussions with regulators, the Federal Reserve granted Tier 1 status to TruPS in 1996 for several reasons. First, Basel I allowed for Tier 1 status of minority interests, making it possible for TruPS to qualify as Tier 1 capital, as they were classified as minority interest in the equity accounts of consolidated subsidiaries under the then-valid accounting rules. Second, the Fed was concerned that banks would issue REIT Trust Preferred and saw TruPS as a better alternative. Finally, from a competitive standpoint, insurance companies were permitted to count TruPS as capital, and international banks were already using hybrid capital as Tier 1 capital. While the Federal Reserve allowed BHCs to include TruPS in regulatory capital, their subsidiary depository institutions were not allowed to do so, since the Federal Deposit Insurance Corporation (FDIC) contended that TruPS do not provide sufficient capital support. Therefore, all TruPS issuance was at the BHC level.

French et al. (2010) provide a detailed description of the history of TruPS. Appendix B of our paper shows a time line of important changes to the TruPS market through time, from initial approval of Tier 1 status to the Dodd-Frank Act, which disallowed Tier 1 recognition.

2. Data

Our data come from several sources. The core sample is an unbalanced panel of all publicly traded U.S. BHCs that report on form FR Y-9C, which is filed quarterly on a consolidated basis by all domestic BHCs with over $150 million in assets ($500 million after 2006). These data are from the Federal Reserve Bank of Chicago. Our dataset covers the period from 1996 to 2012 and includes 857 BHCs. Data on individual trust-preferred securities are from SNL Financial, a private data provider that uses information from a variety of sources to create a proprietary database. We supplement the TruPS data from SNL Financial using hand-collected data from forms 10-K, 10-Q, 8-K, and TruPS prospectuses (for publicly traded TruPS), found at the SEC's Web site. Some data on publicly traded TruPS are from Quantum Online, a Web site that collects information about publicly traded preferred securities. Detailed data on mergers and acquisitions come from SNL Financial. Stock price data come from CRSP. Data on Credit Default Swap (CDS) spreads are obtained from MarkIt.

2.1 TruPS summary statistics

We have data on 1,467 separate TruPS issuances. Figure 2 shows the total amount of TruPS, the total Tier-1-qualified TruPS outstanding by quarter, and the proportion of BHCs that have issued TruPS. The total amount of TruPS outstanding (Tier-1-qualified TruPS) for publicly traded BHCs was

just under $20 ($20) billion at the end of 1996 and rose to a peak of about $140 ($120) billion in early 2010. It is evident from the figure that banks did not initially issue more TruPS than would count toward Tier 1 capital. Total TruPS exceeded Tier-1-qualified TruPS during the financial crisis not because BHCs issued more TruPS but because net losses during this period caused BHCs to reach the Fed-imposed TruPS core capital threshold. The proportion of BHCs with TruPS increased significantly over the sample period, rising from less than 10% to about 80% by the end of 2005, where it remained steady until 2010. The increase is particularly pronounced for the years 2000–2002. In 2000, Salomon Smith Barney issued the first TruPS collateralized debt obligation, allowing small BHCs to issue TruPS through a pooled structure. Small BHCs with less than $1 billion in assets quickly seized the opportunity to issue additional Tier 1 capital between 2000 and 2002. The increase is also partially caused by increased merger activity, which reduced the number of BHCs in the sample over time. The BHCs that leave the sample are less likely to have TruPS, since across the entire sample of 857 BHCs, about 40% never issue TruPS. After Dodd-Frank was enacted in the third quarter of 2010, qualified TruPS dropped from $120 billion to just under $100 billion by the first quarter of 2012. The more significant event was a Notice of Proposed Rulemaking (NOPR) on June 7, 2012, which reiterated the Dodd-Frank requirement that BHCs with over $15 billion in assets phase out their TruPS in Tier 1 capital over a three-year period beginning in January 2013, and that banks between $500 million and $15 billion in assets phase out TruPS over a 10-year period. [4] Many BHCs treated the NOPR as a "qualifying event" that allowed them to redeem TruPS prior to the call date. Most TruPS include a provision allowing immediate call in the case of a qualifying "tax or regulatory event." A tax or regulatory event would be deemed to occur if, for example, TruPS lost their tax-deductibility status or no longer qualified as Tier 1 capital. During the last three quarters of 2012, total qualified TruPS dropped another $40 billion, ending at just under $60 billion at the end of 2012.

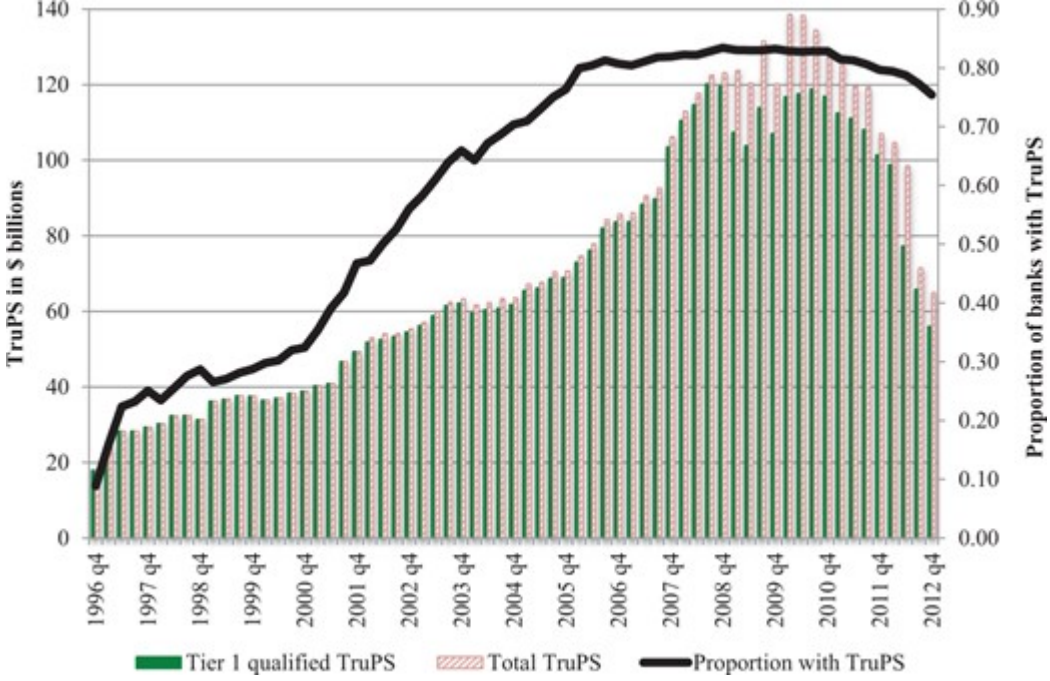


Figure 2 **Total amount of outstanding trust-preferred securities**

The figure shows the total amount of outstanding trust-preferred securities (TruPS) by quarter during our sample period. The solid bars show the total amount of outstanding Tier-1-qualified TruPS, and the shaded bars show the total amount of outstanding TruPS in billions of dollars (left-hand y -axis). The black line shows the fraction of sample banks that have issued TruPS (right-hand y -axis).

Figure 3 shows a histogram of the outstanding TruPS as a fraction of Tier 1 capital for our sample of bank holding companies (BHCs) between 1996 and 2007, conditional on a bank having TruPS outstanding in the respective year. [5] Figure 3 demonstrates that there is a wide cross-sectional distribution of TruPS/Tier 1 ratios; while TruPS usage is substantial, bank holding companies do not typically issue the maximum possible amount. The histogram suggests that banks choose an amount of TruPS/Tier 1 that is optimal for them, and this is consistent with our hypotheses. Note that while there is some clustering of TruPS/Tier 1 at the 25% threshold, there are many BHC-year observations with more than 25% TruPS in Tier 1 capital. French et al. (2010) point out that this is not inconsistent with regulatory limits. The maximum amount of allowable TruPS is based on TruPS/core capital, not TruPS/Tier 1 capital. Since core capital does not reflect deductions for disallowed intangible assets, goodwill, disallowed deferred tax assets, and other deductions, TruPS may legally comprise more than 25% of actual Tier 1 capital. [6]

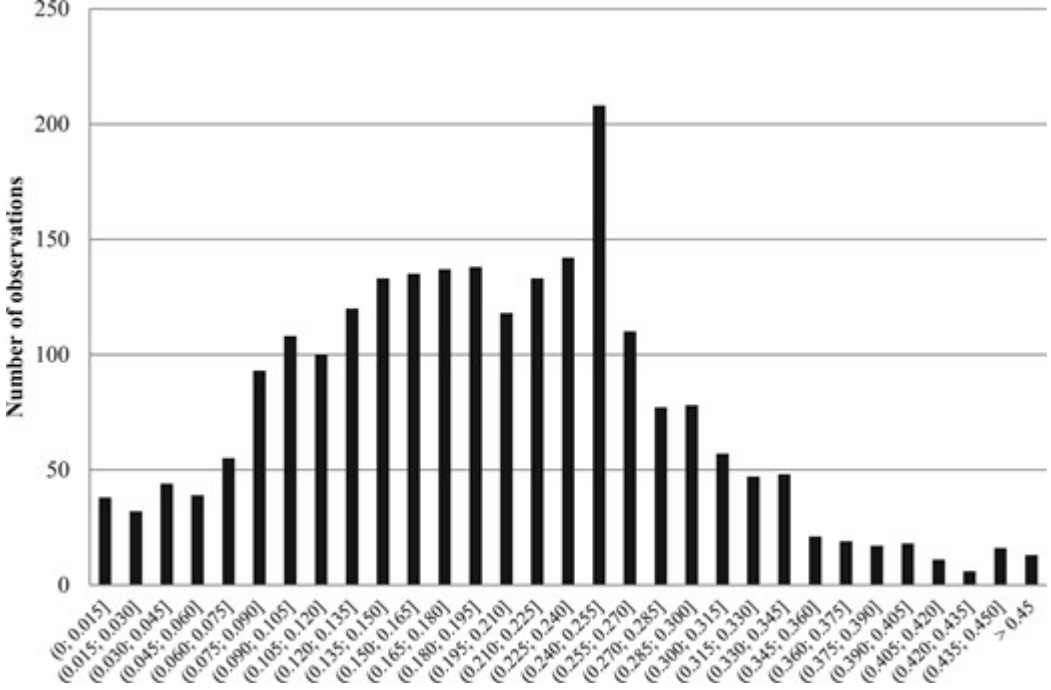


Figure 3 **Histogram of TruPS/Tier 1**

The figure shows a histogram of the outstanding trust-preferred securities (TruPS) as a fraction of Tier 1 capital for our sample of bank holding companies (BHCs) between 1996 and 2007, conditional on a bank having TruPS outstanding in the respective year. BHC-year observations (106) with total assets in excess of $250 billion are excluded from the figure. This is done because a different regulatory TruPS/Tier 1 limit applies to them.

Panel A of Table 1 provides detailed data at the TruPS issuance level. The largest number of securities (209) was issued in 2003, with the highest dollar amount issued in 2007 (about $36 billion). Panel A also details the method of issue, divided into four categories. First, banks can register their securities with the SEC to be sold to the public. Second, they can issue TruPS in a traditional private placement. [7] Third, banks can privately place their TruPS under Rule 144A. [8] Finally, banks can issue TruPS through a TruPS-CDO structure (pooled). The last column provides details on dividend deferrals as a result of BHCs deferring interest payments to the trusts. Most deferrals occur in 2009, with forty-three banks deferring 146 TruPS issues. A BHC may not defer interest to trusts holding TruPS unless it also defers dividends on common and other preferred stock.

