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Risk and Market Segmentation in Financial Intermediaries' Returns

by
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Risk and Market Segmentation in Financial Intermediaries' Returns [1]

First Draft: January 1995
This Draft: October 1996

For Presentation at the Wharton Financial Institutions Center

Abstract: This study examines both the quantity and price of risk exposure for different segments of financial intermediaries in order to determine whether market segmentation exists in the financial services industry in the United States. We distinguish between depository institutions, securities firms, insurance companies, mutual funds, and other financial firms using each company's SIC code. We find evidence of market segmentation in both market risk levels and market risk premiums.

The results provide little evidence of interest rate risk exposure across all types of financial intermediaries, suggesting the prevalence of hedging programs using interest rate derivatives. However, the market prices interest rate risk exposure differentially by type of financial intermediary. We find that as a market segment, insurance companies were exposed to more interest rate risk particularly in the period late 1980's to early 1990's. The interest rate risk premium for banks was among the highest of all financial intermediaries.

Overall, we find that securities firms, as a group, have the most market risk exposure, followed in order of descending market beta, by banks, other financial firms, insurance companies, and mutual funds, although the order is reversed when examining the market risk premium. Indeed, we find support for an inverse relationship between the quantity and price for market risk, but not for interest rate risk.

When we investigate the impact of two regulatory policy changes, we find that (1) the shift in the conduct of monetary policy towards targeting of monetary aggregates induced banks to take on more market risk, probably due to a decline in their charter value; (2) bank market risk-taking increased further with the introduction of risk-based capital requirements which further reduce charter value for banks; and (3) insurance companies are subject to the highest interest rate risk premiums during the 1988-1994 subperiod, following by commercial banks, probably due to interest rate risk subsidy under the risk-based capital requirements. Overall, during the period 1974-1994, banks increased their market risk exposure despite the tightening of regulatory restrictions, insurance companies increased their interest rate risk exposure over the subperiods.

We create synthetic universal banks comprised of portfolios of banks, securities firms, and insurance companies. We find that the synthetic universal banks have significantly positive excess returns, with lower market and interest rate risk exposures and higher expected returns than securities firms.

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We thank the participants at the 1995 FMA Conference for their comments and suggestions.

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Linda Allen*

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RISK AND MARKET SEGMENTATION IN FINANCIAL INTERMEDIARIES' RETURNS

I. Introduction

During the decade of the 1980's, the catch phrase in the field of financial intermediation was "global financial supermarket" or in academic parlance "universal banking". In many countries, lines of distinction separating commercial banking from investment banking from insurance and other financial services have become blurred as financial intermediaries crossed industry boundaries. In the U.S., the first half of the decade of the 1990's has witnessed the dismantling of many financial empires. Perceived synergies and potential diversification benefits are perhaps not substantial enough to outweigh the managerial agency problems and information costs of managing diverse financial intermediaries. The swing of the pendulum from an era of consolidation to greater specialization should be manifest in the risk/return tradeoff for financial intermediaries. In this paper, we examine this tradeoff for different types of financial institutions.

Financial intermediaries (e.g., commercial banks vs. investment banks vs. insurance companies) can be distinguished by differences in both market structure and regulatory environment. The government's regulatory safety net, while more generous for banks than for other nonbank financial intermediaries, is also more onerous and restrictive. Competitive conditions vary among the types of financial intermediaries with implications for their operational efficiency as well as product differentiation and the market power of the individual firm. These distinctions, if significant, create market segmentation among financial institutions.

Several studies have recently examined various aspects of market segmentation and universal banking. [1] Empirical evidence has been found to support universal banking based on experiences in the UK [Llewllyn (1995)], Japan [Hoshi (1995)], and Switzerland [Kilgus (1995)]; as well as mixed evidence for the Korean experience [Park, Kim, and Park (1995)] and Germany [Baums (1995)]. We cannot perform a similar analysis in the U.S. because of de jure, although not de facto, Glass Steagall restrictions on universal banking activity. However, in this paper, we evaluate potential risk diversification benefits by determining whether financial intermediary segments in the U.S. have differing risk/return characteristics.

[1] See for example, Kane (1995), and Eisenbeis (1995) for banks' expansion into insurance activities; Rajan (1995), Gande, Puri, Saunders, and Walter (1995), and Puri (1996) for securities underwriting.

We investigate the degree of market segmentation among the different types of financial intermediaries in order to assess the potential benefits of universal banking in the U.S. We use a two-factor model to estimate both the quantity and price of risk for U.S. banks, securities firms, insurance companies, investment companies, and other financial firms (that are traded on the NYSE, AMEX, and NASDAQ), allowing for fluctuations over time. We test for systematic risk differentials across market segments and compare the results to synthesized universal banks comprised of a portfolio of banks, securities firms, and insurance companies.

Section II describes the data. In Section III, we analyze the impact of market segmentation on returns allowing for time-varying betas and risk premiums, estimated over the period 1974-1994. In Section IV, we examine the impact on market assessment of risks and returns of two distinct policy regime shifts, i.e. the monetary policy shift in October 1979 and the introduction of international risk-adjusted capital requirements in July 1988. In Section V, we construct synthetic universal banks and compare their performance and risk characteristics with those of segmented financial intermediaries. Section VI presents summary and conclusions.

II. The Data

We utilize monthly data from January 1974-December 1994, a total of 21 years, for all financial institutions whose shares are traded on the NYSE, AMEX, or NASDAQ. We distinguish among depository institutions (SIC codes 60, 6711, 6712, and 6719)2, security and commodity broker/dealers (SIC code 62), insurance companies (SIC code 63), mutual funds (SIC codes 6722, 6723, 6724 and 6726), and other financial companies (SIC codes 61, 65, 6733, 6790, 6792, 6794, 6798, and 6799).[3] The total number of financial firms is 1,023. In this sample, 34.3% of the firms are depository institutions; 18.9% securities firms; 7.6% insurance companies; 14.3% mutual funds; and 24. 9% other financial companies. The securities firms are denoted with a dummy variable $DUM_{SEC}= 1$; $DUM_{INS} = 1$ for insurance companies; $DUM_{MF} = 1$ for mutual funds; and $DUM_{OTH} = 1$ for other financial firms. Depository institutions represent the base case for which all dummy variables take on a value of zero.

