Diversification Channels and Bank Holding Company Performance

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This paper examines the effects of diversification on the performance of U.S. bank holding companies across six distinct channels. First, we find that fee income diversification has the strongest favorable impacts on BHCs' performance, while off-balance sheet diversification has unfavorable impacts on risk and fails to contribute to non-money center BHCs' returns. Second, when the scales of the associated activities are large enough, the impact of loan portfolio and fee income diversification on accounting returns changes from favorable to unfavorable, while the impact of security diversification reverses. Finally, larger BHCs achieve more benefits from single-channel diversification, while multi-channel diversification appears to benefit small BHCs the most.

INTRODUCTION

Deregulation over the past few decades has fundamentally changed the U.S. banking industry. As a consequence of the Riegle-Neal Act of 1994 which allowed banks to operate branches and take deposits nationwide, smaller community banks lost their geographic protection and faced competition from larger, potentially more efficient banks.[1] Furthermore, the Gramm-Leach-Bliley Act of 1999 removed long-standing product line restrictions on financial service providers. Subsequently commercial banks shifted away from traditional lending activities toward activities that generated fee income, such as service charges, trading revenue, and other types of fee income. Potentially risky off-balance-sheet activities, such as collateralized debt and mortgage obligations, credit derivatives, etc. became increasingly popular as banks reached for yield.

Removing geographic and business line restrictions for banks provided significant new opportunities but may have created major new threats for both individual banks and the banking system as a whole. The broad research question addressed in this paper relates to what specific diversification channels may be beneficial in reducing risk and increasing returns. The effect of diversification along a single dimension or channel (e.g., geographic diversification) has been well documented in the literature. However, the results remain mixed and there are several important issues which have not been fully addressed. For example, few papers consider possible interaction effects among different channels of diversification where the favorable (unfavorable) effect of single-channel diversification may possibly be offset by negative

(positive) interaction effects when banks employ a multi-channel diversification strategy. For example, geographic and product diversification may go hand-in-hand to either enhance or reduce bank performance. To illustrate, a number of large regional and money center banks headquartered in the northern tier of the U.S. have opened branches or acquired banks in Florida and Arizona and have simultaneously developed new investment products to attract additional retirement deposits. The ultimate impact on bank performance is not obvious given that while growth in the bank's deposit base may be an attractive strategy, large geographically dispersed branch systems can be expensive to operate and difficult to manage. Furthermore, the literature generally does not explicitly account for the separate impact of the size or scale of the diversification channel, that is, the relative importance of the activity being diversified. For example, the impact of the loan portfolio on a bank's risk and return profile may not only be driven by the degree of diversification within the portfolio itself but by the interaction of the relative size of the portfolio and its degree of diversification. Prior research which fails to control for interaction and scale effects may have produced biased results. Thus, there is a need for a more comprehensive analytical framework which addresses a wide range of bank types and diversification strategies over an extended period of time. This study provides such an integrated approach.

More specifically, this study examines three broad and distinct channels of diversification: geographic diversification, asset diversification, and diversification into non-traditional banking activities, and then further divides them into six sub-channels. Thus, geographic diversification is divided into domestic and international geographic diversification since the operational costs and regulatory complexity of international expansion is likely to be substantially higher than for domestic diversification. Furthermore, since loans and securities involve assets with very different risk, return, and liquidity profiles, asset diversification is divided into loan and security portfolio diversification. As demonstrated during the recent financial crisis, BHCs which engage in certain types of off-balance-sheet activities may experience large returns but also excessive risk. Therefore, non-traditional banking activity is further divided into fee income and off-balance-sheet channels of diversification.

This study contributes to the existing research in several ways: 1) It is shown that not all forms of diversification have the same qualitative impact on bank performance. Fee income diversification has the strongest favorable impacts on BHCs' performance, while off-balance sheet diversification has unfavorable impacts on risk and fails to contribute to non-money center BHCs' returns. 2) The results also indicate that the impact of diversification should be modeled as a function of the scale of their associated activities since one frequently observes a "switching" point where the qualitative impact or sign varies in response to an increase in scale. and 3) The study also finds that the interactive or multi-channel effects of various forms of diversifications appear to benefit small banks the most. Thus, these findings both complement and extend existing research on diversification by providing more specific insights into and across various diversification strategies. Furthermore, these results are suggestive of an effective approach to quantifying an optimal degree of bank diversification.

The paper is organized as follows. Section 2 reviews the prior bank diversification literature; Section 3 develops the basic hypotheses and empirical model to be tested; Section 4 describes the data and variables; Section 5 presents the empirical results; and Section 6 summarizes the conclusions.