Table 1

Summary statistics at the trust-preferred security level

Panel A: Issuance frequency, method of issue, and deferral frequency						
Year	**Num. issued**	**Total value issued (in $ millions)**	**Number SEC registered**	**Number traditional private placements**	**Number 144A private placements**	**Number pooled issuances**

1996	63	18,933	13	0	50	0
1997	118	17,049	34	0	84	0
1998	56	5,982	30	0	26	0
1999	34	3,656	19	1	14	0
2000	64	2,803	13	27	7	17
2001	121	12,299	36	36	2	47
2002	170	8,400	32	44	2	92
2003	209	10,190	21	64	5	119
2004	149	6,423	6	64	11	68
2005	120	7,876	9	58	5	48
2006	153	24,225	20	63	11	59
2007	152	36,148	20	56	18	58
2008	40	13,242	19	19	1	1
2009	13	12,416	5	3	5	0
2010	5	6,142	4	0	1	0
2011	0	0	0	0	0	0
2012	0	0	0	0	0	0
Totals	1,467	185,783	281	435	242	509

Panel B. Stated reasons for TruPS issuance

Reason	Frequency
To improve capital position	240
General corporate purposes	236
To fund a specific acquisition	198
To fund the redemption of existing TruPS	163
To fund future growth	139
To pay down debt	78
To fund stock repurchases	73
Other (includes funding loan growth, redeeming preferred stock, and specific goals)	49

No reason stated	291
Total	1,467

Panel C. Underwriting spread for issuing securities

	Common stock	Preferred stock	Senior debt	Senior subordinated debt	Subordinated debt	TruPS
Mean	5.02 [a]	3.09	1.55 [b]	2.15 [b]	1.70 [b]	2.48

The table reports summary statistics for trust-preferred securities (TruPS) issued by U.S. publicly listed bank holding companies from 1996 to 2012. There are 1,467 unique securities. In panel A, *Number pooled issuances* is the number of TruPS that were issued as pooled TruPS (also known as TruPS CDOs). *Number that start deferral (bank)* is the number of TruPS that started deferring dividends in the given year, and the number in parentheses is the number of issuing banks. Panel B reports banks' stated reasons for issuing TruPS, by frequency and across all years. Panel C reports the underwriting spread of TruPS issuance and other types of securities issued by sample banks. The average underwriting discount, that is, the difference between the price paid to the issuer and the price at which the securities are sold, as a percent of the price at which the securities are sold, is reported.

[a] Value is higher than for TruPS and statistically significant at the 1% level based on a t-test, assuming unequal variances.

[b] Values are lower than for TruPS and statistically significant at the 1% level based on t-tests, assuming unequal variances.

Panel B provides data on bank-stated reasons for TruPS issuance. We hand-collect these data from SEC filings and news releases for all TruPS issuances. Consistent with our hypotheses, banks rarely issue TruPS to pay down debt (5%), because doing so would lower their probability of default. Rather, they use TruPS to fund acquisitions or growth (23%), thereby reducing the amount of common stock they must issue to meet capital requirements following an increase in their assets. In addition, they state they use TruPS to improve regulatory capital 16% of the time. Panel C presents the average underwriting costs of common stock, preferred stock, long-term debt with different seniorities, and TruPS. Cost data are available from 2000 forward. The underwriting cost is the difference between the price paid to the issuer and the price at which the securities are sold, as a percent of the price at which the securities are sold. Averages are taken by year and then across years. Underwriting costs are significantly higher for common stock than for TruPS, but lower for long-term debt, indicating that in addition to being tax-deductible Tier 1 capital, TruPS are also less expensive to issue than common stock.

2.2 Bank holding company data

Table 2 presents summary statistics of annual data at the bank holding company level. There are 857 unique banks. Means and medians are calculated by bank and then across banks, and are presented in two categories: banks that issued TruPS at any time during the sample period (518 banks) and banks that did not (339 banks). Banks that acquired but never issued TruPS (six banks) are included in the "did not issue" category. Results do not change if we change the categorization of these banks.

Table 2
Summary statistics for bank holding companies

	Means			Medians		
	TruPS issuers	**Nonissuers**	**Difference**	**TruPS issuers**	**Nonissuers**	**Differ**
Proxies for regulatory capital constraints						
Franchise value	1.058	1.069	−0.011***	1.051	1.067	−0.01
Tier 1 ratio (%)	11.9	14.6	−2.7***	11.6	13.3	−1.7**
Tier 1 ratio less TruPS (%)	10.3	14.6	−4.3***	10.1	13.3	−3.2**
Bank characteristics						
Total assets ($ billions)	1,951	771	1,180***	1,258	616	642**
Regulatory leverage ratio	0.085	0.094	−0.009***	0.083	0.090	−0.00
Insider ownership	0.171	0.180	−0.009	0.142	0.155	−0.01
ROA before taxes (%)	1.5	1.9	−0.4***	1.8	2.2	−0.4**
Stock return	0.072	0.204	−0.132***	0.076	0.178	−0.10
Beta	0.571	0.332	0.239***	0.488	0.242	0.246
Idiosyncratic volatility (%)	2.5	2.4	0.1*	2.3	2.2	0.1**
Loan concentration index	0.594	0.624	−0.030***	0.592	0.606	−0.01
Deposits/assets	0.751	0.780	−0.029***	0.772	0.804	−0.03
Cash/assets	0.041	0.046	−0.005***	0.036	0.040	−0.00

Loans/assets	0.664	0.637	0.027***	0.684	0.651	0.033
State tax rate	0.069	0.073	−0.004**	0.070	0.077	−0.00
Repurchases and growth						
Repurchase indicator variable	0.524	0.468	0.056***	0.545	0.500	0.045
Asset growth, excluding mergers	0.074	0.058	0.016***	0.066	0.051	0.014
Number of mergers in a year	0.388	0.221	0.167***	0.188	0.000	0.188

The table presents means and medians for key characteristics of a sample of bank holding companies (BHC) from 1996 to 2012. Summary statistics are calculated by bank and then across banks, and are winsorized at the 1% and 99% tails. Summary statistics are calculated separately for banks that never issued trust-preferred securities (TruPS) during the sample period and those that issued TruPS. There are 857 banks in the dataset, of which 518 issued TruPS and 339 did not. *Franchise value* is the sum of the market value of equity and the book value of liabilities, scaled by the difference between the book value of assets and goodwill. *Tier 1 ratio (%)* is the ratio of Tier 1 capital to risk-weighted assets. *Tier 1 ratio less TruPS (%)* is Tier 1 capital minus the dollar amount of issued TruPS, divided by risk-weighted assets. *Regulatory leverage ratio* is Tier 1 capital, scaled by total assets. *Insider ownership* is the fraction of a BHC's common stock held by named executive officers and directors. *ROA before taxes (%)* is net income, plus income tax expense, divided by total assets. *Stock return* is the annual stock return in excess of the risk-free rate. *Beta* is the regression coefficient from a market model of excess daily returns on the value-weighted CRSP index for the two-year period prior to the reporting date, and *Idiosyncratic volatility (%)* is the residual from this regression (aggregated to a monthly level). *Loan concentration index* is a Herfindahl-like index measuring the concentration of the loan portfolio as in Berger and Bouwman (2013) . *Asset growth, excluding mergers* is total assets in year t of the BHC, less the sum of the total assets of all institutions or branches acquired in the same year, divided by total assets in year t -1, minus 1. The column *Difference* shows the differences between the group of TruPS issuers and nonissuers. Statistically significant differences at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively.

Following Demsetz, Saidenberg, and Strahan (1996) , we calculate franchise value as the sum of the market value of equity and the book value of liabilities, scaled by book value of assets minus goodwill. Consistent with our hypothesis that TruPS issuers are constrained by capital requirements, both franchise value and the Tier 1 ratio are significantly lower for TruPS issuers than for nonissuers. If we calculate the Tier 1 ratio by removing TruPS from the numerator, the difference increases by 1.6 percentage points. Further, TruPS issuers are larger, have higher risk-weighted assets, have worse ROA, have worse stock performance, have higher betas, have lower deposits, have

less cash, have more loans, and have higher derivative usage. They are also more likely to repurchase stock and have higher internal and external growth than nonissuing banks. Nonissuers are located in states with on average higher state tax rates, which is contrary to what one would expect if taxes were an important motive for TruPS issuance. The results are consistent across means and medians.

3. Empirical Analysis

We first present findings that make a prima facie case for the regulatory arbitrage motive of TruPS. We then investigate whether our hypotheses are supported by the data. The first hypothesis is that banks that issue TruPS are constrained by regulatory capital requirements. To test it, we relate the ratio of TruPS to Tier 1 capital to our proxies for whether a bank is constrained. The second hypothesis is that constrained banks will also use other types of regulatory arbitrage, so we investigate whether banks that choose TruPS and are sufficiently large to qualify also use ABCP. The third hypothesis is that constrained banks that use TruPS are choosing to be riskier and, therefore, will have a shorter distance to default, which we test by examining the relationship between lagged TruPS usage and a bank's z-score. Finally, we expect banks that use TruPS to be more affected by an adverse shock, such as the credit crisis, because their use of regulatory arbitrage makes them inherently riskier. We investigate this hypothesis by examining banks' likelihood of requiring the Troubled Asset Relief Program (TARP) and other government funding and evaluating their operating and stock performance in the crisis.

3.1 Prima facie case for the regulatory arbitrage motive of TruPS issuance

Trust-preferred securities potentially offer additional advantages beyond providing regulatory capital. A well-studied property of senior or secured debt is that senior or secured claimants have incentives to force inefficient liquidations, that is, liquidations in which a firm's assets are sold for less than the firm's value as a going concern (e.g., Bolton and Scharfstein 1996 ; Rajan 1992). Because the bank holding company issues deeply subordinated debt with low priority and an interest deferral option into the trust, TruPS could help reduce these inefficient liquidations. Second, issuing TruPS instead of more senior debt could help reduce conflicts of interest between shareholders and debt holders, such as debt overhang or risk shifting (e.g., Myers 1977 ; Jensen and Meckling 1976). Third, the TruPS structure allows banks to issue a preferred security whose dividends receive favorable tax treatment.

The economic transaction underlying the trust-preferred securities is the issuance of deeply subordinated debt at the bank holding company level. Deeply subordinated debt issuances share the advantages of TruPS already described, except for recognition as regulatory Tier 1 capital. An indirect test of the regulatory arbitrage motive is therefore to examine TruPS issuance

relative to the issuance of subordinated debt. The results are stark: for about 85% of sample BHCs, the fraction of TruPS/Total subordinated debt is equal to one; that is, they only issue subordinated debt to fund trust-preferred securities. [9] We believe that this result suggests a regulatory arbitrage motive for TruPS issuance.

Nonfinancial corporations have been active users of this hybrid security since 1993 (under the name of MIPS or QUIPS), when the Internal Revenue Service (IRS) granted favorable tax treatment to the preferred dividend payments. Benston et al. (2003) estimate that about 300 corporations issued over $65 billion between 1993 and 1999. Banks could have also issued TruPS since 1993 to alleviate inefficient liquidations, receive tax benefits, or reduce debt-equity conflicts. Yet Benston et al. (2003) , as well as our Figure 2 , show that bank holding companies did not issue trust-preferred securities prior to their regulatory approval in October 1996. This fact also suggests a regulatory arbitrage motive for TruPS issuance.

All trust-preferred securities contain an early redemption clause that underscores the regulatory arbitrage motive. The clause specifies that the issuer may immediately redeem the debentures at par if there is a change in the capital adequacy guidelines adopted by the Board of Governors of the Federal Reserve Board resulting in trust-preferred securities not being counted as Tier 1 regulatory capital.

Finally, not only did banks not issue TruPS before they could include them in Tier 1 capital but they also reduced issuance in a period of uncertainty during which Tier 1 recognition was unclear. Specifically, the Financial Accounting Standards Board (FASB) changed the accounting treatment of the special purpose entity (SPE) underlying TruPS in 2003 with a final ruling in December 2003 that threatened Tier 1 recognition of TruPS (see Appendix B for details). Between December 2003 and a final ruling of the Federal Reserve Board that allowed TruPS to maintain their Tier 1 status in April 2005, new TruPS issuance activity decreased by approximately 20%. Finally, not a single bank holding company with assets over $500 million issued TruPS after September 12, 2010, the date after which newly issued TruPS could no longer be counted toward regulatory capital.