All monthly returns and value weighted market indices are obtained from the CRSP tape, with the interest

[2] These include bank holding companies.

[3] These other financial companies include nondepository credit institutions, real estate firms, and holding and other investment offices.

rate index from Citibase. Over the entire time period 1974-1994, the value weighted CRSP index averaged a monthly rate of return of 0.99%, as compared to a monthly return for the S&P 500 of 0.78% per month. Three-month U.S. Treasury bill rates averaged 0.57% per month and the monthly rate of retum for the sample of 1,023 financial firms averaged 0.93 %.

The financial intermediaries with the highest average return over the period 1974-1994 were securities firms, with an average monthly return of 1.56%, followed by 1.29% for insurance companies, and 1.12% for depository institutions. Note, however, that these descriptive statistics do not take risks into account.

III. The Two Factor Model With Time-Varying Betas and Risk Premiums

We follow a well-developed literature and estimate a two-factor model using both market and interest rate risk factors. Flannery and James (1984a,b), Sweeney and Warga (1986), Yourougou (1990), Bae (1990), Madura and Zarruk (1995) all estimate the two factor model for samples of U.S. and international (in Madura and Zarruk (1995)) banks.[4] Most studies find a statistically significant negative coefficient on both short term and long term interest factors. These results are consistent with interest rate sensitivity in bank returns. In this study, we begin by applying the model to a sample of bank and nonbank financial intermediaries to examine whether nonbank financial intermediaries' returns are also affected by interest rate risk exposure.

If market segmentation exists, we would observe differential rates of return for different types of financial intermediaries. The impact of intersectoral barriers to entry and differential charter values, if they exist, could be manifest in either an impact on the quantity of risk undertaken by the financial firm and/or the price of risk levied by the market. That is, the well-known moral hazard side effects of the governmental safety net may induce certain types of financial intermediaries to undertake greater amounts of risk than others. Moreover, because of implicit governmental and private guarantees, the market may price a unit of risk differently for different types of financial intermediaries.

IIIa. The Impact of Market Segmentation on the Quantity of Risk

Both the regulatory environment and the market structure affect financial intermediaries' risk/return

[4] Kane and Unal (1988) offer a partial survey of this literature.

tradeoffs. In the U. S., these underlying environmental factors depend, in large part, upon the financial firm's charter. The charter determines each financial institution's market segment. Each firm's optimal risk position depends upon the charter type, since some segments are the beneficiary of more government largess than others. Moral hazard concerns would dictate that the more generous the governmental guarantee, the greater the optimal level of risk exposure, ceteris paribus. Thus, we would observe firms in market segments with more generous governmental safety nets having higher risk levels. In contrast, if governmental guarantees proscribe excessive risk taking by imposing restrictions and monitoring limitations on financial intermediaries' risk taking behavior, then we would observe an inverse relationship between governmental regulation and risk exposure. Which effect prevails is an empirical question to be resolved in this paper.

Our sampling period 1974-1994 was a period of upheaval in financial markets. The roles of financial intermediaries were altered by market forces (such as the LDC debt crisis, the 1987 and 1989 market breaks, the growth of derivatives, etc.) as well as regulatory initiatives (the European Rate Mechanism, changes in the conduct of monetary policy, the thrift crisis in the U.S. and resulting legislative initiatives, such as the Basle international capital requirements). These shifts should impact both the risk taking activities of the financial intermediaries, as well as the market's assessment of required rates of returns for given levels of risk exposure.

Following Ferson and Harvey [1991, 1993], we use a two-stage regression analysis which allows the betas to vary both across firms and over time. The first stage estimates the two-factor market model. with time-varying betas over the period 1974-1994 consists of

$$R_{it} = \alpha_{it} + \beta_{Mit}R_{Mt} + \beta_{Iit}R_{It} + e_{it} \qquad (1)$$

where R_{Mt} is the monthly market index, measured by the value-weighted CRSP index; R_{It} is the monthly interest rate index, measured by the three month U.S. Treasury bill rate; R_{it} is the monthly rate of return (including dividends) for the 1,023 financial intermediaries. In the first stage of the model, a time series regression is run for each firm resulting in estimates of $\hat{\alpha}_{it}$, $\hat{\beta}_{Mit}$, and $\hat{\beta}_{Iit}$.

We employ a 60-month rolling window to estimate monthly beta coefficients. That is, instead of estimating equation (1) using a single regression over the period 1974-1994, a different set of coefficients is estimated for each month using returns from the previous 60 months. Thus, we perform this estimation for each firm, for each of the

252 months in the period 1974- 1994.[5]

In the second stage, we utilize the coefficient estimates from the first stage as inputs. To examine the impacts of regulatory/market structure differences, we regress the three coefficient estimates on the dummy variables, obtaining the following expressions:

$$\hat{\alpha}_{it} = b_0 + b_{sec}DUM_{sec} + b_{ins}DUM_{ins} + b_{mf}DUM_{mf} + b_{oth}DUM_{oth} + e_{it} \quad (2)$$

$$\hat{\beta}_{Mit} = b_0 + b_{sec}DUM_{sec} + b_{ins}DUM_{ins} + b_{mf}DUM_{mf} + b_{oth}DUM_{oth} + e_{it} \quad (3)$$

$$\hat{\beta}_{Iit} = b_0 + b_{sec}DUM_{sec} + b_{ins}DUM_{ins} + b_{mf}DUM_{mf} + b_{oth}DUM_{oth} + e_{it} \quad (4)$$

where $\hat{\alpha}_{it}$ is the estimate of the intercept term for firm i at time t; $\hat{\beta}_{Mit}$ is the t-period estimate of market risk for firm i; $\hat{\beta}_{Iit}$ is the t-period estimate of interest rate risk for firm i; and the dummy variables as defined in Section II.[6]