LITERATURE REVIEW

As an important strategy for both bank managers and regulators, diversification has stimulated a broad and continuing stream of research. A summary of research findings covering different diversification channels, bank types, performance measures, and time periods are provided by DeYoung and Roland (2001), Stiroh (2004), and Berger, Hasan, and Zhou (2010). One stream of research relates diversification to benefits derived from production theory, suggesting that diversification enhances performance by exploiting potential economies of scale and scope. For example, Diamond (1991), Rajan (1992), Saunders and Walter (1994), Stein (2002), and Akhigbe and Stevenson (2010) argue that commercial banks can facilitate the efficient provision of a variety of financial services using client information gained through the lending process. Santomero and Eckles (2000) and Berger, DeYoung,

Genay, and Udell (2000) suggest that geographic diversification through branching can reduce average production costs as output expands. On the other hand, diversification could intensify agency conflicts between bank insiders and their shareholders. For example, Aron (1988), Stulz (1990), and Rotemberg and Saloner (1994) indicate that diversification may make it more difficult to design efficient managerial incentive contracts that align the incentives of outside investors with management. In their view, management will continue to diversify as long as the short-run marginal benefits exceed the marginal costs of doing so.

In terms of international diversification, Goldstein and Pauzner (2004) argue that global contagion during a financial crisis occurs because investment portfolios are often poorly "diversified" across the same countries. Thus, countries that share the same group of investors often contribute to the rapid transmission of negative shocks from one part of the globe to another. The recent worldwide financial crisis highlights the high degree of global connectivity and provides anecdotal evidence that financial institutions which diversify into high risk activities ultimately perform worse than those which do not diversify to the same degree. Thus diversification may not always reduce risk as portfolio theory often suggests. Furthermore, if the historic negative asset return correlation between traditional and non-traditional banking services disappears, or turns positive as was the case during the financial crisis, then diversification can quickly lead to a dramatic increase in risk. Wagner (2008) and Ibragimov et al. (2011) show that even though diversification can reduce a financial institution's individual probability of failure and idiosyncratic risk, it may contribute to a significant increase in systematic risk. As a result, diversification effects cannot be considered in isolation but need to be modeled in a dynamic system wide framework.

Most studies model diversification as an isolated strategy and fail to account for the importance of channel scale and possible interaction effects. For example, Baele et al. (2007) include a few brief remarks on the optimal level of diversification as a balance between reduced idiosyncratic risk on the one hand and increasing agency costs on the other. Furthermore, when concluding that more concentrated, less diversified loan portfolios lead to superior bank performance, Hayden et al. (2007) considers the diversification effect of only the loan portfolio in isolation. On the other hand, a recent study by Schmid and Walter (2009) comes closest to the objectives of this study. They investigate the valuation effects from combining credit, securities, and insurance activities and conclude that various types of diversification create value discounts. Surprisingly, once a financial firm becomes diversified, there is no further significant difference in the premium or discount between uniquely diversified conglomerates.

RESEARCH HYPOTHESES AND MODEL SPECIFICATION

Hypotheses

According to standard portfolio theory, BHCs may benefit from reduced portfolio risk through diversification if they diversify into activities which exhibit either negative or small positively correlated returns. Thus, it is expected that more highly diversified portfolios can generate either greater returns and/or reduced risk, and hence, produce greater risk-adjusted return. On the other hand, according to agency theory, when BHCs diversify their activities they may encounter serious management or agency problems and in the diversification process may be exposed to more volatile activities which may not prove to be significantly more profitable. Hence, the potential benefits of diversification may be more than offset by the associated agency costs. Therefore, a pair of competing hypotheses on the effect of single channel diversification is stated below:

Ho_{1a}: The portfolio effect hypothesis. Diversification is expected to be positively related to bank performance.

Ho_{1b}: The agency cost hypothesis. Diversification is expected to be negatively related to bank performance.

However, the ultimate effect may vary with the scale of the diversified activity as BHCs experience lower (higher) average costs driven by economies (diseconomies) of scale and scope. Thus, even if the effects are initially favorable they may become unfavorable when the size of the activity reaches some threshold level. Therefore, the relation between diversification effects and the scale of their associated activities may be an inverted U- shaped relationship.

Ho_2: The scale hypothesis. The qualitative effect of diversification is expected to a non-linear function of the channel scale.

In addition to single channel diversification, BHCs may diversify across a number of activities. The interaction effects of multi-channel diversification may be favorable or unfavorable. As mentioned before, banks which simultaneously engage in geographic and loan diversification may experience positive revenue effects as they provide customized services to meet the specific credit needs of an increasingly dispersed customer base. Meanwhile, average operating costs can be reduced (increased) due to possible economies (diseconomies) of scale and scope. Second, BHCs may also achieve similar advantages by simultaneously engaging in both geographic and fee income diversification. In this case the bank would work to meet the non-credit fee-based service needs of its geographically expanding customer base. Third, off-balance-sheet instruments may be used as tools to hedge interest rate, credit, and exchange rate risk imbedded in a bank's security portfolio. Therefore, the interaction of a diversified security portfolio and diversified off-balance-sheet activities could possibly reduce bank risk and lead to an increase in risk-adjusted returns. Fourth, large BHCs have a greater capacity to diversify their activities among a larger number of channels to enhance their market power and reduce risk. Therefore, the interaction of a variety of diversified activities should be negatively related to risk and positively related to risk-adjusted returns. However, if BHCs are not able to manage their key financial activities effectively or if they pursue riskier activities, the interaction effects may have a negative effect. Thus an additional hypothesis dealing with interaction effect is as follows:

Ho_3: Multi-channel diversification may either strengthen or possibly weaken bank performance.

