The Effects of Securitized Asset Portfolio Specialization on Bank Holding Company's Return, and Risk

1. Introduction

The effect of portfolio specialization or diversification on firm performance has been widely studied in the field of banking and finance. The two contrasting theories widely considered are the traditional portfolio theory in favor of diversification and the modern corporate finance theory in favor of portfolio specialization. The traditional portfolio theory asserts that diversification minimizes the occurrence of financial distress because of imperfect correlation of project returns (Diamond, 1984). Following this school of thought, securitized banks should fully diversify their securitized asset portfolio risk.

In contrast, proponents for portfolio specialization argue that when there is a high probability of insolvency, diversification would rather expose the company to many sectors since the downturn of one sector may likely bring the entire bank to bankruptcy (Winton, 1999). Accordingly, the performance of securitized asset portfolio may be endogenously impacted by securitization default risk in association with securitized assets portfolio diversification/concentration decision. Hyland (2003) argue that unlike specialized firm, diversified firms have a discount on their valuation. Infact, they show that specialized firms that become diversified experienced a long-term reduction in firm value.

Previous studies have looked at the impact of portfolio specialization (diversification) on performance for diverse type of portfolios. Geographically specialized banks increase return and reduce risk (See Mayer and Yeager (2001), Hayden et al. (2007), and Berger et al. (2010)). In a recent study, Saeed and Sameer (2015) document that bank market specialization eases financial constraints, an effect that is more pronounced for medium-sized enterprises. On across industry investment, Hiraki and Wang (2015), using a sample of international equity mutual funds show that, conditional on country concentration, industry specialized fund outperformed industry diversified fund. They interpret their

results to imply global industry-specific knowledge helps international mutual fund managers to generate higher returns.

On shareholders holdings, Ekholm and Maury (2014) show that shareholders with concentrated portfolio experience a positive future operational performance and valuation. They argue that shareholders with concentrated portfolios are more informed and they play a better **governance role.** Sources of income specialization is found to be detrimental to bank performance (see Stiroh and Rumble (2006), Mercieca et al. (2007), Baela et al. (2007), Elsas et al. (2010)).

Results on loan portfolio are mixed. Bebczuk and Galindo (2008) and Rossi et al. (2009) focused on Argentinian and Austrian banks respectively. They show that diversification is beneficial for profitability and risk mitigation. In related studies, Acharya et al. (2006), studied Italian banks, Hayden et al. (2007) and Kamp et al. (2007) studied German banks, and Tabak et al (2011) studied Brazilian banks. They find that loan portfolio specialization across different economic sectors increases returns and reduce risk.

Against this background, this study contributes to the current debate by focusing on securitized asset portfolio, an area not covered by previous studies. We empirically assess how securitized asset portfolio specialization affects bank return and securitization risk. First, we test whether the efficient risk-return trade-off for securitized asset portfolios is consistent with the **principles of diversification**. If securitized assets portfolio specialization (diversification) results in increase returns and reduce securitization risk, we will conclude that specialization (diversification) improves bank performance. Secondly, we also test whether the relationship between bank-level returns and securitized assets portfolio specialization is non-linear in securitization risk. If this test holds true, the consequence would be that securitized assets portfolio diversification is beneficial when securitized asset portfolio has moderate downside risk.

We structure the remainder of this study as follows: Section 2 discusses the data and sample selection; section 3 outlines the empirical specification used; and section 4 provides the results and conclusions.

2. Data and Sample Selection

The sample consist of U.S. bank holding company (BHC) data with non-missing securitization data in Schedule HC-S of Y-9C forms obtained from the Federal Reserve Bank of Chicago (FED). Since 1986, the FED has required BHCs to file a Y-9C report on a quarterly basis to capture their consolidated balance sheet, income statement, and detailed supporting schedule, including off-balance sheet items. In the second quarter of 2001 (2001:Q2), the FED additionally mandated U.S. banks to include Schedule HC-S in their Y-9C report, including such items on their securitization schedule as outstanding principal balance of assets securitized and sold with retained services, recourse, or other seller-provided credit enhancements. The report on securitization activity is divided into seven categories based on the classes of underlying assets: 1-4 family residential loans; home equity lines; credit card receivables; auto loans; other consumer loans; commercial and industrial loans; and all other loans, leases, and assets. Incorporating a securitization schedule into FR Y-9C determines the start date of the sample period, yielding 52 quarters from 2001:Q2 to 2014:Q1.