On average, over the period 1974-1979, market beta for all financial firms in the sample, β_M, is 0.9943, while the interest rate risk beta, β_I, is -0.0066 (both are significantly different from zero at the 1 percent level). This result is consistent with previous studies that find a market risk beta below and around one, and a negative interest rate risk beta for financial firms.[7]

Table 1 presents the results of the two-stage estimation of the quantity of risk using 60-month rolling betas for the period 1974-1994. Examination of the intercept term, $\hat{\alpha}_{it}$, estimated from stage one yields an estimate of the financial intermediary's charter value independent of risk exposure. This can be viewed as a measure of market segmentation that is not a function of either the financial intermediaries' risk taking or the market's risk pricing behaviors. The results in Table 1 show that insurance companies have significantly (at the 1% level) lower charter values than all other types of financial intermediaries. This amounts to a statistically significant (at the 1% level) decline in insurance company returns of almost 29 basis points.

Our results for the $\hat{\alpha}_{it}$ estimation suggest that there are no differential charter values included in the market

[5] Braun, Nelson, and Sunier (1991), in comparing this methodology to the estimation of time-varying betas using an EGARCH model, obtain similar results.

[6] There is an "error in the variables" problem in this specification of the dependent variable in a two stage regression as in Fama and MacBeth (1973). The problem arises because the efficiency condition on the expected risk/return equation is in terms of the true values of the betas, but in the empirical tests, estimated betas must be used. See Amsler and Schmidt (1985) and Shanken (1992) for a review of these issues.

[7] Flannery and James (1984), Booth and Officer (1985), Sweeney and Warga (1986), Yourougou (1990), and Bae (1990) all find that banks have significantly negative coefficients on various interest rate (and bond price) factors. We performed our analysis using both 3-month and 1-year Treasury rates, with no impact on our results.

rates of return of depository institutions, securities firms, and mutual funds. Although all of these financial intermediaries have higher charter values imputed into their rates of returns than insurance companies, differences among them are not statistically significant. This suggests that the value of the governmental safety net offered to depository institutions is offset by the regulatory burden.

[Insert Table 1 Around Here]

Depository institutions may overcome their value-reducing regulatory burden and increase their market values by increasing their risk exposures. This moral hazard conclusion is consistent with the results for the market index estimation equation (3) of $\hat{\beta}_{Mit}$. All segments of financial institutions, with the exception of securities firms, have significantly less (at the 1% level) market risk than do banks. These results are consistent with banks' taking on additional market risk exposure than insurance companies, mutual funds, and other financial intermediaries, perhaps as a moral hazard response to the implicit guarantees provided by the governmental safety net. However, securities firms on average have the highest market betas of all financial institutions.

Using the intercept term of equation (3) in the time-varying results shown in Table 1, banks have an average market beta of 1.104. Similarly, Table 1 shows that securities firms have an average market risk beta of 1.3, while mutual funds have an average market risk of .52. Other financial firms have an average market beta of .92, as compared to insurance companies with an average market beta of .88, which represents a statistically significant (at the 1% level) .22 below the average for banks. [8]

When we examine systematic interest rate risk in equation (4), our results are quite different. Most financial intermediaries have interest rate risk exposures that are statistically insignificant from zero. This suggests that there is no market segmentation effect in interest rate risk exposure. The one exception is for insurance companies, shown in Table 1 to have a significantly positive interest rate risk beta of 1.2 on average. This may be the result of the long maturity liabilities of the life insurance companies that dominate our sample of insurance firms. Indeed, the proportion of life insurance companies in our sample of insurance companies doubled over the

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[8] We have also estimated the market model of equation (1) assuming constant betas. The results (not reported here) suggest that the assumption of constant betas introduces an upward bias into measurements of market risk. This may be a function of the increasingly stringent regulations governing financial intermediation during the time period. In particular, as forbearance was curtailed in the wake of the thrift crisis of the early 1980s, the moral hazard incentives for financial companies to engage in risk enhancing activities were reduced. This is reflected in the time-varying measures of risk, but not in the model using constant betas.

time period of the study. For all other market sectors, financial intermediaries appear to be hedging their interest rate risk exposure, thereby producing the insignificant coefficients on their interest rate risk factors.

IIIb. The Impact of Market Segmentation on the Pricing of Risk

Our results from the previous section suggest that market segmentation impacts the financial intermediaries' systematic risk ***levels.*** In this section, we examine whether the market's assessment of the cost per unit of risk differ across market segments. For example, if certain financial intermediaries in certain segments are perceived to be "too big to fail", then even riskier firms may have a lower risk premium built into their rates of return.