Model

To test the above hypotheses various measures of diversifications and their subsequent interactions are integrated into a panel regression model. To address potential autocorrelation problems, a panel regression model with a first-order autoregressive term is estimated using quarterly data across a ten-year period (1998 Q4 – 2008 Q4). Given the wide range of bank sizes included in the study, potential heteroskedasticity problems are addressed by using White's Heteroskedasticity-Consistent Standard Errors to calculate the t-statistics. Thus, the model is specified in equation (1) as follows:

$$\text{Performance}_{i,t} = \alpha + \beta\ \text{DIV}_{i,t} + \gamma\ \text{SDIV}_{i,t} + \lambda\ \text{IDIV}_{i,t} + \delta\, \text{C}_{i,t} + \text{u}_{i,t}$$
$$\text{u}_{i,t} = \rho\ \text{u}_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

where, i represents the i^{th} BHC and t indicates the financial reporting quarter. Performance represents alternative measures of bank performance such as accounting and markets returns, along with risk and risk-adjusted returns. DIV is a vector of modified Herfindahl-Hirschman indices which include international geographic diversification (H1), domestic geographic diversification (H2), loan portfolio diversification (H3), security portfolio diversification (H4), fee income diversification (H5) and off-balance sheet diversification (H6). Since DIV is scaled from 0-1, the scale of the activity being diversified is lost. To control for the relative importance of the activity, the ratio of the size of the activity (e.g., aggregate loan portfolio) divided by total bank assets is calculated. The associated diversification measure

is then multiplied by its scale measure to produce a weighted diversification index (SDIV). IDIV reflects the interaction of various diversifications measures, including the interaction of geographic and loan portfolio diversifications, geographic and fee income diversifications, security portfolio and off-balance sheet diversifications, and finally the analysis includes the interaction of all six individual diversification measures. The interaction term is simply the product of the individual diversification indices. Since each individual diversification index ranges from 0-1, the interaction indices also have the same range. C is a vector of control variables to be discussed below. $u_{i,t}$ is the disturbance term and ρ is the auto-correlation coefficient, and $\varepsilon_{i,t}$ is the stochastic disturbance term which satisfies the standard OLS assumptions.

The specific control (scale) variables are as follows: cross-border loan exposure to total asset ratio (S1), domestic deposits to total asset ratio (S2), domestic loans to total asset ratio (S3), security portfolio to total asset ratio (S4), fee income activity to total asset ratio (S5), and the level of off-balance-sheet activities to total asset ratio (S6). These six control variables are designed to measure the relative size or scale of the activity.

International BHCs have the opportunity to diversify their loan and security portfolios globally. Thus, the cross-border exposure ratio of the sample of international banks is expected to be positively related both to absolute and to risk-adjusted stock returns, and negatively related to risk. Deposits provide BHCs with funds to expand their loan and investment portfolios. High level of deposits should increase BHCs' returns and reduce funding risk. Loans, securities and fee income revenue cash flow streams are the major sources of earnings for BHCs, where under normal conditions greater levels of all three cash flow streams should provide BHCs with higher returns. However, BHCs may expand into high risk activities which may lead to significant increases in credit and portfolio risk. This was especially evident in the recent financial crisis when many banks rapidly diversified into high risk mortgage related off-balance sheet activities. Therefore, the off-balance sheet ratio could either be positively or negatively related to the risk and return measures.

Other control variables which may impact BHCs performance are also included. For example, the log of total assets (C1) is used to control for any systematic differences in performance across and within bank type groups. As an inverse measure of financial leverage, the equity to total asset ratio (C2), may affect performance because yield-seeking BHCs may be inclined to hold less equity capital. However, it is also possible that large uninsured depositors may more intensively monitor their bank when they report high leverage ratios. The quarterly growth in assets (C3) may influence bank performance as market-share oriented BHCs attempt to grow more rapidly. Finally, a dummy variable for each year during the sample period, 1998-2008, is included to control for changes in the economic environment, with 1998 serving as the base year. In addition, two years of data, 1996 and 1997, are included in certain supporting calculations as the accounting standard deviations and betas are calculated on a three year rolling basis.

To compare the impact of diversification among different types and sizes of BHCs, a panel regression is estimated for each of four sub-groups based on their level of total assets at the end of 2008: 1) small BHCs with assets less than $1 billion, 2) larger community BHCs with assets between $1 billion and $25 billion, 3) regional BHCs with assets between $25 billion and $150 billion, and 4) money center BHCs with assets greater than $150 billion. Moreover, many money center BHCs are institutions with a significant level of international activities. Thus, a fifth sub-group of large banks with significant international operations is modeled separately.