3.2 TruPS/Tier 1 and TruPS/Total Subordinated debt ratio

We now examine the determinants of the TruPS/Tier 1 and the TruPS/Total subordinated debt ratios. The TruPS/Tier 1 ratio can vary because of growth in retained earnings and new common equity issuances that affect the denominator or because of new TruPS issuances or TruPS redemptions that affect the numerator and denominator. The TruPS/total subordinated debt ratio can vary because a bank issues TruPS or subordinated debt. The TruPS/Total subordinated debt ratio has the advantage of being leverage neutral, but it suffers from limited variation—for most sample bank-years, the ratio is either zero or one. [10]

Our two key explanatory variables are the two proxies for regulatory capital constraints, franchise value and the regulatory Tier 1 ratio. In addition to these two variables, we include the log of total bank assets to control for size. Large banks may face different transaction costs, may embrace the new instruments earlier, may have different business models requiring different capital levels, and may have a different safety net protection. We also use in some specifications an indicator variable equal to one if the bank is internationally active, and zero otherwise. Large internationally active bank holding companies were initially encouraged and, after 2004, were restricted by regulators, to have a lower maximum TruPS/core capital ratio than other banks (15% instead of 25%). The indicator variable is equal to one if a BHC has total assets larger than $250 billion or if the Federal Reserve Statistical Release "Large Commercial Banks" shows that the main subsidiary bank of the BHC has more than $10 billion in foreign assets. [11]

In some specifications we control for additional bank characteristics that could influence the TruPS/Tier 1 ratio. We include the deposits/assets ratio because banks with a stable funding structure could potentially depend less on TruPS. We include the cash/assets ratio because banks with larger cash reserves should have a lower need to raise capital to fund new investments. Past profitability may also affect the decision to issue trust-preferred securities and potentially also impacts franchise value and regulatory capital. We therefore control for both return on assets and stock returns in some regression specifications.

One potential concern for our regression specification is that the TruPS/Tier 1 ratio and our proxies for regulatory capital constraints are both driven by risk. We therefore include four additional variables that measure risk. We use a BHC's market beta to capture differences in systematic risk, and we also control for the bank stock's idiosyncratic volatility. Beta is the regression coefficient from a regression of excess daily returns on a constant and the value-weighted CRSP index, and idiosyncratic volatility is the residual from this regression (aggregated to a monthly level). We also include the fraction of loans/assets and the loan concentration index of Berger and Bouwman (2013) , which is a Herfindahl-like index measuring the concentration of the loan portfolio, to capture the riskiness of a bank's loan portfolio. We do not include a measure of regulatory risk assessment, such as the risk-weighted assets, because one of our main variables of interest, the Tier 1 ratio, already includes risk-weighted assets in the denominator. However, if we do include risk-weighted assets as an independent variable, the results are unchanged.

The above variables control for some measurable risks, but the risk-taking incentives of management, potentially unobservable, could affect both the decision to issue the new hybrid instrument and the regulatory capital a BHC holds. We control for the risk-taking incentives of bank managers by including director and officer aggregate stock ownership in the regressions. There is a widely held view in corporate finance that higher managerial

ownership is valuable for shareholders because it better aligns the interests of managers with those of shareholders. Managerial incentives to take excessive risks should therefore be negatively related to the management team's ownership in their banks.

The tax deductibility of the interest paid on the subordinated debt underlying TruPS is an attractive feature to banks, and the benefit increases in the amount of taxes paid. We therefore include a bank holding company's state tax rate to examine whether taxes affect the TruPS/Tier 1 ratio. A bank could issue TruPS because it is reducing its Tier 1 capital through repurchases of equity. We include a repurchase indicator variable equal to one if the bank holding company repurchased stock in the same year it issued TruPS, and zero otherwise. We also include the organic asset growth (excluding mergers) and the number of mergers in the current year as regression variables. As a bank grows, it requires a larger dollar amount of regulatory capital, and this leads to the issuance of common stock or TruPS. Mergers that generate goodwill naturally deplete Tier 1 capital because goodwill is subtracted from the numerator when calculating Tier 1. Hence, issuing TruPS provides a direct way to replenish Tier 1 capital that is lost to goodwill without having to issue new common equity. All variables are defined in the caption of Table 2 .

We have two sets of results. Table 3 shows panel regressions results, in which identification comes from both the cross-section and time series. Table 4 shows bank fixed effects regressions results.

Table 3

Tobit regressions: TruPS level and bank characteristics

Panel A						
	Dep. var = TruPS/Tier 1					
	1	**2**	**3**	**4**	**5**	**6**
Proxies for capital constraints						
Franchise value $_{t-1}$	−0.355***	−0.331***	−0.377***	−0.294***	−0.435***	−0.236
Tier 1 ratio $_{t-1}$ (%)	−0.014***	−0.015***	−0.015***		−0.015***	−0.014
Tier 1 ratio, excluding TruPS $_{t-1}$ (%)				−0.032***		
Bank characteristics						

Internationally active indicator $_{t-1}$		−0.114***	−0.117***	−0.115***		−0.112
Log total assets $_{t-1}$	0.016***	0.017***	0.015***	−0.003	0.023***	0.016*
Insider ownership $_{t-1}$		0.132***	0.119***	0.087**	0.129***	0.818
ROA before taxes $_{t-1}$ (%)		−0.008***	−0.009***	0.001	−0.008***	−0.008
Stock return $_{t-1}$		0.057***	0.046***	0.043***	0.066***	0.058*
Beta $_{t-1}$		0.014	0.015**	0.022***	0.010	0.014*
Idiosyncratic volatility $_{t-1}$ (%)		0.004	0.005*	−0.003	0.005	0.004
Loan concentration index $_{t-1}$		−0.066**	−0.066**	−0.025	−0.068**	−0.065
Deposits/Assets $_{t-1}$		−0.081	−0.094	−0.154***	−0.106	−0.081
Cash/Assets $_{t-1}$		−0.297*	−0.251	−0.097	−0.452***	−0.304
Loans/Assets $_{t-1}$		−0.084	−0.100	−0.233***	−0.098	−0.084
State tax rate $_{t-1}$		0.295	0.371*	0.079	0.285	0.286
Interaction variables						
Franchise value $_{t-1}$ x Ins. own $_{t-1}$						−0.627
Tier 1 ratio $_{t-1}$ x Ins. own $_{t-1}$						−0.002
Repurchases and growth						
Repurchase dummy variable $_{t}$			−0.007			
Asset growth, excluding mergers $_{t}$			0.122**			

Number of mergers $_{t}$			0.019***			
N	6,512	6,512	6,512	6,512	6,171	6,512
Censor at 0	yes	yes	yes	yes	yes	yes
Censor at 1	no	no	no	no	no	no
Excludes very large banks?	no	no	no	no	yes	no
Includes year fixed effects	yes	yes	yes	yes	yes	yes

Panel B

	Dep. var = TruPS/Tier 1		**Dep. var = TruPS/Sub debt**	
	1	**2**	**3**	**4**
Proxies for capital constraints				
Franchise value $_{t-5}$	−0.245***	−0.162**	−0.968***	−0.812***
Tier 1 ratio $_{t-5}$ (%)	−0.012***	−0.012***	−0.023***	−0.020***
Bank characteristics				
Internationally active indicator $_{t-1}$		−0.034		−0.057
Log total assets $_{t-1}$	0.002	0.002	−0.006	−0.019
Insider ownership $_{t-1}$		0.107**		0.412**
ROA before taxes $_{t-1}$ (%)		−0.010***		−0.025***
Stock return $_{t-1}$		0.009		0.127***
Beta $_{t-1}$		0.010		0.116***
Idiosyncratic volatility $_{t-1}$ (%)		0.003*		−0.002
Loan concentration index $_{t-1}$		−0.032		−0.149
Deposits/Assets $_{t-1}$		−0.112		−0.192
Cash/Assets $_{t-1}$		−0.394***		−1.657**
Loans/Assets $_{t-1}$		0.022		0.140
State tax rate $_{t-1}$		0.080		0.206

N	3,592	3,592	3,592	3,592
Censor at 0	yes	yes	yes	yes
Censor at 1	no	no	yes	yes
Includes year fixed effects	yes	yes	yes	yes

The table presents results from tobit regressions of TruPS levels on bank characteristics. The sample consists of 6,512 bank holding company-years (BHC-years). Independent variables, except for those measuring concurrent repurchases and growth, are lagged one period, and described in detail in Section 3 . Regressions in panel A include year fixed effects and take into account that the dependent variable is left censored at zero. Columns 1–6 use TruPS/Tier1 capital as the dependent variable. Column 5 excludes bank holding companies with greater than $50 billion in assets. Columns 7 and 8 use TruPS/Total subordinated debt as the dependent variable, where TruPS/Total subordinated debt is set to zero if total subordinated debt is equal to zero. Columns 7 and 8 also right censor the dependent variable at one, because many bank holding companies only issue subordinated debt for the purpose of issuing TruPS. Panel B reestimates the regressions of Columns 1, 2, 7, and 8, but uses franchise value and the Tier 1 ratio lagged by five years as explanatory variables. Standard errors are clustered by BHC and year. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively.

Table 4

Bank fixed effects regressions: TruPS level and bank characteristics

	1	2	3	4	5
Proxies for capital constraints					
Franchise value $_{t-1}$	−0.088**	−0.077*	−0.080**	−0.096**	−0.127***
Tier 1 ratio $_{t-1}$ (%)	−0.003***	−0.003***		−0.003***	−0.003***
Tier 1 ratio, excluding TruPS $_{t-1}$ (%)			−0.009***		
Bank characteristics					
Log total assets $_{t-1}$	0.027***	0.023***	0.011	0.028***	0.030***
Insider ownership $_{t-1}$		0.050	0.021	0.046	0.055
Beta $_{t-1}$		0.000	0.003	0.000	−0.001
Idiosyncratic volatility $_{t-1}$ (%)		0.004**	0.001	0.005**	0.005***

Loan concentration index $_{t-1}$		0.045	0.051*	0.046	0.041
Deposits/Assets $_{t-1}$		−0.128***	−0.145***	−0.125***	−0.116***
Cash/Assets $_{t-1}$		−0.055	−0.076	−0.052	−0.090
Loans/Assets $_{t-1}$		−0.015	−0.074***	−0.019	−0.034
State tax rate $_{t-1}$		0.199	0.143	0.230	0.128
Repurchases and growth					
Repurchase dummy variable $_{t}$				−0.007**	−0.006*
Asset growth, excluding mergers $_{t}$				0.028*	0.038**
Number of mergers $_{t}$				0.005***	0.007***
N	6,512	6,512	6,512	6,512	6,171
Excludes very large banks?	no	no	no	no	yes
Includes bank fixed effects	yes	yes	yes	yes	yes
Includes year fixed effects	yes	yes	yes	yes	yes

The table presents results from BHC fixed effects regressions of TruPS levels on bank characteristics. The sample consists of 6,512 bank holding company-years (BHC-years). Independent variables, except for those measuring concurrent repurchases and growth, are lagged one period and described in detail in Section 3 . Regressions include year fixed effects and BHC fixed effects. Column 5 excludes banks with greater than $50 billion in assets. Standard errors are clustered by BHC and year. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively.

Panel A of Table 3 , specifications 1 through 6, use TruPS/Tier 1 as a dependent variable. Specifications 7 and 8 standardize TruPS by total subordinated debt. Because there are a number of bank-firm-years with no TruPS, all specifications estimate tobit regressions with left censoring at zero. In addition to left censoring at zero, specifications 7 and 8 also right censor the TruPS/Total subordinated debt variable at one since the ratio is bounded by one. All regressions contain year fixed effects and standard errors clustered by BHC. In addition, specifications 1 to 6 also cluster standard errors by year. As one of its main explanatory variables, specification 4 includes the Tier 1 ratio that excludes TruPS in the numerator

to reduce concerns about a mechanical relationship between the TruPS/Tier 1 ratio and the lagged Tier 1 ratio.