Following Ferson and Harvey (1991), we utilize a three-stage regression analysis to estimate the impact of market segmentation of financial firms' risk premiums. allowing both the betas and the risk premiums to vary over time. The first stage is identical to the first stage in the quantity of risk analysis. We use a time-series model with a 60-month rolling window to estimate time-varying betas in equation (1). The second stage utilizes these coefficients to estimate a cross-sectional model to analyze the monthly risk premium, allowing the risk premiums to vary over time. Thus, the market's monthly assessment of the price of market risk and interest rate risk is estimated using the following expression:

$$R_{it} = \gamma_{0t} + \gamma_{Mt}(\beta_{Mit}|\Omega_{t-1}) + \gamma_{It}(\beta_{Iit}|\Omega_{t-1}) + e_{it} \qquad (5)$$

where $(\hat{\beta}_{Mit}|\Omega_{t-1})$ is the stage-one conditional estimate of firm i's market risk exposure given the information set, Ω_{t-1}, where t-1 is the 60-month rolling window used to estimate the coefficients of the market model equation (1); $(\hat{\beta}_{Iit}|\Omega_{t-1})$ is the stage-one conditional estimate of firm i's interest rate risk exposure; and R_{it} is the monthly rate of return for firm i. The monthly estimate of the market risk premium is $\hat{\gamma}_{Mt}$ and the monthly estimate of the interest rate risk premium is $\hat{\gamma}_{It}$.

In stage three, the monthly estimates of the two risk premiums are regressed on the relative proportions of each segment of financial intermediary in the market. Thus, we estimate:

$$\hat{\gamma}_{Mt} = b_0 + b_{sec}P_{sec,t} + b_{ins}P_{ins,t} + b_{mf}P_{mf,t} + b_{oth}P_{oth,t} + e_t \qquad (6)$$

$$\hat{\gamma}_{It} = b_0 + b_{sec}P_{sec,t} + b_{ins}P_{ins,t} + b_{mf}P_{mf,t} + b_{oth}P_{oth,t} + e_t \qquad (7)$$

where $P_{sec,t}$ is the proportion of firms with $DUM_{SEC}=1$ in the sample in period t -- for each market segment: insurance firms (INS), mutual funds (MF), and all other financial intermediaries (OTH).

Table 2 presents the results of this three-stage estimation model for the 1974-1994 period. The greater the proportion of securities firms and insurance companies in the financial services industry, the lower the average market risk premium. The market risk premium is significantly (at the 1% level) higher for mutual funds and other financial intermediaries than for securities firms, banks, and insurance companies. The governmental safety net offered to banks is reflected in the lower market risk premium for these firms than for mutual funds and other financial firms. Securities firms have the lowest market risk premiums, almost 28 basis points below that of the banks. This comparative advantage in market risk pricing for securities firms may account for their highest levels of market risk taking among all financial intermediaries, as discussed earlier based on results in Table 1.

[Insert Table 2 Around Here]

The interest rate risk premium is analyzed in equation (7). Table 2 shows that the price of interest rate risk increases significantly (at the 1% level) the greater the proportion of banks in the financial services industry. Banks' higher interest rate risk premium is consistent with the market's assessment that the banks' governmental safety net, while covers market risk, does not cover interest rate risk exposure. Increasing the proportion of securities firms, insurance companies, mutual funds, and other financial firms significantly decreases the price of interest rate risk.

Comparing the results on the price of risk to those on the quantity of risk, the insurance companies' high levels of interest rate risk, shown in Table 1, may be a reaction to their relatively low premium for interest rate risk exposure, which is almost 53 basis points below that of the banks. Similarly, the banks' high interest rate risk premium shown in Table 2 may explain their reluctance to take on interest rate risk, as shown by the insignificant b_0 coefficient for $\hat{\beta}_{1it}$ in Table 1.

IV. Policy Implications

In Section III, we modeled intertemporal shifts in risk levels and premia using an exogenously determined 60-month rolling window. However, intertemporal shifts in risk premia may be the result of discrete policy changes, such as the introduction of international capital requirements, or shifts in monetary and/or exchange rate policy regimes. This section tests this assertion by examining the impact of policy changes on financial firms' risk taking behavior, market assessment of the unit price of risk, and financial intermediary segmentation.

In particular, we test the impact of two major policy shifts: (1) the October 1979 shift in the conduct of monetary policy; and (2) the July 1988 announcement of international risk-adjusted capital requirements. The impact of the monetary policy regime shift, dramatically increasing interest rate volatility, should affect both the quantity and price of financial intermediaries' interest rate risk exposure. The imposition of risk-based capital requirements is likely to alter the optimal levels of risk and should affect the market's assessment of financial intermediaries' market risk premiums, as well as the estimates of the market beta.

We use the rolling-window methodology of Section III to estimate the parameters for each of the time period segments. The time period segments are: (1) Pre-monetary policy shift: January 1974-September 1979; (2) Pre-Basle capital requirements: October 1979-June 1988; and (3) July 1988-December 1994. Because of the shorter length of the time segments. we utilize a 36-month rolling window, rather than the 60-month window used in Section III. We present the results of this estimation in Tables 3 and 4.

[Insert Table 3 Around Here]

Table 3 examines the impact of policy regime shifts on the quantity of risk, as measured by the market beta, the interest rate beta, and the intercept term, using equations 1, 2, 3, and 4 for each sub-period. Examination of the intercept term, $\hat{\alpha}_{it}$, produces results that are consistent with the erosion in the value of the banking charter over time. The coefficient $\hat{b}_0$ is significantly (at the 1% level) positive for the 1974-1979 period only. As the market and regulatory environments became less friendly to the banking industry during 1979-1988 and 1988-1994, the banks' excess returns, as measured by the intercept term, became insignificantly different from zero.

Not surprisingly, securities firms demonstrate significantly (at the 1% level) positive excess returns during the 1979-1988 period largely characterized by bull markets and a boom in mergers and financial innovations. Table 3 shows that mutual funds and other financial intermediaries shared in these excess returns, averaging around 7 basis points for each during this period, as compared to the almost 20 basis point excess returns for securities firms during 1979-1988.

Results presented in Table 1 suggest that, during 1974-1994, securities firms have the highest average market beta when compared to all other types of financial intermediaries. The results in Table 3 (sub-period) suggest that this is the case during the 1974-1979 subperiod. However, during 1979-1994, both banks and securities firms had the highest market betas, with an insignificant difference between them. The market's assessment of bank risk levels was high during this period because of a series of consecutive credit crises (LDC debt, farm credit debt, oil company debt, real estate debt). Despite progressively tighter bank regulations and restrictions on forbearance, bank market risk exposure increased over the period.