In constructing the data set, we removed bank quarters with missing information on capital ratio, total assets, return on asset, and return on equity. For banks involved in mergers and acquisitions within the sample period, we maintained the code of the acquiring BHC while the acquirer is eliminated. Finally, we avoided the possibility of outliers driving the results, by winsorizing all variables at the 1% level[1]. The final data set contains 263 securitizers.

[1] By winsorization, we exclude observations with values either larger than the 99th percentile or smaller than the 1st percentile. While this cut-off point is arbitrary, it is frequently used in related studies (see Casu and Sarkisyan, 2014)

3. Empirical Specifications

3.1 The Effect of Securitization Portfolio Specialization on Bank Performance

To understand whether securitization portfolio specialization results in better performance, we regress returns on a specialization measure, as in the following fixed effects panel regression model:

$$Return_{i,t} = \alpha + \beta_1 Sec\ HHI_{i,t-1} + \gamma Z_{i,t-1} + \theta Quarter_t + v_{i,t} \quad (1)$$

β_1 , γ and θ reflect the extent to which changes in the relative factors of the model contribute to changes in the dependent variable, wherein $v_{i,t}$ is the error term for bank *i* in quarter *t*. The dependent variable $Return_{i,t}$ is the return of bank *i* at time *t* measured by the Return on Assets $(ROA)_{i,t}$ and Return on Equity $(ROE)_{i,t}$. The primary independent variable is $Sec\ HHI_{i,t-1}$, i.e. the Securitization Herfindahl-Hirschman Index, which measures bank *i's* securitization specialization in period *t*. $Z_{i,t-1}$, is a vector of control variables. We control for capital ratio which is equity capital scaled by total asset, bank size (*size*) which is the logarithm of total asset, and real gross domestic product *(log (rgdp))* to account for changes in the economic environment. If $\beta_1 > 0$, specialization leads to better performance, otherwise $\beta_1 < 0$ means diversification leads to better performance.

To obviate possible endogeneity problems, we lagged by one quarter all bank-specific regressors in the study's model (Demsetz and Strahan, 1997; Stiroh, 2006). We also lagged the economic environment variables by one quarter, as banks do not immediately respond to changes in the economic environment.

3.2 The Effect of Securitization Portfolio Specialization on Bank Performance as a function of Securitization Risk

We used another equation to estimate the relationship between securitization portfolio concentration and performance as a function of securitization risk. For this purpose, we introduce the variable $ChargeOff\ Sec_{i,t-1}$, which represents, in this case, the ratio of net charge-offs on securitized assets to

securitized assets. We use its square value $ChargeOff\ Sec^2_{i,t-1}$ to check for non-linearity on the relation between bank performance and securitization specialization as a function of securitization risk[2]. We considered the following quadratic fixed effect regression:

$$Return_{i,t} =$$

$$\alpha + \beta_1 Sec\ HHI_{i,t-1} + \gamma Z_{i,t-1} + \mu_{11} ChargeOff\ Sec_{i,t-1} + \mu_{12}\ Sec\ HHI\ .\ ChargeOff\ Sec_{i,t-1} +$$

$$\mu_{12}\ Sec\ HHI\ .\ ChargeOff\ Sec^2_{i,t-1} + \theta Quarter_t + v_{i,t} \quad (2)$$

The relation between return and securitization specialization is captured in the following marginal effect of $Sec\ HHI_{i,t-1}$ on the dependent variable $Return_{i,t}$:

$$\frac{d(Return_{i,t})}{d(Sec\ HHI_{i,t-1})} = \beta_1 + \mu_{11} ChargeOff\ Sec_{i,t-1} + \mu_{12}\ ChargeOff\ Sec^2_{i,t-1} \quad (3)$$

There is a U-shaped relation in bank's return and securitization portfolio specialization as function of securitization risk only if $\mu_{11} < 0$ and $\mu_{12} > 0$. In this case, diversification of securitization portfolio achieve better bank performance in low securitization risk scenario, while specialization of securitization portfolio achieve better bank performance in high securitization risk scenario.

3.3 The Effect of Securitization specialization on risk

In this section, we consider the relationship between securitization specialization and securitization risk using the following fixed effect model:

$$ChargeOff\ Sec_{i,t} = \alpha + \beta_1 Sec\ HHI_{i,t-1} + \gamma Z_{i,t-1} + \theta Quarter_t + v_{i,t} \quad (4)$$

β_1 , γ, and θ reflect the extent to which the relative model factor contributes to changes in the dependent variable, with $v_{i,t}$ acting as the error term for bank i in quarter t. The dependent variable $ChargeOff\ Sec_{i,t}$ is the securitization risk variable which is the net charge-offs on securitized assets to securitized assets. Our independent variables are $Sec\ HHI_{i,t-1}$ which represents the securitization Herfindahl-Hirschman Index to measure bank $i's$ securitization specialization in period t; and $Z_{i,t-1}$

[2] We follow Winton (1999) who show a U-shaped relation in bank's return and loan portfolio concentration as function of bank risk.

represents a vector of control variables (i.e. bank-specific characteristics) in addition to controlling for the economic environment. We control for capital ratio, bank size, bank performance (return on asset/return on equity), and real gross domestic product. We lagged all independent variable by one period.