As predicted by our hypotheses, panel A of Table 3 shows that bank holding companies with more franchise value and higher Tier 1 capital hold less TruPS, no matter whether we standardize by Tier 1 or by total subordinated debt. The parsimonious specifications 1 and 7, which only control for bank size, show statistically and economically meaningful effects. A one-standard-deviation increase in franchise value (0.073) is associated with a 2.6% decrease in the TruPS/Tier 1 ratio and a 6.9% decrease in the TruPS/Total subordinated debt ratio. A one-standard-deviation increase in the Tier 1 ratio (4.13%) is associated with a 5.8% decrease in the TruPS/Tier 1 ratio and a 15.3% decrease in the TruPS/Total subordinated debt ratio. The economic and statistical magnitudes of the coefficients of franchise value and the Tier 1 ratio are stable across the different specifications. The more constrained a bank holding company is by regulatory capital, the more TruPS it holds.

Regarding the control variables, the indicator variable for being a large international bank is significantly negative and economically large. Internationally active banks have about 11.5% less TruPS/Tier 1 than other banks, consistent with the lower limit of 15% relative to 25% of total core capital for these banks. Larger banks have more TruPS. Past stock returns have a positive association with both TruPS ratios. Low accounting returns that decrease Tier 1 capital are positively associated with the TruPS ratios. BHCs with more insider ownership have significantly more TruPS. The tax rate is not a strong predictor of the TruPS ratios. Concurrent organic asset growth and growth via mergers are strongly positively associated with the level of TruPS (specification 3).

Specifications 4 to 6 of Table 3 , panel A, show additional results. In Column 4, we use the Tier 1 ratio that excludes TruPS in the numerator instead of the regulatory Tier 1 ratio as the key independent variable to address the concern that the Tier 1 capital in year t is in the denominator of the dependent variable and, lagged by one year, in the numerator of the key independent variable. The results in Column 4 actually become stronger: the Tier 1 ratio less TruPS is negatively and strongly significantly related to the TruPS/Tier 1 ratio.

A well-established view is that TBTF incentives play a critical role in regulatory arbitrage. With this view, a TBTF bank does not bear all the costs of an increase in its risk and therefore has incentives to take on more risk, for instance, through TruPS. This view implies that TBTF banks have higher incentives to issue TruPS than other banks. Hence, it could be that our results are driven by TBTF banks. In Column 5, we repeat our analysis, excluding all sample banks with more than $50 billion in assets to address the concern that TBTF status could drive our results. The results of Column 5 are qualitatively and quantitatively similar to the results that include all

sample banks, and, as a result, are inconsistent with TBTF having a unique role as a driver of regulatory arbitrage—at least for regulatory arbitrage implemented through TruPS issuance. These results imply that all constrained banks have similar incentives to undertake regulatory arbitrage regardless of their TBTF status.

In Column 6, we investigate the alternative hypothesis that managerial incentives to take excessive risk drive a bank's decision to use TruPS. As already discussed, one view is that banks take excessive risks because bank insiders have misaligned incentives. We would expect that bank insiders with less insider ownership would have greater incentives to take excessive risks because their interests are not well aligned with shareholders' interests and because the adverse consequences on their wealth of greater risk are smaller. Table 3 shows that managerial ownership is positively associated with the TruPS/Tier 1 ratio. If managerial ownership is a good proxy for low managerial incentives to take risks, the result appears inconsistent with an argument that risk-taking incentives can explain TruPS issuance. To further address this point, we also interact insider ownership with franchise value and the Tier 1 ratio in Column 6 of Table 3 , panel A. If managerial incentives played a large role in explaining both TruPS issuance and low capital ratios, we would expect the coefficient of the interaction term of managerial ownership and franchise value/Tier 1 capital to be negative: in firms with low managerial ownership, the effect of a low Tier 1 ratio on TruPS usage should be stronger. Column 6 shows that the coefficients on both interaction terms are statistically indistinguishable from zero.

In panel B of Table 3 , we reestimate specifications 1, 2, 7, and 8 of panel A, but substitute lagged franchise value and the lagged Tier 1 ratio with franchise value and a Tier 1 ratio that are lagged by five years. We do so to reduce concerns that TruPS/Tier 1 and our proxies for constrained banks may be jointly determined by some unobserved time-varying characteristics. Five-year lagged franchise value and the five-year lagged Tier 1 ratio continue to have negative and statistically and economically significant coefficients. The results help alleviate concerns that the TruPS/Tier 1 ratio, Tier 1 ratio, and franchise value are jointly driven by time-varying unobserved characteristics, because these characteristics would now have to simultaneously explain franchise value and Tier 1 capital five years ago, as well as current TruPS usage.

In unreported regressions, we also estimate a Cox proportional hazard model examining the determinants of a bank's initial TruPS issuance. The results of these hazard regressions are quantitatively and qualitatively similar to the results reported in Table 3 . It is reassuring that the two models yield similar results, although one models the level of TruPS and the other models the time to first issuance and ignores further issuances.

Next, we turn to the question of whether time-invariant unobserved bank characteristics can explain our results. Table 4 reports results from BHC

fixed effects regressions. In these regressions, we do not include the internationally active indicator variable, because there is virtually no time-series variation for this variable. We also do not include the performance variables. With bank fixed effects, the change in franchise value is mainly driven by changes in market value of equity. Including both stock returns and franchise value in the regressions makes the interpretation of the coefficients more complicated. The same caveat holds for accounting returns which could drive, in the time series, much of the change in Tier 1 capital via retained earnings. In the regressions in Table 4 , we can gauge the economic magnitude of the estimated coefficients by multiplying them by the time-series standard deviation of franchise value (0.047) or of the Tier 1 ratio (2%). For example, in the most parsimonious specification, Column 1, which includes both franchise value and the Tier 1 ratio, a (within) one-standard-deviation increase in franchise value (Tier 1 ratio) is associated with a decrease of 0.047 × 0.088 = 0.41% (2 × 0.003 = 0.6%) in the TruPS/Tier 1 ratio. Relative to the median TruPS/Tier 1 ratio of 0.074, this is a 5.6% (8.1%) decrease. The coefficients on franchise value and the Tier 1 ratio are qualitatively and quantitatively similar or even stronger in all regressions that include different sets of control variables. Column 3 shows results in which we replace the Tier 1 ratio by the common equity Tier 1 ratio. The result becomes stronger and shows that banks with less common equity have higher levels of TruPS in their Tier 1 capital.

In the firm fixed effects regressions, several bank characteristics have strong predictive power for the TruPS/Tier 1 ratio. If a bank becomes larger, its TruPS/Tier 1 ratio significantly increases. If the deposit base of banks shrinks, their TruPS/Tier 1 ratio significantly increases. When banks have rapid internal growth or external growth via mergers, which makes them more likely to be constrained by capital requirements, they increase their TruPS/Tier 1 ratios. If idiosyncratic volatility increases, so does the TruPS/Tier 1 ratio. These results corroborate our hypothesis that banks with riskier business models that are more likely to be constrained by capital requirements use TruPS more heavily.

3.3 Distinction between pecking order and regulatory constraints

An important additional question is whether we can distinguish our hypothesis—that banks constrained by capital requirements issue TruPS—from the prediction of a simple pecking order theory. Under the pecking order, management would, conditional on the need to raise Tier 1 capital, always issue the least information-sensitive form of Tier 1 capital, which is TruPS. Fama and French (2005) examine firms that issue or retire equity and show that equity issuance decisions often violate the pecking order because equity issuers are not typically under duress, have moderate leverage, and have financing surpluses. Frank and Goyal (2003) argue that more opaque firms are more likely to have asymmetric information problems and should

as a consequence be more likely to follow the pecking order. We follow the insights of these two papers and examine the characteristics of firms that issue equity versus TruPS, conditional on the decision to issue either.
In unreported regressions, we do not find evidence that bank holding companies that are more difficult to understand by analysts (and thus are more opaque) issue TruPS more frequently, which is inconsistent with the pecking order. We also find strong and consistent evidence that banks are more likely to issue equity instead of TruPS if they have higher Tier 1 ratios. The finding is similar to that of Fama and French (2005) and shows that BHCs with more capital choose to issue equity. Therefore, equity is not issued as a last resort, and this violates the pecking order. Our finding shows that banks already constrained by capital requirements issue a hybrid security instead of equity to lever up and be riskier, possibly consistent with a risk-shifting explanation after debt issuance as in Jensen and Meckling (1976) .

3.4 Regulatory arbitrage and asset-backed commercial paper

Our second hypothesis predicts that a constrained bank will use all available opportunities to optimize its level of risk. We thus relate TruPS-based regulatory arbitrage to another type of regulatory arbitrage. Acharya, Schnabl, and Suarez (2013) show that banks used asset-backed commercial paper (ABCP) conduits as a form of regulatory arbitrage during the 2000s. These conduits allowed banks to move assets off their balance sheets, thereby improving their Tier 1 ratios by reducing risk-weighted assets (the denominator of the Tier 1 ratio). However, banks generally retained the risk associated with these assets by providing liquidity or credit guarantees should the underlying assets fail to roll over and/or default. Similar to our results for trust-preferred securities, they find that banks constrained by capital requirements had more conduit exposure than other banks.
One key difference between ABCP usage and TruPS usage is that ABCP usage was available to only a small fraction of the largest banks since regulatory arbitrage via ABCP entailed high fixed costs. By contrast, TruPS issuance was available to far more banks, and after the invention of TruPS CDOs to virtually all banks. Actual ABCP and TruPS usage rates help illustrate this difference: in our sample, 25 of 857 banks used ABCP (about 3%), while 518 of 857 banks used TruPS (over 60%). Thus, the following analysis focuses on whether banks that use ABCP also use TruPS rather than the reverse comparison, due to the low participation rates in ABCP.
We examine whether the same banks that used ABCP for regulatory arbitrage were also significant users of TruPS, as predicted by our second hypothesis. With that hypothesis, constrained banks are expected to use all tools at their disposal that enable them to become riskier. While most banks using TruPS were typically not large enough to justify the costs of implementing an ABCP program, the banks that had such programs had no obstacle to using TruPS.

In Table A1 , we list the names of banks with conduit exposure at any point during the sample period, based on four items reported on form FR Y-9C since 2001. [12]Table A1 also provides details on whether banks have outstanding TruPS during the period, and the average size of the bank's assets and ABCP exposure, sorted in order of total sponsored ABCP exposure. [13] As expected, banks that have sponsored ABCP also have TruPS.
Our results provide strong evidence that the same banks that use ABCP to decrease the denominator of their Tier 1 ratio also use TruPS to increase the numerator of their Tier 1 ratio. Both activities are a form of regulatory arbitrage allowing constrained banks to move closer to their desired level of risk without a reduction in Tier 1 capital.

3.5 Distance to default and TruPS usage

We now analyze our third hypothesis, which posits that banks with TruPS are riskier. We examine whether TruPS usage is correlated with a common proxy for bank risk from 1996 to 2011. Our measure of risk is the bank's z-score, a distance-to-default measure. We follow Boyd, Graham, and Hewitt (1993) and Laeven and Levine (2009) and calculate the z-score as the ratio of the return on assets, plus the capital-asset ratio, divided by the standard deviation of the return on assets, where capital is the market value of equity. The standard deviation of ROA is calculated using six years of quarterly data. A higher z-score indicates that the bank is further away from default. The mean and median z-scores (log(z-score)) of our sample banks are 17.84 and 18.35 (2.75 and 2.93), which are comparable to the means reported in Laeven and Levine (2009) for the United States. Table 5 , Columns 1 to 5, reports regressions of the log of z-score on our measures of TruPS exposure. Columns 1 and 3 use the TruPS/Tier 1 ratio as the key explanatory variable; Columns 2 and 4 use TruPS/Total subordinated debt; and Column 5 lags the TruPS/Tier 1 variable five years to alleviate endogeneity concerns. We do not report regressions in which we lag the TruPS/Total subordinated debt ratio by five years, because there is little time-series variation in this variable. The table shows that banks with more TruPS/Tier 1 had a significantly lower distance to default. A one-standard-deviation increase in TruPS/Tier 1 (0.117) in Column 3 is associated with a decrease in the log z-score of 0.042. The result in Column 5, where we lag the TruPS/Tier 1 variable by five years, is of similar economical and statistical magnitude as that in Column 3.