The secular increase in bank market risk exposure during 1979-1994 is consistent with a risk enhancing response to decline in bank charter values (see Keeley (1990)). Moreover, banks may engage in excessive risk-taking due to the moral hazard result of implicit government guarantees which subsidize banking operations. During the earliest period, January 1974-September 1979, before the shift in the monetary policy regime, insurance companies had significantly (at the one percent level) higher market betas than did banks. The lower level of market risk taking for banks in the 1974-1979 period is consistent with the relatively stable interest rate environment during that period. Bank charters were valued at the capitalized spread earned from extending long term loans financed with short term, low cost deposit sources of funds. To preserve that charter value, banks voluntarily constrained their levels of risk-taking. When the monetary policy regime shifted, the value of bank charters fell. Banks lost their monopoly over low cost deposits and the rewards to running the banks' traditional short book were all but eliminated. The results in Table 3 suggest that banks responded to the shift in monetary policy by increasing their market risk exposure.

Recall that, from Table 1, all financial intermediaries except insurance companies are not exposed to significant amount of interest rate risk during the entire 1974-1994 period. However, the subperiod results in Table 3 show that banks and other financial intermediaries had significant (at the one percent level) levels of interest rate risk exposure during the 1974-1979. This is consistent with the more stable interest rates of the 1974-1979 period before the monetary policy shift. During this period, banks had significant exposures to increasing interest rates, as reflected in the negative coefficient on the interest rate risk factor. In contrast, securities firms had marginally significant (at the 10% level) exposure to declining interest rates.

After 1979, banks had both the incentive and the opportunity to hedge interest rate risk exposure using derivatives[9] as reflected in the insignificant coefficients for the interest rate factor for banks during 1979-1994 shown in Table 3. Insurance companies' high interest rate risk levels, discussed in Section III, are seen to be a

[9] This is consistent with Jagtiani, Saunders, and Udell (1995) concerning banks' motivation and pattern of engaging in off-balance sheet derivatives (futures, options, and swaps) during their sampling period 1984-1991.

phenomenon of the latest period, 1988-1994 only. Insurance companies may have exploited the unusually steep yield curves of this period and taken on unprecedented levels of interest rate risk exposure.

[Insert Table 4 Around Here]

Table 4 examines the risk premium over the three policy regimes, using equations 1, 5, 6, and 7. Market risk premiums for securities firms were the lowest among all financial intermediaries during all three sub-periods. For other financial firms, the market risk premium varied from period to period.

An inverse relationship between the price and the quantity of market risk is most apparent during the stable 1974-1979 period. Using the results presented in Tables 3, we can rank the market segments in order of market risk exposure from highest to lowest as follows: securities firms, insurance companies, other firms, banks, and mutual funds. In contrast, using Table 4 results to measure market risk premiums, the ranking is exactly the opposite: mutual funds (highest), banks, other firms, insurance companies, and securities firms (lowest). This suggests that those market segments with the lowest market risk premiums take on the highest quantities of market risk.

This reverse relationship does not hold well during 1979-1988 and 1988-1994 sub-periods. For example, during 1988-1994 (after the Basle Accord announcement), banks were taking on more market risk than other types of financial intermediaries, and banks were simultaneously subject to the highest market risk premium.

Unlike in the case of market risk, the relationship (direct rather than inverse relationship) between the price and the quantity of interest rate risk is less evident during the stable 1974-1979 period. From Table 3, we can rank market segments in order of interest rate risk premiums from highest to lowest as follows: other financial intermediaries (OTH), commercial banks (COM), securities firms (SEC), insurance companies (INS), and mutual funds (MF). Comparing with the results in Table 3, this ranking suggests a direct relationship between the price and the quantity of interest rate risk -- reflecting the highest interest rate risk level for OTH, but an insignificant difference in the interest rate risk levels among COM, SEC, INS, and MF.

The impact of the monetary policy shift is also apparent in the interest rate risk premiums shown in Table 4. The results show that, for commercial banks, both the levels of interest rate risk (Table 3) and interest rate risk premiums (Table 4) declined during the 1979-1988 and 1988-1994 periods. However, banks were still subject to the second highest interest rate risk premiums of all financial intermediaries.

In the wake of the passage of the Basle capital requirements during the 1988-1994 period, interest rate risk premiums on banks and insurance companies increased to levels significantly (at the one percent level) higher than all other types of financial intermediaries. This could be a reaction to the structure of the risk-adjusted capital requirements for banks and insurance companies that levied a cost for credit risk, but implicitly subsidized interest rate risk exposure (see Allen, Jagtiani, and Landskroner (1996)). Moreover, the extremely large interest rate risk premiums charged for insurance companies during the 1988-1994 period reflect their largest quantities of interest rate risk exposure among all financial intermediaries. The market assessed a catastrophic risk premium on insurance companies that took on extraordinarily high levels of interest rate risk exposure during the 1988-1994 period.

V. Market Segmentation versus Synthetic Universality

We have identified significant differences in both risk taking and risk pricing across market segments of financial intermediaries. In this section, we examine whether combining market segments, via universal banking, offers the possibility of risk diversification benefits. Since universal banking is not permitted de jure[10] in the United States, we construct a "synthetic universal bank" [11], which is a portfolio consisting of one depository institution, one securities firm, and one insurance company. [12] We replicated synthetic universal banks by choosing every possible combination of these three market segments. In order to create a times series of returns for each universal bank, we were limited to consideration of firms with returns for the entire period. Out of our sample, only nine securities firms had continuous data for a period extending from January 1986 to December 1994.13 Thus, we limited our analysis in this section to the period January 1986-December 1994. We chose the largest nine

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[10] Although one can argue that increasingly it is permitted de facto, particularly with the allowance of Section 20 subsidiaries. However, even Section 20 subsidiaries are limited in both their lines of business and volumes of activity.