DATA AND VARIABLE DEFINITIONS

Data

The initial data sample includes all U.S. BHCs consistently filing quarterly FR Y-9C reports from 1996 Q1 to 2008 Q4. The data period is long enough to cover at least an entire economic circle. During the sample period, failed or merged BHCs are excluded from the sample. This is expected to generate little survivorship bias.[2] The 442 BHCs included in the sample are divided into four size groups and an

internationally active category as follows: 1) 184 are small BHCs, 2) 239 are larger community BHCs, 3) ten are regional BHCs, and 4) nine are money center BHCs, while six BHCs are internationally active (JPMorgan Chase, Citigroup, Bank of America, State Street Bank, Comerica, and Bank of Hawaii). Of the 442 sample BHCs, 119 are publicly traded BHCs (30 small BHCs, 70 larger community BHCs, 10 regional BHCs and 9 money center BHCs).

Accounting data used to calculate the dependent variables, diversification indices and control variables are taken from BHCs' annual reports and regulatory FR Y-9C reports provided by the Federal Reserve Bank of Chicago. Domestic state-level deposits of BHCs used for calculating the domestic geographic diversification index are taken from the Federal Deposit Insurance Corporation's (FDIC) Summary of Deposits (SOD) database. Because international cross-border deposits are not disclosed, the international geographic diversification index is based upon cross-border loan exposures as reported in the BHCs 10-K annual report when available. Daily stock market prices and returns along with the S&P500 index returns are obtained from the University of Chicago's Center for Research in Security Prices (CRSP) database. The 10-year Treasury note rate is from the Federal Reserve Bank of St. Louis's macroeconomic database (FRED).

Variables

All the variables are modeled on a quarterly basis. Linear interpolation is used to convert annual data into quarterly data where applicable. To measure the degree of diversification this study employs the Herfindahl-Hirschman index approach used by Stiroh and Rumble (2006) and Deng, Elyasiani and Mao (2007) for each of the six diversification channels:

$$H(k) = 1 - \sum_j \left(\frac{\text{Activity}_j}{\sum_j \text{Activity}_j}\right)^2 \qquad k=1, 2, \ldots, 6 \tag{2}$$

The Herfindahl-Hirschman index ranges between zero and one, and increases in value along with the degree of diversification. Cross-border loan exposures are the activities used in the approach for the international geographic diversification index H(1); the deposits in the states of the U.S. are for the domestic geographic diversification H(2); the exposures of loan categories are for the loan diversification (H3); the exposures of security categories are for the security diversification (H4); the exposures of fee-income activity categories are for the fee income diversification (H5); the exposures of off-balance sheet activity categories are for the loan diversification (H6).

To get a comprehensive picture of the effects of diversification, a number of accounting and market performance measures are employed as the dependent variables in separate panel regressions. These measures are designed to quantify both accounting and market returns, credit risk, market risk, and default risk and are defined in Table 1.

EMPIRICAL RESULTS

Performance Results for All BHCs and the Total Time Periods

Table 2 summarizes the number and percent of regression coefficients that were statistically significant for the total sample of BHCs over the entire data period.[3] The aggregate results for all twelve performance measures located in the right most column (labeled "All Performances") will be discussed in detail. In the table, a "+" is used to signify a favorable effect, such as an increase in profitability, while a "-" represents an unfavorable impact, such as an increase in risk. The column labeled (+/-) indicates the ratio of favorable to unfavorable coefficients. A positive (+/-) ratio means that the favorable impacts of diversification dominate the unfavorable ones. An (X) appears in the column if the ratio is infinity due to division by zero.

Among the direct "activity diversification" factors a total of seventeen diversification measures are statistically significant, with ten favorable and seven unfavorable impacts depicted. In particular, fee income diversification (H5) has the most consistent and widespread impact with six significant

coefficients (50% of the performance measures) all having a favorable impact upon bank performance. Of the six significant coefficients, three indicate a favorable impact upon various measures of accounting return, and one favorable impact each relating to credit, market, and default risk. Off-balance-sheet diversification (H6) reports no significant favorable effects but four unfavorable coefficients with three relating to market risk and one to credit risk.

TABLE 1
PERFORMANCE MEASURES

To get a comprehensive picture of the effects of diversification, a number of accounting and market performance measures are employed as the dependent variables which include accounting and market returns, credit risk, market risk, and default risk.