Table 5
Distance to default and TruPS usage

	Log continuous z-score					Lo mo z-s
	1	2	3	4	5	6

TruPS/Tier 1 $_{t-1}$	−0.668***		−0.352***			−0.
	(0.01)		*(0.00)*			*(0.*
TruPS/Subordinated debt		−0.099**		−0.039		
		(0.05)		*(0.15)*		
TruPS/Tier 1 $_{t-5}$					−0.349**	
					(0.02)	
Tier 1 ratio $_{t-1}$			0.013***	0.014***	0.014**	0.0
			(0.01)	*(0.01)*	*(0.02)*	*(0.*
Stock return $_{t-1}$			0.309***	0.306***	0.434***	0.3
			(0.00)	*(0.00)*	*(0.00)*	*(0.*
Log (market value) $_{t-1}$			−0.008	−0.009	−0.032**	−0.
			(0.63)	*(0.63)*	*(0.05)*	*(0.*
Beta $_{t-1}$			−0.023	−0.026	0.045	−0.
			(0.66)	*(0.66)*	*(0.41)*	*(0.*
Idiosyncratic volatility $_{t-1}$			−0.126***	−0.127***	−0.194***	−0.
			(0.00)	*(0.00)*	*(0.00)*	*(0.*
Book/Market $_{t-1}$			−0.462***	−0.469***	−0.401***	−0.
			(0.00)	*(0.00)*	*(0.00)*	*(0.*
Loan concentration index $_{t-1}$			−0.348***	−0.341***	−0.465***	−0.
			(0.00)	*(0.00)*	*(0.00)*	*(0.*
Mean asset growth, past 3 years			0.373***	0.349***	0.432***	0.3
			(0.00)	*(0.00)*	*(0.00)*	*(0.*
N	5,876	5,876	5,140	5,140	3,223	5,1
Includes year fixed effects?	yes	yes	yes	yes	yes	yes
R^2	0.33	0.32	0.55	0.55	0.53	0.5

The table presents results from pooled time-series cross-sectional OLS regressions of the log of the z-score on TruPS usage and other bank characteristics. The z-score is calculated as [(ROA + capital ratio) / sigma(ROA)]. ROA is calculated as the sum of quarterly net income over one year, divided by end-of-year total assets. The capital ratio (market value of equity/total assets) in the numerator is calculated as end-of-year. Sigma ROA is calculated using quarterly data from the six years prior to the year of interest. Independent variables are lagged one period and described in detail in Section 3 . In Columns 1 to 5, the dependent variable is the log of the z-score. Column 6 uses the log of a modified z-score, which is defined as follows: [(ROA + (market value of equity + market value of TruPS used to repurchase shares)/assets)/sigma(ROA)]. All z-scores are winsorized at the 1% and 99% tails. Regressions include year fixed effects. Standard errors are clustered by bank and by year. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively, and p -values are reported below the coefficients in parentheses.

The TruPS/Total subordinated debt measure is statistically significant in Column 2, but just misses statistical significance in Column 4. As for the other explanatory variables, we find that better capitalized banks, banks with better returns in the prior year, banks with lower idiosyncratic volatility, banks with lower book-to-market ratios, banks with a less correlated loan portfolio, and banks with lower asset growth have a larger distant to default.

One concern about the above results with respect to the TruPS/Tier 1 ratio is that the z-score goes down when TruPS are issued to retire equity. While this means that banks become riskier, it establishes a somewhat mechanical relationship between z-score and TruPS/Tier 1. In Column 6, we test whether there continues to exist a negative relation between TruPS/Tier 1 once we add back the value of TruPS-financed repurchased equity. We create a modified z-score as follows. In each year in which a firm repurchased shares and issued TruPS, we add back the value of the repurchased shares to the capital ratio in the numerator of the z-score and calculate a modified z-score as (ROA + (market value of equity + market value of TruPS used to repurchase shares)/assets)/sigma(ROA). Column 6 shows that the TruPS/Tier 1 ratio is still economically and statistically negative and significant in the modified z-score regressions.

3.6 TruPS and bank risk during the recent crisis

Our fourth hypothesis is that banks with a higher ratio of TruPS/Tier 1 or TruPS/Total subordinated debt are riskier, so that we would expect them to have been affected more strongly by the financial crisis.

We start the section by providing visual evidence that banks with more TruPS are riskier during the crisis. Figure 4 shows the evolution of credit default swap (CDS) spreads, buy-and-hold stock returns, and accounting return on equity and accounting return on assets for two groups of banks. The first group has an above median TruPS/Tier 1 ratio (dashed line in all subplots), and the second group has a below median TruPS/Tier 1 ratio (solid

line in all subplots). The CDS subplot uses data on all available names from our sample (twenty observations), and the other three plots use the full sample. The evidence from all four subplots confirms our hypothesis. CDS spreads are low for both groups of banks during 2006 and 2007, but start to widen during the financial crisis. During the height of the crisis, the dashed line is always above the solid line. CDS spreads of BHCs with more TruPS are larger than the spreads of BHCs with little TruPS exposure; that is, BHCs with more TruPS are viewed by the market as riskier. The top right subplot shows cumulative buy-and-hold returns for the two portfolios of BHCs. Again, there is little difference in the performance of the high TruPS and low TruPS portfolios in 2006 and 2007. In 2008, the differences between the two portfolios become apparent, and the high TruPS portfolio starts to significantly underperform. The bottom left subplot shows that the high TruPS portfolio has a worse return on equity than the low TruPS portfolio during the financial crisis, but not before or after (we plot the average return on equity). The bottom right figure shows the return on assets for the high TruPS and low TruPS portfolio. The return on assets for the high TruPS BHCs is lower than the return on assets for the low TruPS BHCs throughout the sample period. [14]

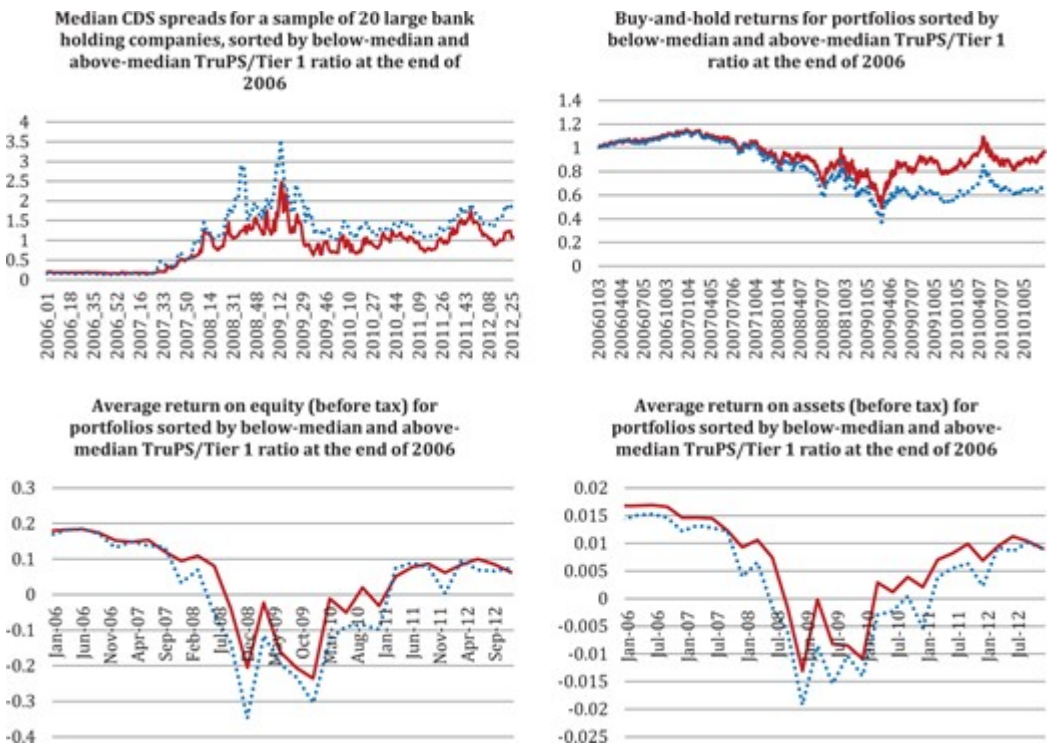


Figure 4 **Evolution of returns and CDS spreads for high and low TruPS usage banks**

The four subplots show the evolution of credit default swap spreads (top left), buy-and-hold stock returns (top right), return on equity (bottom left), and return on assets (bottom right) from 2006 onward. To create each subplot, all available data were split by the median TruPS/Tier 1 ratio at the end of 2006. Within each subplot, the solid line shows the evolution for a portfolio of banks with below-median TruPS usage, and the dashed line shows the evolution for a portfolio of banks with above-median TruPS usage. The top left subplot uses data on CDS premia on the five-year, no restructuring contract from MarkIt for the twenty sample bank holding companies with available data. The three other subplots are based on the data described in detail in Section 2 .

Overall, Figure 4 demonstrates that banks with more TruPS were riskier and performed worse during the financial crisis compared to their low TruPS counterparts. We now turn to a more formal analysis that allows us to control for other variables that may affect the relationship.

3.6.1 TARP, Fed facilities, and TruPS usage

One measure of the impact of the crisis on a bank is whether it received financial assistance from the U.S. government during the crisis. Government assistance came in several different forms. The best-known program is funding from the TARP. The TARP was authorized by the U.S. Congress on October 3, 2008, to strengthen the financial sector. Our focus is on the Capital Purchase Program (CPP), the direct government purchase of newly issued preferred stock of BHCs. Eligible institutions were permitted to sell equity to the Treasury in amounts of 1% to 3% of the risk-weighted assets. The Treasury spent about $205 billion on the CPP from the start of their plan in October 2008 to the final distribution in December 2009. Most financial institutions participating in the CPP paid a 5% dividend on preferred shares for the first five years and a 9% rate thereafter. In addition, Treasury received warrants to purchase common shares or other securities from the banks at the time of the CPP investment. We also add banks that received government support via the Term Auction Facility Program (TAF), the Primary Dealer Credit Facility (PDCF) Program, or the Term Securities Lending Facility (TSLF). [15] In an additional test, we also add banks that borrowed from the Federal Home Loan Bank System (FHLB). The FHLB provides funds via secured loans and mortgage purchase programs.