[11] Boyd, Graham, and Hewitt (1993) used a similar approach to examine the impact of diversification on bankruptcy risk. Boyd, et al execute the simulation of universal banks differently from our method here. They employ dichotomous pairings (one bank holding company and one non-bank firm), whereas we create portfolios of three segments of financial intermediaries. Boyd et al devise a scaling procedure to adjust the relative weights of each firm in the portfolio, whereas we use the value weights (V_{sec}, V_{ins}).

[12] This methodology produces a lower bound estimate of the returns to universal banking, since potential synergies are not considered.

[13] This creates a problem of survival bias, but since we are comparing the results across surviving firms, the effect should cancel out. The list of firms used to create universal banking portfolios appears in Appendix 1.

depository institutions and insurance companies (on the basis of asset size) and replicated all possible combinations of synthetic universal banks, for a total of 729 possibilities, each with 108 monthly rates of return. The mean monthly return for synthetic universal banks is 1.1212%. In contrast, the mean monthly return in this sample over the January 1986-December 1994 period was 1.3604% for depository institutions, 0.9177% for insurance companies, and 1.04802% for securities firms.

[Insert Table 5 Around Here]

We use the two factor market model to compare the synthetic universal bank sample to each of the market segments to determine whether the return differentials were a function of risk differentials. Although securities firms had lower average returns than did universal banks (1.05% vs. 1.12%), they had the highest risk exposures, as measured by the estimates of β_M and β_I shown in Table 5. This suggests that the creation of universal bank portfolios both increases the expected return and reduces the risk exposure of securities firms. To determine whether banks and insurance companies receive adequate returns to risk, as compared to the universal banking portfolio, we decompose these returns further.

Table 5 estimates of the intercept term show that, over the entire time period, the synthetic universal banking portfolio has significantly (at the 1% level) positive excess returns, consistent with a value enhancing portfolio diversification effect. Universal banks have significantly (at the 1% level) positive excess returns in the 1988-1994 subperiod, but have significantly (at the 1% level) negative excess returns during the 1986-1988 subperiod. This result may reflect the popularity of corporate spinoffs and leveraged buyouts in the 1980's and the collapse of junk bonds in 1989.

Differences in systematic risk exposure are very apparent from the market betas in Table 5. In all periods, securities firms have significantly higher market betas than universal banks and any other type of financial intermediary. Despite tighter regulations and the restriction of governmental forbearance, both depository institutions and insurance companies increased their market risk exposure over the nine year period. In all periods, the systematic risk of the synthetic universal bank is significantly lower than that of securities firms. Over the whole period 1986-1994, synthetic universal banks, and all other financial intermediaries, had significantly (at the 1% level) negative interest rate betas. Our sub-period results, however, show that the interest rate beta was significantly positive during the period 1986- 1988; but significantly negative during the period 1988-1994. This is consistent with shifts in interest rate expectations, such that the 1986-1988 interest rate risk exposure reflects expectations of interest rate increases, whereas the opposite is true for the latter sub-periods.

Evidence presented in Table 5 is consistent with a simple averaging of financial intermediaries' returns that reduces the risk of the synthetic universal banking portfolio. To determine whether the synthetic universal bank has a higher expected return than the individual market segments after controlling for risk, we evaluated each return generating function at the mean using the risk levels of each of the market segments. We found that if the universal banking portfolio had the same market beta as the securities firms, the expected return would be 0.207% higher than the expected return estimated from the securities firms' return generating function. Performing the same analysis for insurance companies, we found a yield differential of 0.11% higher for equally risky universal bank portfolios. However, there was no evidence of gains in expected returns for commercial banks.

We performed the same analysis comparing universal banking returns to market segment returns using the universal bank's return generating function and interest rate risk levels for each of the market segments. An equally risky universal bank portfolio would earn an additional 2.017% higher than insurance companies and O. 553% for banks. Securities firms, on the other hand, did not benefit from the interest rate risk diversification benefits of universal banking.

To further examine the risk exposure of synthetic universal banks, we utilize the two-stage (of Section III) and three-stage procedures to examine the risk level and the unit price of risk for universal bank portfolios for the entire 1986-1994 period. To determine the impact of the different market segments on universal bank risk and return, we examine the market capitalization of each of the components of the universal bank portfolio. Thus, V_{sec} is defined to be the book value of assets of the securities firm as a fraction of the synthetic bank's total asset value, as of December 1994. Similarly, V_{ins} is the insurance company's fraction of the synthetic universal bank's asset value, obtained from CRSP.

The first stage of the analysis is the reestimation of equation (1) using the synthetic universal bank sample with a 36-month rolling window. The estimated time-varying betas are then used as dependent variables in the second stage where the following equations are estimated:

$$\hat{\alpha}_{it} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (8)$$

$$\hat{\beta}_{Mit} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (9)$$

$$\hat{\beta}_{Iit} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (10)$$

where $\hat{\alpha}_{it}$, $\hat{\beta}_{Mit}$, and $\hat{\beta}_{Iit}$ are the estimated coefficients of equation (1), respectively, for the intercept, the market index, and the interest rate index; $V_{sec,i}$ is the securities firm's proportion of the synthetic universal bank's asset value, and $V_{ins,i}$ is the insurance company's proportion of the synthetic universal bank's asset value.