4. Results

We present the results of our models in this section. Table 1 below presents the results showing the effect of securitized asset portfolio specialization on bank performance. The estimated coefficients of the specialization measures are positively related with bank performance, which is, however, only significant when ROE is the dependent variable. This suggests that securitization specialization influences positively banks' return. Tabak *et al*., (2011), and Archaya *et al*., (2006) provided similar results between loan portfolio specialization and bank performance. While these studies considered loan portfolio, we consider securitized asset portfolio. Archaya *et al*., (2006) explains that specialization minimizes the cost of monitoring, which can cause a positive effect in profits as well. Securitizing many asset classes considering that banks may not have the expertise in diverse assets, could be more costly than just securitizing the well-known assets.

Put Table 1 here

Looking at our control variables, we find a positive relation between bank size and return. This suggests that bigger banks tend to have better performance than smaller banks which is in accordance with previous studies (See Tecles and Tabak, 2010 and Tabak *et al*., 2011). The coefficients of capital ratio are positively related with bank performance, only significant with ROA. This suggest that an increase in the proportion of equity to total asset has a positive effect in the bank's management of its assets.

Additionally, we are interested in observing whether bank performance-securitization specialization depends on securitization risk. To arrive at a conclusion, we estimated equation (2),

introducing interactions between securitization specialization measure with $ChargeOff\ Sec_{i,t-1}$ and $ChargeOff\ Sec^2{}_{i,t-1}$. Table 2 presents the results of the fixed effect estimation. We conclude that securitization portfolio specialization benefits the most those banks that faces higher securitization risk. In fact, securitization portfolio diversification will benefit banks that face lower securitization risk. We indeed find that the relationship between bank performance and securitization specialization is U-shaped in securitization risk. Our finding is similar to findings by Winton (1999) and Acharya et al. (2006) that demonstrated that the relationship between loan portfolio and returns is non-linear on loan risk. Again, the results of the other explanatory variables are similar to those in table 1.

Put Table 2 here

Table 3 presents the results of the fixed effect estimation of equation (4). We aim to evaluate the effects of securitization portfolio specialization on securitization risk, proxy by net charge-offs on securitized assets to securitized assets. The independent variables in the model are lagged values of Sec HHI, of capital ratio, of the natural logarithm of total assets which represent bank size, of the natural logarithm of real gross domestic product, and of bank performance measured by ROA for model 1 and ROE for model 2.

The estimates of securitization portfolio specialization index are significantly negatively related to bank's securitization risk. This result suggest that securitization portfolio specialization implies lower securitization risk**.** It may be the case that banks gain expertise on fewer assets they securitized making it easier to catch problems with those assets before the problems deteriorate too far. Therefore, exposure to several securitized asset classes seems to in fact increase securitization risk. Looking at our control variables, the coefficient for bank performance has the expected negative sign, significant for ROA, meaning that lower performance leads to higher securitization risk.

Put Table 3 here

5. Conclusions

Understanding the effect of securitized asset portfolio specialization on banks performance and securitization risk are of the uttermost importance in financial intermediation studies. However, studies looking at such relationships are scarce. In this paper, we evaluated the effects of securitized asset portfolio specialization on banks' return and securitization risk, using fixed effect estimator on 263 U.S. BHC panel data from 2001:Q2 to 2014:Q1.

We find that securitized asset portfolio specialization seems to benefit the performance of U.S. securitized banks both in return and securitization risk. However, the relationship between securitized asset portfolio specializations is U-shape on securitization risk - securitization portfolio diversification benefits banks that face lower securitization risk whereas securitization portfolio specialization is the best option for overall performance for banks that face higher securitization risk. We find a negative relationship between securitized asset portfolio specialization and securitization risk, meaning securitization portfolio specialization implies lower securitization risk. Additionally, we also find that lower performance leads to higher securitization risk.