Of the 383 banks in our sample at the start of the crisis in July 2007, 191 received funding from at least one of the four government programs and facilities. The majority of our sample banks (323 out of 383) borrowed from the FHLB postcrisis. We drop six of these banks that were among the initial recipients of CPP since these banks were strongly encouraged to participate in the program by Secretary of the Treasury Henry Paulson. [16] Results do not change if we include these banks. Since our hypotheses predict that banks with higher levels of TruPS/Tier 1 are more likely to suffer during a financial crisis, we predict that these banks will be more likely to use the government programs. Columns 1 through 5 of Table 6 present results of a probit regression in which the dependent variable is set to one if the bank receives CPP, TAF, PDCF, or TSLF funding between October 2008 and December 2009, and zero otherwise. Columns 6 and 7 of Table 6 present results in which the dependent variable is equal to one if the bank received CPP, TAF, PDCF, or TSLF funding or if it borrowed via the FHLB. The independent variables are measured precrisis, as of June 2007. The main variables of interest are TruPS/Tier 1 and TruPS/Total subordinated debt. Column 5 includes a specification in which we lag TruPS/Tier 1 by five years to alleviate endogeneity concerns. The regressions also include a set of control variables used in the prior literature (see, e.g., Duchin and Sosyura 2012). These

variables include either the Tier 1 ratio or the regulatory leverage ratio, which is Tier 1/Total assets. Since these variables have a correlation coefficient of 0.75, they are included in separate regressions. Regressions also include the log of total assets to control for size, idiosyncratic volatility, beta, and the loan concentration index to control for risk, a bank's book to market ratio, prior year stock performance and ROA, and the prior three-year mean of asset growth. [17]

Table 6.
Special federal programs and TruPS usage

	1	2	3	4	5	6
TruPS/Tier 1	0.712***	0.650**	0.786***			0.3
	(0.00)	*(0.02)*	*(0.00)*			*(0.0*
TruPS/Subordinated debt				0.119*		
				(0.09)		
TruPS/Tier 1 $_{t-5}$					0.593**	
					(0.03)	
Tier 1 ratio		−3.825**			−4.540**	
		(0.03)			*(0.03)*	
Leverage ratio			−3.586*	−3.967**		0.2
			(0.07)	*(0.05)*		*(0.7*
Return on assets before		0.499	−0.091	−0.399	1.056	−0.
taxes 7/2006 to 6/2007		*(0.78)*	*(0.95)*	*(0.78)*	*(0.56)*	*(0.0*
Stock return 7/2006 to		−0.202	−0.291	−0.289	−0.257	0.0
6/2007		*(0.36)*	*(0.19)*	*(0.19)*	*(0.25)*	*(0.7*
Log (total assets)		0.118***	0.122***	0.125***	0.125***	−0.
		(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.5*
Beta		−0.134***	−0.139***	−0.132***	−0.148***	0.0
		(0.01)	*(0.00)*	*(0.01)*	*(0.00)*	*(0.2*

Idiosyncratic volatility		3.901	4.036	2.463	3.396	−3.
		(0.63)	*(0.61)*	*(0.76)*	*(0.70)*	*(0.2*
Book/market		−0.080	−0.179	−0.159	−0.039	0.0
		(0.62)	*(0.23)*	*(0.28)*	*(0.70)*	*(0.2*
Loan concentration index		−0.109	−0.142	−0.170	−0.172	0.1
		(0.61)	*(0.51)*	*(0.43)*	*(0.44)*	*(0.2*
Mean asset growth ratio,		−0.054	0.094	0.175	−0.118	−0.
past 3 years		*(0.82)*	*(0.69)*	*(0.43)*	*(0.63)*	*(0.0*
Observations	377	365	365	365	350	365
Pseudo R^2	0.02	0.12	0.10	0.09	0.13	0.1

The table shows results from probit regressions in which the dependent variable is set to one if the firm ever received funds from the Capital Purchase Program (CPP) of the Troubled Asset Relief Program (TARP), the Term Auction Facility (TAF), the Primary Dealer Credit Facility (PDCF), or the Term Securities Lending Facility (TSLF) and zero otherwise (Columns 1 through 5). The dependent variable in Columns 6 and 7 is equal to one if the firm ever received funds from one of the four programs above or if it borrowed from the Federal Home Loan Bank System. The independent variables are measured precrisis in June 2007 and are described in Section 3 . The table reports marginal effects. Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively, and p -values from heteroskedasticity-adjusted standard errors are reported below the coefficients in parentheses.

The results presented in Table 6 provide strong evidence that the banks that use more TruPS are more likely to use the CPP program. The effects are economically large and statistically significant. In Column 2, a one-standard-deviation increase in TruPS/Tier 1 (0.117) is associated with a 7.6% (0.117 × 0.650 = 0.076) higher probability of receiving funds from government programs. Banks that used more TruPS were more likely to need government assistance during the financial crisis, consistent with our hypothesis that these banks are riskier. The Tier 1 capital ratio is strongly negatively related to government assistance, and the regulatory leverage ratio is weakly negatively related to government assistance, implying that better-capitalized banks are less likely to participate in these programs. There is some evidence that banks with lower systematic risk were more likely to participate in one of the programs. The other control variables are mostly insignificant. In Column 4, we standardize TruPS by total subordinated debt instead of the Tier 1 ratio. We find an economically

important, but statistically weaker, effect. A one-standard-deviation increase in TruPS/Total subordinated debt (0.466) is associated with a 5.5% higher probability of getting government assistance (0.119 × 0.466 = 0.055). In Column 5, we seek to reduce endogeneity concerns. We lag the TruPS/Tier 1 ratio by five years so that we measure it in 2002. We continue to find an economically and statistically important relationship between TruPS and crisis federal assistance. BHCs with more TruPS in 2002 have a much higher probability of receiving government assistance during the recent crisis. Finally, in Columns 6 and 7, we are more inclusive in the definition of government assistance and also include bank holding companies that borrowed from one of the government sponsored partner institutions of the Federal Home Bank Lending System. Our results continue to hold. Both the TruPS/Tier 1 ratio and the TruPS/Total subordinated debt ratio strongly and positively predict government assistance. The increase in the probability of receiving assistance for a one-standard-deviation increase in the ratios is 4.3% and 3.4%, respectively.

In untabulated regressions, we only use the receipt of TARP funds, as well as the actual dollar amount of CPP funding, as a fraction of Tier 1 capital instead of the more inclusive indicator variable. The results are statistically significant and economically large. For example, in a regression that mimics Column 2 of Table 6 , we find that a one-standard-deviation increase in TruPS/Tier 1 increases the probability of receiving CPP funding by 9.8% and the ratio of CPP funding/Tier 1 by 2.6%, or 19% relative to the mean CPP funding/Tier 1 ratio of 0.135.

3.6.2 Crisis performance and TruPS usage

Next, we evaluate the relation between bank performance during the financial crisis and TruPS usage. Our hypothesis predicts that banks with high levels of TruPS should perform worse during the crisis. We evaluate both stock price performance in Table 7 and operating performance in Table 8 (return on assets and return on equity before income taxes). We consider the performance of BHCs from July 1, 2007 to December 31, 2008, to correspond to the returns during the crisis. These results are robust to alternative crisis ending dates of March 31, June 30, or September 30, 2009. As in Table 6 , all explanatory variables are measured prior to the crisis, that is, as of June 30, 2007.

Table 7.
Crisis stock returns and TruPS usage

	Stock market return					
	1	2	3	4	5	6
TruPS/Tier 1	−0.320***		−0.163	−0.272**	−0.004	−0.158

	(0.01)		*(0.17)*	*(0.02)*	*(0.98)*	*(0.27)*
TruPS/Total Sub debt		−0.046				
		(0.13)				
TruPS/Tier 1 $_{t-5}$						
Tier 1 ratio			1.587***		1.560***	
			(0.00)		*(0.00)*	
Regulatory leverage ratio				−0.741		−0.707
				(0.29)		*(0.29)*
Stock return 7/2006 to 6/2007			−0.029	0.056	−0.067	0.009
			(0.77)	*(0.56)*	*(0.51)*	*(0.92)*
Log (market value)			−0.039***	−0.046***	−0.035***	−0.043
			(0.00)	*(0.00)*	*(0.00)*	*(0.00)*
Beta			0.086***	0.092***	0.092***	0.099*
			(0.00)	*(0.00)*	*(0.00)*	*(0.00)*
Idiosyncratic volatility			−11.281***	−11.080***	−9.984***	−9.779
			(0.00)	*(0.00)*	*(0.01)*	*(0.01)*
Book/market			−0.153***	−0.135**	−0.079	−0.051
			(0.01)	*(0.03)*	*(0.25)*	*(0.47)*
Loan concentration index			−0.358***	−0.296***	−0.299***	−0.236
			(0.00)	*(0.00)*	*(0.00)*	*(0.01)*
Mean asset growth, past 3 years			−0.317***	−0.374***	−0.358***	−0.411
			(0.00)	*(0.00)*	*(0.00)*	*(0.00)*

Past due real estate					−0.977	−1.505
loans/total loans					*(0.40)*	*(0.15)*
TruPS/Tier 1 × Past due real					−16.284**	−13.26
estate loans/total loans					*(0.02)*	*(0.04)*
Constant	−0.203***	−0.220***	0.543***	0.858***	0.419**	0.727*
	(0.00)	*(0.00)*	*(0.01)*	*(0.00)*	*(0.04)*	*(0.00)*
Observations	382	382	370	370	370	370
R^2	0.02	0.01	0.23	0.20	0.26	0.24

The table shows results from cross-sectional regressions of crisis returns on bank characteristics, measured in June 2007. The dependent variable is the buy-and-hold stock return of bank holding companies. Returns are calculated from July 2007 through December 2008. The independent variables are described in Sections 3 and 4 . Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively, and p -values from heteroskedasticity-adjusted standard errors are reported below the coefficients in parentheses.

Table 8.
Accounting returns and TruPS usage

	Return on assets before income tax					**Return**
	1	**2**	**3**	**4**	**5**	**6**
TruPS/Tier 1	−0.065***		−0.028**	−0.031**		−1.192**
	(0.00)		*(0.05)*	*(0.03)*		*(0.00)*
TruPS/Total Subordinated debt		−0.010***				
		(0.01)				
TruPS/Tier 1 $_{t-5}$					−0.030**	
					(0.05)	
Tier 1 ratio			0.028		0.045	

			(0.67)		*(0.55)*	
Regulatory leverage ratio				−0.178		
				(0.11)		
Return on assets before taxes			0.152	0.219**	0.121	
7/2006 to 6/2007			*(0.11)*	*(0.04)*	*(0.13)*	
Return on equity before taxes						
7/2006 to 6/2007						
Log (total assets)			−0.002*	−0.003***	−0.002*	
			(0.10)	*(0.01)*	*(0.10)*	
Beta			−0.001	−0.001	−0.001	
			(0.58)	*(0.65)*	*(0.60)*	
Idiosyncratic volatility			−0.021	−0.023	−0.143	
			(0.95)	*(0.95)*	*(0.72)*	
Book/market			−0.048***	−0.046***	−0.043***	
			(0.00)	*(0.00)*	*(0.00)*	
Loan concentration index			−0.030***	−0.028***	−0.300***	
			(0.00)	*(0.00)*	*(0.00)*	
Mean asset growth, past 3 years			−0.049***	−0.050***	−0.063***	
			(0.00)	*(0.00)*	*(0.00)*	
Constant	0.019***	0.019***	0.092***	0.122***	0.094***	0.019***
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
Observations	377	377	365	365	295	376

R^2	0.05	0.02	0.29	0.30	0.27	0.05

The table shows results from cross-sectional regressions of crisis accounting returns on bank characteristics, measured in June 2007. In Columns 1–5, the dependent variable is the return on assets before income tax. In Columns 6 through 10, the dependent variable is the return on equity before income tax. Returns are calculated from July 2007 through December 2008. The independent variables are described in Sections 3 and 4 . Coefficients with statistical significance at the 10%, 5%, and 1% level are indicated with *, **, and ***, respectively, and p -values from heteroskedasticity-adjusted standard errors are reported below the coefficients in parentheses.

Table 7 shows results for stock market performance for the period from July 2007 to December 2008. In Column 1, which includes just the TruPS/Tier 1 ratio, the coefficient on TruPS/Tier 1 is negative and strongly statistically significant. Column 2 includes TruPS/Total subordinated debt. The coefficient is negative, but just misses significance levels, with a p -value of 0.13. Returning to the regressions that use TruPS/Tier 1 as the key independent variable, its coefficient loses significance in Column 3 when we include the Tier 1 ratio and a number of other controls. However, in Column 4, which includes regulatory leverage as a control variable, the coefficient on TruPS/Tier 1 is negative and strongly statistically significant. In terms of economic magnitude, a one-standard-deviation increase in the TruPS/Tier 1 ratio (0.106) decreases annualized crisis returns by 2.9%. Relative to the sample BHC's annualized crisis return of -25.2%, this corresponds to an 11.4% lower return.