[Insert Table 6 Around Here]

Table 6 shows that during the period 1986-1994, the synthetic universal bank portfolio had significantly (at the 1% level) positive excess returns, $\hat{\alpha}$. As the insurance company's and securities firm's proportion in the universal bank portfolio increased, the portfolio's excess returns increased, suggesting that there are return enhancing benefits of diversification. In contrast, the significantly (at the 1% level) positive coefficients of $\hat{b}_{sec}$ and $\hat{b}_{ins}$ in equation (9) for $\hat{\beta}_{Mit}$ suggest that the synthetic universal bank's market risk exposure increases as the proportion invested in securities and insurance firms increases. Thus, combining securities trading and insurance underwriting with commercial banking activity increases the market risk exposure of the universal bank portfolio. The positive coefficient for $\hat{b}_{sec}$ in equation (9) estimation of $\hat{\beta}_M$ is consistent with greater market risk exposure at large securities firms, as shown in Table 3 for the 1988-1994 subperiod. However, Table 3 shows that the market risk of the insurance segment alone is lower, thereby suggesting that the insurance companies' market risk enhancing effect is not simply the result of averaging.

The greater the proportion of the securities trading and insurance underwriting activities, the higher the interest rate risk exposure (the more negative the β_I coefficient) of the synthetic universal bank. Risk diversification enables synthetic universal banks to take on more of both types of risk.

We can also examine the market and interest rate risk premiums for synthetic universal banks using a three-stage procedure similar to that of Section III. In stage one, we estimate equation (1) using synthetic universal bank sample with 36-month rolling window. The estimated time-varying betas from stage one are used as independent variables in a time-series analysis in stage two, using the following expression:

$$R_{it} = \gamma_{0i} + \gamma_{Mi}(\beta_{Mit} | \Omega_{t-1}) + \gamma_{Ii}(\beta_{Iit} | \Omega_{t-1}) + e_{it} \quad (11)$$

where $(\hat{\beta}_{Mit} | \Omega_{t-1})$ is the stage-one conditional estimate of firm i's market risk exposure given the information set, Ω_{t-1}, where t-1 is the 36-month rolling window used to estimate the coefficients of the market model equation (1); $(\hat{\beta}_{Iit} | \Omega_{t-1})$ is the stage-one conditional estimate of firm i's interest rate risk exposure; and R_{it} is the monthly rate of return for firm i. Each universal bank's estimate of the market risk premium is $\hat{\gamma}_{Mi}$, and the estimate of the interest rate risk premium is $\hat{\gamma}_{Ii}$.

The estimated cross-sectional market risk premium and interest rate risk premium from stage two are used as dependent variables in stage three where the following equations are estimated:

$$\gamma_{Mi} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (12)$$

$$\gamma_{Ii} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (13)$$

[Insert Table 7 Around Here]

The results for equation (12) shown in Table 7 suggest that increasing the insurance component of the synthetic universal bank decreases the unit price of market risk, although securities component increases the universal bank's market risk premium. This is interesting since securities firms have the lowest market risk premium of all market segments during 1979-1988 and 1988-1994 periods. For the interest rate risk premium, results from equation (13) in Table 7 show that both securities trading and insurance activities increase the universal bank's interest rate risk premium. Creation of synthetic universal bank portfolios appears to affect the market's pricing of risk.

VI. Summary and Conclusions

This study examines both the quantity and price of risk exposure for different segments of financial intermediaries. If market segmentation exists in the financial services industry, each firm's risk exposure will be impacted by the type of charter it holds. We distinguish between depository institutions (commercial banks, savings banks, and S&Ls), securities firms, insurance companies, mutual funds, and other financial firms using each company's two digit SIC code. We find evidence of market segmentation in both market risk levels and risk premiums. Securities firms, as a group, have the most market risk exposure, followed in order of descending market beta, by banks, other financial firms, insurance companies, and mutual funds. Market risk premiums tend to decrease as the proportion of securities firms and insurance companies in the industry increases, demonstrating an inverse relationship between the quantity and price of market risk.

Using a two factor model, with time-varying betas and risk premiums, we find little evidence of interest rate risk exposure across all types of financial intermediaries, suggesting the prevalence of hedging programs using interest rate derivatives. However, the market prices interest rate risk exposure differentially by type of financial intermediary and across time period. We find that as a market segment, insurance companies are exposed to more interest rate risk than any other market segment, particularly in the period late 1980's to early 1990's. The interest rate risk premium for banks has been among the highest of all financial intermediaries.

When we investigate the impact of two regulatory policy changes, we find that (1) the shift in the conduct of monetary policy towards targeting of monetary aggregates induced banks to take on more market risk due to a decline in their charter value; (2) bank market risk-taking increased further with the introduction of risk-based capital requirements which further reduced charter value for banks; and (3) insurance companies are subject to the highest interest rate risk premiums during the 1988-1994 subperiod, following by commercial banks, probably due to implicit interest rate risk subsidies under the risk-based capital requirements. Overall, during the period 1974-1994, banks increased their market risk exposure despite the tightening of regulatory restrictions, and insurance companies increased their interest rate risk exposure over the subperiods.

We create synthetic universal banks using portfolios comprised of banks, securities firms, and insurance companies. There is evidence of significant positive excess returns for the synthetic universal banking portfolio. The diversification benefits of universal banking are most apparent for securities firms because the average synthetic universal bank portfolio has both a higher expected return and lower risk than the average securities firm. Increasing the proportion of securities firms and insurance companies permits the synthetic universal bank to take on additional market and interest rate risk exposures. Diversification benefits in the pricing of market risk are most apparent for insurance firms. The interest rate risk premium faced by a universal bank increases with both securities trading and insurance activities. Despite secular erosions in Glass-Steagall barriers, market segments of financial intermediaries have significant impacts on financial firms' risk/return tradeoff.