Performance	Measures	Note
Accounting returns	ROA	Return on asset
	RAROA	Risk-adjusted return on asset ($RAROA_{i,t} = \frac{ROA_{i,t}}{\sigma_{ROA\,i,t}}$)
		$\sigma_{ROA_{i,t}}$ is the rolling standard deviations of ROA
	ROE	Return on equity
	RAROE	Risk-adjusted return on equity ($RAROE_{i,t} = \frac{ROE_{i,t}}{\sigma_{ROE\,i,t}}$)
		$\sigma_{ROE_{i,t}}$ is the rolling standard deviations of ROE
Market returns	SR	Stock returns with dividends
	RASR	Risk-adjusted stock returns with dividends ($RASR_{i,t} = \frac{SR_{i,t}}{\sigma_{SR_{i,t}}}$)
		$\sigma_{SR_{i,t}}$ is the rolling standard deviation of SR
Credit risk	Net charge-offs ratio (NCO)	(The absolute value of the difference between total charge-off s and total recoveries) / (Total assets)
Market risk	Maturity gap ratio (MG)	(The difference between earning assets and the sum of interest-bearing deposits and debt that either re-prices or matures within one year) / (Total assets)
	Derivatives loss ratio (DL)	Derivatives losses / Total assets
	Market beta (MB)	Market beta ($\beta_{m,i}$)and interest rate beta ($\beta_{r,i}$) are estimated from the two-factor market model: $SR_{i,t} = \alpha + \beta_{m,i} R_{m,t} + \beta_{r,i} R_{r,t} + \varepsilon_t$
	Interest rate beta (IRB)	$SR_{i,t}$ is the stock return; $R_{m,t}$ is S&P500 index return; $R_{r,t}$ is 10-year Treasury rate.
Default risk	Distance-to-default (Z)	$Z_{i,t} = \frac{ROA_{i,t} + E/A_{i,t}}{\sigma_{ROA\,i,t}}$, $ROA_{i,t}$ is return on asset; $E/A_{i,t}$ is equity to total assets ratio; $\sigma_{ROA_{i,t}}$ is the rolling standard deviations of ROA

Note: This table provides the definitions of the performance variables.

Among the "Activity interaction" terms in Table 2, a total of twelve coefficients were statistically significant, with ten diversification interaction terms reporting a favorable impact. The interaction of domestic geographic diversification (H2) with both loan diversification (H2*H3) and fee income diversification (H2*H5) had favorable impacts upon two measures of accounting returns. On the other hand, H2*H5 had an unfavorable impact on market risk. In terms of the interaction of the security portfolio and off-balance sheet diversifications (H4*H6), all three statistically significant coefficients had a favorable impact, with two reducing a bank's market risk and one reducing credit risk. For the "All activities" diversification interaction term (H2*H3*H4*H5*H6) a total of four were statistically significant with three favorable impacts on market risk and one unfavorable impact on market returns.

Thus, the results suggest that not all forms of diversifications have favorable impact on BHC performance. Loan diversification and fee income diversification generally improves BHC performance. However, both domestic geographic diversification and off-balance sheet activity diversification either have no statistically significant impact on BHC performance or reduce performance. Furthermore, multi-channel diversification strengthens bank performance.

Size-Related Coefficient Switching Behavior

Table 3 reports a summary of how the qualitative impact of diversification may change sign. It also indicates the mean diversification value in the parenthesis which can be compared to the calculated switch point to see if the average BHC in the sample is above or below the switch point. We find that the impacts of loan, security, and fee income channels on accounting returns depends on the scales of the associated activities. When the scale of loan portfolio ratio exceeds 62.75% of total assets, its impact on ROA turns negative. The result suggests that BHCs tend to make increasingly risky loans when the size of their loan portfolios expands beyond a critical level. Moreover, agency problems might arise as the portfolio becomes excessively large. Thus, at this point the favorable marginal portfolio effect is less than the corresponding marginal agency cost effect. The sample average scale value for the loan portfolio is 0.6634, which is slightly above the switch point, implying that roughly half of the BHCs experience a favorable impact from loan diversification, while the other half experiences an unfavorable impact. On the other hand, the impacts of security portfolio diversification on ROA and ROE changes sign from unfavorable to favorable with switching points of 0.3125 and 0.2223, respectively. The results indicate that with larger portfolios of securities BHCs are more likely to increase their returns when investing in a wide range of diversified securities. Furthermore, when the scale of fee income activity is above 0.0063, the impact on ROA turns from favorable to unfavorable. The result suggests that the financial and managerial costs associated with a dramatic expansion of fee-based services may ultimately reduce bank profitability.

Bank Size Analysis

Performance Results for BHCs of Different Sizes: Total Time Period

As a robustness check we examine the impact of diversification on different size and types of banks. Because BHCs of different size have diverse advantage and disadvantage in the market, the impacts of diversification on them may differ. Regressions are estimated for small, community, regional, money center, and international banks for the entire sample period. Table 4 summarizes the percentage of statistically significant diversification and interaction impacts across all twelve BHC performance measures for the entire sample period.

Similarly, fee income diversification (H5) has a consistently favorable impact (with +/- ratios greater than 1.00) on the performance of small, larger community, regional and money center banks. Off-balance sheet diversification (H6) weakens the performance of smaller BHCs but strengthens that of very large BHCs. The possible reason is that money center or international BHCs are more proficient in off-balance sheet activities. On the other hand, from the same table we also can find that the effects of single channel diversification appear to benefit larger BHCs with the number of favorable (+/-) ratios greater than 1.00 increasing from only one for small BHCs (fee income diversification), to two for larger community banks (loan portfolio and fee income diversifications), to three for regional banks (domestic geographic, loan

portfolio, and fee income diversifications) and finally to four among money center BHCs (domestic geographic, loan portfolio, fee income, and off-balance sheet diversifications). International BHCs are the exception, with four out of the six diversification channels reporting unfavorable results, implying that activity diversification makes cross-border bank management difficult.