Columns 5 and 6 include a variable for past due real estate loans held by banks scaled by total loans before the crisis, as well as an interaction of this variable with the TruPS/Tier 1 ratio. We wish to understand whether TruPS usage alone or perhaps a combination of TruPS usage and choosing a riskier lending portfolio is associated with worse stock performance during the crisis. To construct this variable, we collect data on past due real estate loans. [18] The variable has a mean of 0.014 and a median of 0.009, and ranges from 0 to 0.232. Not surprisingly given our predictions, banks with high TruPS usage (above median TruPS/Tier 1) have more past due loans, both as of June 2007 and throughout our sample period (the difference is large and significant for the sample period, but not significant for June 2007). Columns 5 and 6 indicate that banks with risky real estate assets and high levels of TruPS/Tier 1 perform significantly worse than their counterparts, suggesting that banks with TruPS do not simply have lower returns because they have more leverage but that they also made a riskier precrisis asset choice. The economic magnitude of this effect is also significant; a one-standard-deviation change in the interaction variable leads to a 5.1% (4.2%) decrease in stock return in Columns 5 and 6. Relative to the sample BHC's

annualized crisis return of -25.2%, this corresponds to a 20.2% (16.4%) lower return.

Finally, in Column 7 we report regression results that attempt to alleviate endogeneity concerns by lagging the TruPS/Tier 1 ratio by five years. The coefficient on the five year lagged TruPS/Tier 1 is negative and statistically significant.

The control variables in the stock return regressions have the expected signs and are consistent with recent findings. Small banks and banks with high Tier 1 ratios performed better during the crisis. Banks with high idiosyncratic volatility, high book to market ratios, more concentrated loan portfolios, and high growth over the past three years did worse during the crisis. Finally, there is some evidence that bank holding companies with higher betas did better during the crisis. [19]

Table 8 shows regression results for the return on assets and return equity for the period from July 2007 to December 2008. For the ROA regressions in Columns 1 to 5, the coefficient on TruPS/Tier 1 is negative and statistically significant regardless of the control variables used and regardless of whether we use the June 2007 or the five-year lagged TruPS/Tier 1 ratio. As with the stock performance regressions, the economic magnitude is meaningful. The average BHC has an annualized ROA of 0.86%. A one-standard-deviation increase in TruPS/Tier 1 decreases ROA by 0.29% (0.106 × (-0.028)) in Column 3 (with the Tier 1 ratio as a control variable) and 0.33% in Column 4 (which includes the leverage ratio as a control variable). Relative to the sample mean, these correspond to 34% and 39% lower returns, respectively. Note that we used the return on assets before taxes in the regressions of Columns 1 to 5 so that there should not be a mechanical relation between increases in TruPS and the return on assets (due to leverage, via a tax shield of debt). The regression in Column 2 uses as the key independent variable TruPS/Total subordinated debt, which has a negative and significant coefficient, consistent with the results for TruPS/Tier 1. Columns 6 through 10 show the results for ROE. We again consistently find that the return on equity is lower for bank holding companies with more TruPS/Tier 1. The economic magnitude is large. A one-standard-deviation increase in the TruPS/Tier 1 ratio (0.106) decreases the return on equity by 6.9% (0.106 × (-0.652)). The average BHC has an annualized ROE of 27.8%. Relative to the sample mean, the decrease corresponds to a 25% lower return. The results are robust, whether we include the Tier 1 ratio or the total leverage ratio as a control variable. Finally, the regression in Column 7 uses as the key independent variable TruPS/Total subordinated debt, which has a negative and significant coefficient, consistent with the results for TruPS/Tier 1. A one-standard-deviation increase in TruPS/Total subordinated debt (0.40) decreases the return on equity by 7.7% (0.40 × (-0.193)).

Turning to the control variables for both the ROA and ROE regressions, we find that bank holding companies that are larger, have higher book-to-

market ratios, have higher growth over the past three years, and have more concentrated loan portfolios had worse performance during the crisis.

4. Conclusion

Our paper provides an answer to why some banks engage in regulatory arbitrage and others do not. Our conjecture is that banks have different optimal levels of risk depending on their franchise values. Banks with high franchise values find it optimal to have low levels of risk and high levels of capital. These banks are unconstrained by capital requirements. In contrast, banks with low franchise values find it optimal to have high levels of risk and low levels of capital. Such banks are constrained by capital requirements. Constrained banks take actions to relax these constraints when possible. Therefore, we predict that constrained banks will use regulatory arbitrage, such as issuing TruPS. TruPS allow constrained banks to satisfy capital requirements with more risk than banks that do not issue TruPS. Effectively, a bank with TruPS in its regulatory capital is more levered than a bank that has the same amount of regulatory capital comprised solely of common equity. Since TruPS are a combination of equity and debt, replacing equity with TruPS amounts to an increase in the bank's debt.

We show that banks that use trust-preferred securities have lower franchise values and Tier 1 capital ratios. Consistent with our hypotheses, we also show that banks that use TruPS are more likely to engage in other forms of regulatory arbitrage such as using ABCP conduits. We expect banks that issue more TruPS to be riskier than other banks, and we find that banks with more TruPS have a smaller distance-to-default during our sample period. We also expect riskier banks to have been more fragile during the financial crisis and show that, everything else equal, a bank that had more TruPS in its capital structure was more likely to receive TARP funding and assistance from other government emergency programs and had worse stock and operating performance during the 2007 crisis.

Because our study focuses on the use of TruPS by banks, it considers a form of regulatory arbitrage that is available to almost all banks in contrast to other forms of regulatory arbitrage considered in the literature that are typically mostly available to the very largest banks. Consequently, we can investigate the importance of TBTF as a determinant of regulatory arbitrage. We find that the determinants of TruPS use by banks that would not be expected to benefit from TBTF are the same as those of the very largest banks. We view this evidence as supporting our explanation for the use of regulatory arbitrage. Similarly, we find that banks in which interests of managers are poorly aligned with those of shareholders and in which managers have little skin in the game actually hold less TruPS. This evidence suggests that misaligned incentives are not the main driver of regulatory arbitrage.

Given our evidence, the best defense against regulatory arbitrage would seem to be franchise values that lead banks to choose risk levels such that

they are not constrained by regulatory capital requirements. Our evidence suggests that the existence of a less regulated shadow banking sector that competes with banks reduces their franchise value and hence leads to even more regulatory arbitrage.

Appendix A. A Description of Tier 1 Capital

The following description of Tier 1 capital is based on the Bank Holding Company Act, Section 6000 FDIC Law. [20]

Tier 1 capital is defined as the sum of core capital elements less any amounts of goodwill, other intangible assets (except for certain mortgage servicing rights), credit-enhancing interest-only strips receivables, deferred tax assets, and nonfinancial equity investments. Core capital elements include common stockholders' equity, qualifying noncumulative perpetual preferred stock, senior perpetual preferred stock issued under TARP (for 2008 forward), minority interest related to qualifying common or noncumulative perpetual preferred stock directly issued by a consolidated U.S. depository institution or foreign bank subsidiary (class A minority interest), and restricted core capital elements. Restricted core capital elements include qualifying cumulative perpetual preferred stock, minority interest related to qualifying cumulative perpetual preferred stock directly issued by a consolidated U.S. depository institution or foreign bank subsidiary (class B minority interest) (effective March 31, 2011), minority interest related to qualifying common stockholders' equity or perpetual preferred stock issued by a consolidated subsidiary that is neither a U.S. depository institution nor a foreign bank (class C minority interest) (effective March 31, 2011), and qualifying trust preferred securities. [21]

Effective March 31, 2011, the aggregate amount of restricted core capital elements that may be included in the Tier 1 capital of a banking organization must not exceed 25% (15% for internationally active bank holding companies) of the sum of all core capital elements, including restricted core capital elements, net of goodwill less any associated deferred tax liability. Prior to March 31, 2011, the aggregate amount of qualifying cumulative perpetual preferred stock (including related surplus) and qualifying trust preferred securities that a banking organization may include in Tier 1 capital is limited to 25% (15% for internationally active bank holding companies) of the sum of the following core capital elements: qualifying common stockholders' equity, qualifying noncumulative and cumulative perpetual preferred stock (including related surplus), qualifying minority interest in the equity accounts of consolidated subsidiaries, and qualifying trust preferred securities.

Table A1

List of banks with conduit exposure

	Sponsored ABCP	Other Bank ABCP

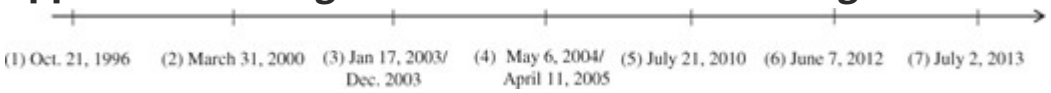
Name	Has TruPS?	Assets ($MM)	Liq. ($MM)	Credit ($MM)	Total ($MM)	Liq. ($MM)	Credit ($MM)
J.P. Morgan Chase & Co	yes	1,462,148	48,912	4,781	53,693	6,539	47
Citigroup, Inc.	yes	1,641,036	50,456	2,071	52,527	1,681	5
Bank One Corporation	yes	290,967	41,144	1,264	42,408	3,733	0
Bank of America Corp.	yes	1,460,707	37,814	3,672	41,486	92	0
Wachovia Corporation	yes	511,060	17,307	4,143	21,450	3,121	2,356
State Street Corporation	yes	117,755	19,522	1,589	21,111	0	0
Wells Fargo & Company	yes	1,289,051	9,358	18	9,376	230	641
U.S. Bancorp	yes	200,303	6,623	1,530	8,153	0	0
Zions Bancorporation	yes	38,615	5,738	134	5,872	0	61
Suntrust Banks Inc.	yes	160,078	5,319	509	5,828	132	0
FleetBoston Financial Corp.	yes	198,194	4,072	1,692	5,764	0	0
PNC Financial Services Group	yes	155,780	5,397	322	5,719	208	0
Compass Bancshares	yes	27,914	2,000	0	2,000	85	83
Fifth Third	yes	101,409	475	1,414	1,889	109	174
Mellon Financial Corp.	yes	37,300	1,633	255	1,888	632	0
Countrywide Financial Corp.	yes	167,842	0	1,163	1,163	0	429
National City Corporation	yes	134,973	909	0	909	463	0
Bank of New York Mellon Co.	yes	244,156	881	18	899	429	0
Keycorp	yes	91,263	371	52	423	235	1
Bank of New York	yes	91,872	0	229	229	889	0

First Tennessee National Corp.	yes	22,222	0	224	224	0	0
Cit Group	no	60,511	0	46	46	0	0
Capital One Financial Corp.	yes	110,695	0	35	35	0	678
Marshall and Ilsley	yes	31,450	0	2	2	0	0
Independent Bank Corp.	yes	4,833	0	1	1	0	0
Amsouth Bancorporation	no	45,454	0	0	0	1,990	115
Colonial Bancgroup	yes	23,400	0	0	0	735	68
First Community Bancshares	yes	2,273	0	0	0	0	14
Goldman Sachs Group	yes	917,524	0	0	0	25	0
Hibernia Corporation	no	17,524	0	0	0	0	35
M&T Bank Corporation	yes	61,188	0	0	0	0	24
Morgan Stanley	yes	776,179	0	0	0	2,170	0
People's Mutual Holdings	no	11,999	0	0	0	98	0
Regions Financial Corporation	yes	142,207	0	0	0	237	46
Susquehanna Bancshares, Inc.	no	5,749	0	0	0	0	31

The table below lists all sample BHCs that had exposure to asset-backed commercial paper at some point during the period 2001–2012. The data are derived from four items reported on Form FR Y-9C. Item BHCKB806 reports the maximum contractual credit exposure remaining for conduits sponsored by the bank or bank affiliate, and BHCKB807 reports the same information for conduits sponsored by other institutions. BHCKB808 reports the unused facilities for liquidity protection for conduits sponsored by the bank or affiliate, and

BHCKB809 reports unused liquidity facilities for conduits sponsored by other institutions. The reported numbers are time-series averages by BHC.

Appendix B. Changes to the TruPS Market through Time



(1) Board of Governors of the Federal Reserve System (FRB) announces that bank holding companies may include trust-preferred securities up to 25% of core capital in Tier 1 regulatory capital.

(2) Salomon Smith Barney issues the first TruPS collateralized debt obligation, allowing small BHCs to issue TruPS through a pooled structure (see Cordell, Hopkins, and Huang 2011 for more information).