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Table 1

Relationship between return and securitization concentration – Fixed effect estimation

Variables	1 ROA	2 ROE
Sec HHI $_{t-1}$	0.001	0.018**
	(1.101)	(1.962)
Capital Ratio $_{t-1}$	0.046***	0.341
	(4.350)	(1.175)
Size $_{t-1}$	0.001**	0.022**
	(2.052)	(2.259)
Log(RGDP) $_{t-1}$	-0.016	-0.123
	(-0.670)	(-0.419)
Constant	0.130	0.839
	(0.573)	(0.302)
Observation	2,963	2,963
Number of banks	240	240
Quarter FE	Yes	Yes
Firm FE	Yes	Yes
Adj. R^2	0.525	0.327

Note: The table presents the results of a regression analysis wherein the dependent variable is bank performance measured. The independent variables are as a follows: Securitization Herfindahl-Hirschman Index (Sec HHI); capital ratio; size; and natural log of real gdp (log (rgdp)). The independent variables are lagged one quarter. The columns represent two specifications of the regression model with Model 1 using the return on asset (ROA) for bank performance and model 2 using the return on equity (ROE). The sample covers the data from 2001:Q2 to 2014:Q1. We incorporate both firm and quarter dummies in all regressions (not reported). We calculated the *t*-statistics using

robust standard errors corrected for clustering at BHC-level, and are reported in parentheses. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively.

Table 2

Nonlinearity of the relationship between return and securitization concentration – Fixed effect estimation

Variables	1 ROA	2 ROE
Sec HHI $_{t-1}$	0.001	0.021**
	(1.505)	(2.483)
Capital Ratio $_{t-1}$	0.047***	0.351
	(4.434)	(1.207)
Size $_{t-1}$	0.001*	0.020**
	(1.857)	(2.091)
Log (RGDP) $_{t-1}$	-0.014	-0.086
	(-0.595)	(-0.308)
ChargeOff sec $_{t-1}$	0.076	1.122**
	(1.474)	(1.996)
Sec HHI x ChargeOff Sec $_{t-1}$	-0.330***	-3.825***
	(-3.040)	(-3.315)
Sec HHI x ChargeOff Sec^2 $_{t-1}$	4.304***	44.974***
	(3.242)	(2.991)
Constant	0.107	0.500
	(0.214)	(0.190)
Observation	2,963	2,963
Number of banks	240	240

Year FE	Yes	Yes
Firm FE	Yes	Yes
Adj. R^2	0.520	0.328

Note: The table presents the results of a regression analysis wherein the dependent variable is bank performance measured. The independent variables are as a follows: Securitization Herfindahl-Hirschman Index (Sec HHI); capital ratio; size; and natural log of real gross domestic product (log (rgdp)); ChargeOff Sec. The independent variables are lagged one quarter. The columns represent two specifications of the regression model with Model 1 using return on asset (ROA) for bank performance and model 2 using return on equity (ROE). The sample covers the data from 2001:Q2 to 2014:Q1. We incorporate both firm and quarter dummies in all regressions (not reported). We calculated the *t*-statistics using robust standard errors corrected for clustering at BHC-level, and are reported in parentheses. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively.

Table 3

The effect of securitization concentration on risk – Fixed Effect estimation

ChargeOff Sec	1	2
Sec HHI $_{t-1}$	-0.004***	-0.004***
	(-2.654)	(-2.699)
Capital Ratio $_{t-1}$	0.008	0.005
	(1.481)	(0.927)
Size $_{t-1}$	0.0003	0.0001
	(0.737)	(0.349)
ROA $_{t-1}$	-0.067***	
	(-3.772)	
ROE $_{t-1}$		-0.001
		(-1.180)
Log (RGDP) $_{t-1}$	-0.027	-0.025
	(-0.540)	(-0.505)
Constant	0.258	0.247
	(0.542)	(0.513)
Observation	2,963	2,963
Number of banks	240	240
Year FE	Yes	Yes
Firm FE	Yes	Yes
Adj. R^2	0.599	0.598

Note: The table presents the results of a regression analysis wherein the dependent variable is securitization chargeof (ChargeOff Sec). The independent variables are as a follows: Securitization Herfindahl-Hirschman Index (Sec HHI); capital ratio; size; banks performance (ROA/ROE) and natural logarithm of real gross domestic product (log (rgdp)). The independent variables are lagged one quarter. The columns represent two specifications of the regression model with Model 1 using ROA for bank performance and model 2 using ROE. The sample covers the data from 2001:Q2 to 2014:Q1. We incorporate both firm and quarter dummies in all regressions (not reported). We calculated the *t*-statistics using robust standard errors corrected for clustering at BHC-level, and are reported in parentheses. *, **, *** indicate significance at 10%, 5%, and 1% levels, respectively.