However, the interaction effects of diversification appear to benefit smaller banks the most with the number of favorable (+/-) ratios equal to three for small banks (H2*H5, H4*H6, and "all activities"), two for community banks (H4*H6 and "all activities"), and none for regional and money center banks. Smaller local banks can benefit by providing a variety of financial services to their limited customers.

Size-Related Coefficient Switching Behavior by Type of BHC

Similar to the results for the entire sample, ultimate diversification effects appear to vary by the scale of activity. Table 5 reports the summary of this switching behavior for small BHCs (Panel A), larger community BHCs (Panel B), and regional BHCs (Panel C).

The size-related impact on accounting returns is robust for the loan and security portfolios, as well as for fee income activity. That is, when the scale of the loan portfolio reaches a critical level, the impact of loan diversification switches from favorable to unfavorable for larger community and regional BHCs. When the scale of the security portfolio is below the switch point, diversification has unfavorable impacts for the small, larger community, and regional BHCs. Finally, when the scale of fee income activities is sufficiently large, the impact of diversification turns unfavorable for the small BHCs. Although the impact of diversification on stock returns, credit risk, market risk and default risk is not found to be size-related for the whole sample, the effect switches sign for certain groups of BHCs.

CONCLUSIONS

The study examines multi-channel diversification and finds that not all forms of diversification have the same qualitative impact on BHC performance. The overall findings indicate that fee income diversification has the strongest favorable impacts on BHCs' performance as it both increases returns and reduces bank risk. Security portfolio diversification has unfavorable impacts on accounting returns but favorable impacts on market returns. Off-balance sheet activity diversification has an unfavorable impact on risk and fails to contribute to non-money center BHC returns. Moreover, for certain diversification measures, the ultimately impact depends on the scale of the associated activity. When the scale of the activity is large enough, the net diversification impact may change sign.

Over all, it appears that larger banks (with the exception of international banks) achieve more favorable benefits from single-channel diversification. This may be due to the fact that they possess greater market power and are able to enjoy the portfolio benefits of holding diversified loan and security portfolios and the associated cost synergies generated through economies of scale. At the same time, multi-channel diversification may make larger BHCs more difficult to manage and lead them to invest in excessively risky activities where higher operating expenses and agency costs offset potential portfolio benefits. This may help explain the somewhat surprising result that the interaction effects of various forms of diversifications appear to benefit small BHCs the most.

Thus, the results also indicate that increasing diversification just for diversification sake is a much too simplistic strategy. Bank management needs to carefully select the diversification strategy which is right for banks of their size and type. They need to insure that the scale of the diversified activity is of proper size. If done properly, diversification can lead to enhanced financial performance, improved competitiveness, and lower risk.

ENDNOTES

1. Calomiris (2000) suggests that geographic restrictions promote smaller banks and inhibit diversification, thus making local banks more vulnerable to economic downturns.
2. Although the exact number of outright failed BHCs is not recorded by the Federal Reserve Bank, it is

expected to be quite small since very few BHCs actually liquidate prior to bankruptcy as failing BHCs are usually merged with other healthy banks.

3. The detailed results for equation (1) for each of the twelve bank performance measures are available upon request.

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TABLE 2
NUMBER AND PERCENTAGE OF STATISTICALLY SIGNIFICANT DIVERSIFICATION EFFECTS FOR ALL BHCs FOR THE TOTAL PERIOD

This table reports the number and percent of regression coefficients that were statistically significant for the total sample of BHCs over the entire data period. (1998 Q4 - 2008 Q4)

		(n=4) Accounting Returns			(n=2) Market Returns			(n=1) Credit Risk			(n=4) Market Risk			(n=1) Default Risk			(n=12) All Performances		
(Number)	Variable Abbreviation	+	-	Total	+	-	Total	+	-	Total	+	-	Total	+	-	Total	+	-	Total
Activity diversification																			
Domestic Geographic Div. (DGD)	H2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Loan Div. (LD)	H3	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2
Security Div. (SD)	H4	0	2	2	2	0	2	0	0	0	0	0	0	0	0	0	2	2	4
Fee income Div. (FID)	H5	3	0	3	0	0	0	1	0	1	1	0	1	1	0	1	6	0	6
Off-balance sheet Div. (OBSD)	H6	0	0	0	0	0	0	0	1	1	0	3	3	0	0	0	0	4	4
Activity interaction																			
DGD * LD	H2*H3	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
DGD * FID	H2*H5	2	0	2	0	0	0	0	0	0	0	1	1	0	0	0	2	1	3
SD * OBSD	H4*H6	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	3	0	3
All Activities	H2*H3*H4*H5*H6	0	0	0	0	1	1	0	0	0	3	0	3	0	0	0	3	1	4