(3) FASB changes the accounting treatment of the special purpose entity (SPE) underlying TruPS in 2003 (the initial ruling was on January 17, and the final ruling was in December). Until 2003, the SPE has been consolidated at the BHC level and the trust-preferred securities issued by the SPE have been classified as a minority interest in the equity accounts of consolidated subsidiaries. Under the new rules, the SPEs must be deconsolidated from their BHC sponsors' financial statements. Because the initial Tier 1 treatment of TruPS hinged on the securities being classified as minority interest, the new FASB rule caused uncertainty as to how the FRB would treat these instruments for regulatory capital purposes.

(4) The FRB resolves uncertainty by proposing new regulations allowing TruPS to maintain their Tier 1 status (initial Notice of Proposed Rulemaking (NOPR)/final ruling).

(5) The Dodd-Frank Act is signed into law. The Collins amendment to Dodd-Frank states that TruPS issued after May 19, 2010 (September 12, 2010 for BHCs with below $15 billion in assets), are not eligible as Tier 1 capital. In addition, BHCs with over $15 billion in assets must phase out TruPS from Tier 1 over a three-year period beginning in January 2013.

(6) The FRB reverses the Collins Amendment's exemption for banks with below $15 billion of assets by issuing a NOPR requiring BHCs with assets between $500 million and $15 billion to phase out TruPS from Tier 1 capital starting in January 2013, except over a longer ten-year period.

(7) The FRB issues the final ruling, which partially reverses the June 7, 2012 NOPR and allows bank holding companies with total consolidated assets of less than $15 billion on December 31, 2009, to be permanently grandfathered in as a component of Tier 1 capital trust-preferred securities that were issued prior to May 19, 2010. The FRB cites the limited

access of these banking organizations to the capital markets as the reason for including this grandfathering provision.

We gratefully acknowledge helpful comments and suggestions from two anonymous referees, Norah Barger, Andrea Beltratti, Fabio Braggion, Wolfgang Bühler, Engelbert Dockner, Paul Irvine, Jan Krahnen, Christian Leuz, Yan Liu, Aksel Mjøs, Steven Ongena, Sascha Steffen, Phil Strahan (the editor), Elu von Thadden, Josef Zechner, and seminar and conference participants at Bank for International Settlements, Bentley University, Bristol University, European School of Management and Technology, the Federal Reserve Board, the Frankfurt School of Finance and Management, Goethe Universität Frankfurt, HEC Paris, NHH Bergen, Oxford, Universität Mannheim, Universität St. Gallen, the University of Massachusetts at Amherst, Wirtschaftsuniversität Wien, Bocconi Carefin Conference, the American Economic Association, the European Finance Association, and the Napa Conference on Financial Markets Research for helpful comments and suggestions. We are grateful for the valuable research assistance provided by Brian Baugh, Andrei Gonçalves, and Riley Heiman. Fahlenbrach thanks the Swiss Finance Institute for generous financial support. Stulz serves on the board of a bank that is affected by capital requirements and consults and provides expert testimony for financial institutions.

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[1] We recognize that this approach is somewhat imprecise for two reasons. First, there are multiple capital requirements, so that a bank's buffer stock might differ substantially across measures. For instance, U.S. banks must meet a regulatory leverage ratio test in which the denominator of the capital requirement formula is total assets rather than risk-weighted assets. A bank can have a large buffer with respect to the ratio that uses risk-weighted assets but a low buffer with respect to the leverage ratio. Second, a bank could choose to have a lower buffer stock simply because it has low risk. We control for systematic and idiosyncratic risk in our empirical analyses.

[2] Tier 1 capital for the period we study includes total shareholders' equity, minus goodwill and other intangibles (except for mortgage-servicing rights), plus qualifying hybrid securities and noncontrolling interests. Perpetual preferred stock and trust-preferred securities were permitted up to a regulatory limit (approximately 15% of a BHC's core capital for large banks and 25% a BHC's core capital for small banks). See Appendix A for a detailed description of Tier 1 capital.

[3] Benston et al. (2003) examine sixty-seven TruPS issuances during 1996 and 1997. They find that the market responds favorably to TruPS filings, and that issuers of TruPS are larger and more sophisticated and have lower economic capital than nonissuers. Harvey, Collins, and Wansley (2003) find that the issuance of TruPS from 1996–2000 had a positive impact on bank stock prices, especially for firms that used TruPS to retire common or preferred stock. Krishnan and Laux (2005) study trust-preferred securities issued by both banks and other corporations, and find that the initial stock price reaction to the issuance of TruPS is positive when issuers state a specific reason for issuance. Balasubramanian and Cyree (2010) argue that banks issue TruPS to change their capital structure or improve capital ratios, but not for tax benefits. Finally, Kim and Stock (2012) show that the value of existing trust-preferred securities increased when banks accepted TARP funding.

[4] On July 2, 2013, the Fed's Final Rules allowed banks with assets below $15 billion to permanently treat TruPS as Additional Tier 1 Capital, contradicting the 10-year phase-out requirement of the June 7, 2012 NOPR. Our data end in 2012, before this Final Rule was announced.

[5] The data underlying the histogram exclude 106 BHC firm-years for internationally active banks because a different regulatory upper limit for TruPS/Tier 1 applies to them. Since there are so few observations, their inclusion in the histogram will not significantly change the distribution. We only show the histogram from 1996 to 2007, because banks did not issue TruPS during the crisis and started redeeming them after regulatory changes in 2010.

[6] Note that it is not possible to calculate core capital for the whole sample due to data availability, which explains why we focus on Tier 1 instead.

[7] In a traditional private placement, BHCs issue these securities to accredited investors. The placement is generally conducted on a best-efforts basis, and the securities are restricted from resale for at least a year (see Arena 2011 for details).

[8] The SEC introduced Rule 144A private placements in 1990. Unlike traditional private placements, Rule 144A placements may be traded among qualified institutional buyers without a minimum holding period. Qualified institutional buyers include banks, savings, and loans, and BHCs with audited net worth of at least $25 million, insurance companies or pension plans with at least $100 million in investible assets, brokers and dealers registered under the Exchange Act, and entities whose equity holders are all qualified institutional buyers.

[9] The finding is consistent with the earlier literature on subordinated debt issuance by banks (e.g., Avery, Belton, and Goldberg 1988 ; Flannery and Sorescu 1996 ; Goyal 2005) that shows that only the largest U.S. bank holding companies issue subordinated debt in meaningful quantities.

[10] We set the TruPS/Total subordinated debt ratio to zero if both TruPS and subordinated debt are equal to zero.

[11] Internationally active BHCs are defined as those with over $250 billion in assets or $10 billion in foreign exposure. There is, to the best of our knowledge, no publicly available list of these banks, because the Federal Financial Institutions Examination Council's (FFIEC) country exposure report on foreign assets is not in the public domain. The Federal Reserve maintains a Web page where it lists the largest U.S. commercial banks and the fraction of domestic assets they hold, by quarter. These data are, however, for the depository bank subsidiaries and not for the bank holding companies. Hence, our procedure misses those BHC with less than $250 billion in total assets, in which the main subsidiary bank does not hold $10 billion in foreign assets, but the BHC does on a consolidated basis. Because there are only ten or so internationally active banks each year, these missing internationally active BHC are unlikely to make a difference in the regressions.

[12] Item BHCKB806 reports the maximum contractual credit exposure remaining for conduits sponsored by the bank or bank affiliate, and BHCKB807 reports the same information for conduits sponsored by other institutions. BHCKB808 reports the unused facilities for liquidity protection for conduits sponsored by the bank or affiliate, and BHCKB809 reports unused liquidity facilities for conduits sponsored by other institutions.

[13] These data differ from those of Acharya, Schnabl, and Suarez (2013) for two reasons. First, form FR Y-9C data provide details on the guarantees for both sponsored and other conduits for our sample, but not theirs, as theirs is not limited to U.S. banks. Second, we list all banks with conduit exposure, not just those with assets greater than $50 billion at the end of 2006.

[14] The ROA and ROE evidence from Figure 4 holds in a more formal regression analysis that we omit for brevity. A regression of ROA on bank characteristics, TruPS/Tier 1, and TruPS/Tier 1 interacted with a crisis indicator variable between 1996 and 2008 suggests that

the ROA is lower for banks with more TruPS, but that there is no incremental effect during the financial crisis. A regression of ROE on bank characteristics, TruPS/Tier 1, and TruPS/Tier 1 interacted with a crisis indicator variable between 1996 and 2008 shows that the ROE of banks with more TruPS/Tier 1 is not different from the ROE of banks with little TruPS/Tier 1 during normal times, but that the ROE of banks with more TruPS is strongly and economically significantly lower during the crisis period. The fact that the normal-time ROEs are the same for both categories of firms is consistent with an industry equilibrium in compensation tied to ROE.

[15] See www.treasury.gov/initiatives/financial-stability/TARP-Programs/bank-investment-programs/cap/Pages/overview.aspx for more details on TARP, www.federalreserve.gov/monetarypolicy/taf.htm for details on TAF, www.federalreserve.gov/newsevents/reform_pdcf.htm for details on PDCF, and www.federalreserve.gov/monetarypolicy/tslf.htm for details on the TSLF.

[16] These banks include Bank of America, Bank of New York, Citibank, J.P. Morgan, State Street, and Wells Fargo. On October 13, 2008, U.S. Treasury secretary Paulson requested these banks to accept TARP money, stating in a memo to the banks, “We don't believe it is tenable to opt out because doing so would leave you vulnerable and exposed. If a capital infusion is not appealing, you should be aware your regulator will require it in any circumstance.” Three investment banks—Goldman Sachs, Merrill Lynch, and Morgan Stanley—also received this initial request, but they are not in the sample as of 2007, since they were not bank holding companies at the time. For more detail, see http://uk.reuters.com/article/2009/05/14/us-financial-banks-meeting-idUKTRE54D0NH20090514 .

[17] Results are robust to the inclusion of an indicator variable set to one if the bank is internationally active to control for different TruPS requirements for those banks.

[18] The specific data series from the bank holding company reports include real estate loans that are past due, and these fall into three classifications: 30–89 days past due and still accruing interest, over 90 days past due and still accruing interest, and past due but no longer accruing interest. The following categories of real estate are included: Loans secured by real estate (in domestic offices): construction and land development, and other land, Loans secured by real estate (in domestic offices): secured by farmland, Loans secured by real estate (in domestic offices): secured by multifamily (five or more) residential properties, Loans secured by real estate (in domestic offices): secured by nonfarm nonresidential properties, Loans secured by 1–4 family residential properties: revolving, open-end loans secured by 1–4 family residential properties and extended under lines of credit, Closed-end loans secured by 1–4 family residential properties: secured by first liens, Closed-end loans secured by 1–4 family residential properties: secured by junior liens, Closed-end loans secured by 1–4 family residential properties: secured by first liens, 1–4 family residential construction loans, Other construction loans and all land development and other land loans. We sum these variables and scale by total loans for a variable called *Past due real estate loans/total loans* . This variable is winsorized at the 1% and 99% tails. Results do not change if we instead scale by total assets.

[19] This finding is consistent with Fahlenbrach, Prilmeier, and Stulz (2012) . See their paper for a potential explanation of this somewhat surprising finding.

[20] www.fdic.gov/regulations/laws/rules/6000-1900.html

[21] Prior to the passage of FASB 46 in 2003, minority interest was not categorized into classes A, B, and C, and TruPS were classified as minority interest. There was also no specific limit on how much of a bank's Tier 1 capital could be comprised of minority interest, with the exception of TruPS, which were limited to 25% of core capital. The definition of core capital was also slightly different prior to FASB 46 and included common stockholders' equity, qualifying noncumulative perpetual preferred stock, including related surplus, qualifying cumulative perpetual preferred stock including related surplus (up to a 25% of core capital limit), and minority interest in the equity accounts of consolidated subsidiaries. The concept of “restricted securities” was introduced after FASB 46.

JEL: G01 - Financial Crises, G21 - Banks; Depository Institutions; Micro Finance Institutions; Mortgages, G28 - Government Policy and Regulation

Issue Section: Articles