		Accounting Returns				Market Returns				Credit Risk				Market Risk				Default Risk				All Performances			
(%)	Variable Abbreviation	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-
Activity diversification																									
Domestic Geographic Div. (DGD)	H2	0	25	25	0.00	0	0	0	.	0	0	0	.	0	0	0	.	0	0	0	.	0	8	8	0.00
Loan Div. (LD)	H3	25	0	25	X	50	0	50	x	0	0	0	.	0	0	0	.	0	0	0	.	17	0	17	X
Security Div. (SD)	H4	0	50	50	0.00	100	0	100	x	0	0	0	.	0	0	0	.	0	0	0	.	17	17	34	1.00
Fee income Div. (FID)	H5	75	0	75	X	0	0	0	.	100	0	100	x	25	0	25	x	100	0	100	x	50	0	50	X
Off-balance sheet Div. (OBSD)	H6	0	0	0	.	0	0	0	.	0	100	100	0.00	0	75	75	0.00	0	0	0	.	0	33	33	0.00
Activity interaction																									
DGD * LD	H2*H3	50	0	50	x	0	0	0	.	0	0	0	.	0	0	0	.	0	0	0	.	17	0	17	X
DGD * FID	H2*H5	50	0	50	x	0	0	0	.	0	0	0	.	0	25	25	0.00	0	0	0	.	17	8	25	2.13
SD * OBSD	H4*H6	0	0	0	.	0	0	0	.	100	0	100	x	50	0	50	x	0	0	0	.	25	0	25	X
All Activities	H2*H3*H4*H5*H6	0	0	0	.	0	50	50	0.00	0	0	0	.	75	0	75	x	0	0	0	.	25	8	33	3.13

Note: This table summarizes the number and percent of regression coefficients that were statistically significant for the total sample of BHCs over the entire data period. "n" indicates the number of performance measures; "+" indicates favorable impact on dependent variable; "-" indicates unfavorable impact on dependent variable, "x" indicates infinity. "." indicates an unavailable item. "Percentage" indicates the percentage of individual diversification or interaction which have significant impacts on BHCs performance measures. "Total" indicates the total number or percentage of individual diversification or interaction which have significant impacts on BHCs performance measures; +/- indicates the ratio of "+" to "-".

TABLE 3
SIGN REVERSAL FOR STATISTICALLY SIGNIFICANT DIVERSIFICATION EFFECTS FOR ALL BHCs FOR TOTAL PERIOD

The table reports a summary of how the qualitative impact of diversification may change sign. We also calculate the average diversification value in the parenthesis for comparison. (1998 Q4–2008 Q4).

	ROA	RAROA	ROE	RAROE	SR	RASR	NCO	MG	DL	MB	IRB	Z
H2												
H3	0.6275 (+)											
	(0.6634)											
H4	0.3125 (-)		0.2223 (-)									
	(0.1871)		(0.1871)									
H5	0.0063 (+)											
	(0.0031)											
H6												

Note: This table reports a summary of how the qualitative impact of diversification may change sign. The switch point in the table indicates the scale of activity/total asset ratio at which diversification changes its direction of impact. "+" indicates favorable impact; "-" indicates unfavorable impact. The mean of the associated activity/total asset ratio is in the parentheses.
H2: domestic geographic diversification; H3: loan diversification; H4: security diversification; H5: fee income diversification; H6: off-balance sheet diversification. ROA: return on asset; RAROA: risk-adjusted ROA; ROE: return on equity; RAROE: risk-adjusted ROE; SR: stock return; RASR: risk-adjusted SR; NCO: net charge-offs; MG: maturity gap; DL: derivatives losses; MB: market beta; IRB: interest rate beta; Z: distance to default.

TABLE 4
SUMMARY OF STATISTICALLY SIGNIFICANT DIVERSIFICATION IMPACTS BY TYPE OF BANK AND BY DIVERSIFICATION MEASURE FOR THE TOTAL PERIOD

The table summarizes the percentage of statistically significant diversification and interaction impacts across all twelve BHC performance measures for the entire sample period.

		Small				Community				Regional				Money Center				International				All BHCs			
(%)	Variable Abbreviation	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-	+	-	Total	+/-
Activity diversification																									
International Geographic Div. (IGD)	H1																	0	50	50	0.00				
Domestic Geographic Div. (DGD)	H2	0	0	0	.	8	17	25	0.47	42	17	59	2.47	15	0	15	x	8	0	8	X	0	8	8	0.00
Loan Div. (LD)	H3	0	8	8	0.00	17	0	17	X	25	8	33	3.13	8	0	8	x	8	58	66	0.14	17	0	17	X
Security Div. (SD)	H4	8	33	41	0.24	0	17	17	0.00	8	25	33	0.32	8	8	16	1.00	0	8	8	0.00	17	17	34	1.00
Fee income Div. (FID)	H5	25	17	42	1.47	50	0	50	X	17	0	17	X	15	8	23	1.88	0	33	33	0.00	50	0	50	X
Off-balance sheet Div. (OBSD)	H6	8	17	25	0.47	8	17	25	0.47	0	0	0	.	23	0	23	X	17	0	17	X	0	33	33	0.00
Activity interaction																									
IGD*LD	H1*H3																	67	0	67	X				
IGD*FID	H1*H5																	33	0	33	X				
DGD * LD	H2*H3	0	8	8	0.00	0	8	8	0.00	8	17	25	0.47	0	8	8	0.00	0	8	8	0.00	17	0	17	X
DGD * FID	H2*H5	8	0	8	X	17	17	34	1.00	17	25	42	0.68	0	8	8	0.00	0	50	50	0.00	17	8	25	2.13
SD * OBSD	H4*H6	17	8	25	2.13	17	0	17	x	0	0	0	.	0	8	8	0.00	8	8	16	1.00	25	0	25	X
All Activities	H2*H3*H4*H5*H6	8	0	8	X	8	0	8	x	0	8	8	0.00	0	8	8	0.00	25	0	25	x	25	8	33	3.13

Note: This table summarizes the percentage of statistically significant diversification and interaction impacts across all twelve BHC performance measures for the entire sample period. "+" indicates favorable impact on dependent variable; "-" indicates unfavorable impact on dependent variable, "x" indicates infinity. "." indicates an unavailable item. "%" indicates the percentage of individual diversification or interaction which have significant impacts on BHCs' integral performance "Total" indicates the percentage of performance measures on which individual diversification or interaction have significant impacts; +/- indicates the ratio of "+" to "-".

TABLE 5
SIGN REVERSAL FOR STATISTICALLY SIGNIFICANT DIVERSIFICATION EFFECTS BY TYPE OF BANK FOR TOTAL PERIOD

This table reports the summary of the switching point of diversification effect by BHC type. (1998 Q4 – 2008 Q4)

Panel A: Small BHCs

	ROA	RAROA	ROE	RAROE	SR	RASR	NCO	MG	DL	MB	IRB	Z
H2												
H3								0.6888 (-)				
								(0.6597)				
H4	0.1887 (-)		0.1995 (-)									
	(0.1863)		(0.1863)									
H5	0.0021 (+)		0.0022 (+)		0.0016 (-)	0.0033 (-)						
	(0.0023)		(0.0023)		(0.0023)	(0.0023)						
H6							0.6522 (-)		0.2000 (+)	0.3798 (-)		
							(0.1513)		(0.1513)	(0.1513)		

Note: This table reports the summary of this switching behavior for small BHCs (Panel A), larger community BHCs (Panel B), and regional BHCs (Panel C). The switch point in the table indicates the scale of activity/total asset ratio at which diversification changes its direction of impact. "+" indicates favorable impact; "-" indicates unfavorable impact. The mean of the associated activity/total asset ratio is in the parentheses. H2 denotes domestic geographic diversification. H3 denotes loan diversification. H4 denotes security diversification. H5 denotes fee income diversification. H6 denotes off-balance sheet diversification. ROA denotes return on asset. RAROA denotes risk-adjusted ROA. ROE denotes return on equity. RAROE denotes risk-adjusted ROE. SR denotes stock return. RASR denotes risk-adjusted SR. NCO denotes net charge-offs. MG denotes maturity gap. DL denotes derivatives losses. MB denotes market beta. IRB denotes interest rate beta. Z denotes distance to default.

TABLE 5
(CONTINUED)

Sign reversal for statistically significant diversification effects by type of bank for total period (1998 Q4 – 2008 Q4).

Panel B: Community BHCs

	ROA	RAROA	ROE	RAROE	SR	RASR	NCO	MG	DL	MB	IRB	Z
H2												
H3	0.4126 (+)											
	(0.6707)											
H4	0.4667 (-)											
	(0.1902)											
H5												
H6									0.2500 (+)			
									(0.2230)			

Panel C: Regional BHCs

	ROA	RAROA	ROE	RAROE	SR	RASR	NCO	MG	DL	MB	IRB	Z
H2												
H3		0.7972 (+)						0.8607 (-)		0.7620 (+)		0.7486 (+)
		(0.6763)						(0.6763)		(0.6763)		(0.6763)
H4		0.1668 (-)		0.1487 (-)			0.3056 (+)					0.1445 (-)
		(0.1572)		(0.1572)			(0.1572)					(0.1572)
H5						0.0133 (+)						
						(0.0045)						
H6												

Note: This table reports the summary of this switching behavior for small BHCs (Panel A), larger community BHCs (Panel B), and regional BHCs (Panel C). The switch point in the table indicates the scale of activity/total asset ratio at which diversification changes its direction of impact. "+" indicates favorable impact; "-" indicates unfavorable impact. The mean of the associated activity/total asset ratio is in the parentheses. H2 denotes domestic geographic diversification. H3 denotes loan diversification. H4 denotes security diversification. H5 denotes fee income diversification. H6 denotes off-balance sheet diversification. ROA denotes return on asset. RAROA denotes risk-adjusted ROA. ROE denotes return on equity. RAROE denotes risk-adjusted ROE. SR denotes stock return. RASR denotes risk-adjusted SR. NCO denotes net charge-offs. MG denotes maturity gap. DL denotes derivatives losses. MB denotes market beta. IRB denotes interest rate beta. Z denotes distance to default.