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TABLE 1

Quantity of Risk Analysis (1974-1994)

Using Two-Factor Market Model With 60-Month Rolling Betas

Results from Stage-One regressions are not reported here. R_{it} are monthly returns on a sample of 1,023 financial firms. R_{Mt} are value weighted CRSP index of monthly returns. R_{It} are monthly returns on 3-month U.S. Treasury bills. Dummy variables DUM_{sec}, DUM_{ins}, DUM_{mf}, and DUM_{oth} are equal to 1 for securities firms, insurance companies, mutual funds, and other financial firms respectively. Depository institutions are the base case where all dummy variables are set to zero. Results from Stage-Two regressions are reported with P-values in parentheses. ** denotes significance at the 1 percent level.

Stage One Estimation:

$$R_{it} = \alpha_{it} + \beta_{Mit}R_{Mt} + \beta_{Iit}R_{It} + e_{it} \quad (1)$$

Stage Two Estimation:

$$\hat{\alpha}_{it} = b_0 + b_{sec}DUM_{sec} + b_{ins}DUM_{ins} + b_{mf}DUM_{mf} + b_{oth}DUM_{oth} + e_{it} \quad (2)$$

$$\hat{\beta}_{Mit} = b_0 + b_{sec}DUM_{sec} + b_{ins}DUM_{ins} + b_{mf}DUM_{mf} + b_{oth}DUM_{oth} + e_{it} \quad (3)$$

$$\hat{\beta}_{Iit} = b_0 + b_{sec}DUM_{sec} + b_{ins}DUM_{ins} + b_{mf}DUM_{mf} + b_{oth}DUM_{oth} + e_{it} \quad (4)$$

Results From Stage-Two Regressions:

Dependent Variable	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
α_{it}	.00916 (.7423)	.04712 (.5442)	-.28807** (.0001)	.04085 (.2940)	.02213 (.6087)	.0003
β_{Mit}	1.10422** (.0001)	.19982** (.0017)	-.21982** (.0001)	-.58535** (.0001)	-.18225** (.0001)	.0053
β_{Iit}	-.04231 (.7040)	-.10715 (.7303)	1.20735** (.0001)	-.05780 (.7104)	-.02343 (.8922)	.0003

TABLE 2

Price of Risk Analysis (1974-1994)

Using Two-Factor Market Model With 60-Month Rolling Betas

Results from Stage-One and Stage-Two regressions are not reported here. R_{it} are monthly returns on a sample of 1,023 financial firms. R_{Mt} are value weighted CRSP index of monthly returns. R_{It} are monthly returns on 3-month U.S. Treasury bills. Variables $P_{sec,t}$, $P_{ins,t}$, $P_{mf,t}$, and $P_{oth,t}$ are respectively the proportion of securities firms, insurance companies, mutual funds, and other financial firms in the sample at time t. Results from Stage-Three regressions are reported with P-values in parentheses, ** denotes significance at the 1 percent level.

Stage One Estimation:

$$R_{it} = \alpha_{it} + \beta_{Mit}R_{Mt} + \beta_{Iit}R_{It} + e_{it} \quad (1)$$

Stage Two Estimation:

$$R_{it} = \gamma_{0t} + \gamma_{Mt}(\beta_{Mit}|\Omega_{t-1}) + \gamma_{It}(\beta_{Iit}|\Omega_{t-1}) + e_{it} \quad (5)$$

Stage Three Estimation:

$$\hat{\gamma}_{Mt} = b_0 + b_{sec}P_{sec,t} + b_{ins}P_{ins,t} + b_{mf}P_{mf,t} + b_{oth}P_{oth,t} + e_t \quad (6)$$

$$\hat{\gamma}_{It} = b_0 + b_{sec}P_{sec,t} + b_{ins}P_{ins,t} + b_{mf}P_{mf,t} + b_{oth}P_{oth,t} + e_t \quad (7)$$

Results From Stage-Three Regressions:

Dependent Variable	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
γ_{Mt}	.00089 (.7235)	-.27633** (.0001)	-.09237** (.0001)	.02629** (.0001)	.05394** (.0001)	.0166
γ_{It}	.20785 *** (.0001)	-. 16947** (.0001)	-.52797** (.0001)	-.11154** (.0001)	-.52671** (.0001)	.0156

TABLE 3

Quantity of Risk Sub-Period Analysis (1974-79, 1979-88, 1988-94)

Using Two-Factor Market Model With 36-Month Rolling Betas

Like in the analysis of the whole sample reported in Table 1, this sub-period estimation is based on equations (l), (2), (3), and (4). Results from Stage-One regressions are not reported here. Results from Stage-Two regressions are reported below with P-values in parentheses. ** and * denotes significance at the 1 and 5 percent level respectively.

Sub-Period January 1974- September 1979

	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
α	.04897** (.0001)	-.07646† (.0780)	.00595 (.8318)	-.03077 (.1406)	.0590** (.0010)	.0026
β_M	1.12848** (.0001)	.96223** (.0001)	.1901 O** (.0001)	-.38624** (.0001)	.15153** (.0001)	.0578
β_I	-.07614** (.0023)	.16472 (.0735)	-.01588 (.7893)	.04649 (.2940)	-.15314** (.0001)	.0033

Sub-Period October 1979- June 1988

	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
α	-.02897 (.0954)	.19455** (.0004)	.07322 (.1143)	.06743* (.0386)	.06564* (.0207)	.0007
β_M	1.10742** (,0001)	-.00039 (.9976)	-.31778** (.0033)	-.61213** (.0001)	-.15641* (.0181)	.0033
β_I	.06053 (.0737)	-.39451** (.0002)	-.1341 (.1377)	-.12761* (.0446)	-.12325* (.0258)	.0007

Sub-Period July 1988- December 1994

	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
α	.07574 (.3912)	-.00637 (.9750)	-.74994** (.0001)	-.05133 (.6257)	-.03139 (.8079)	.0007
β_M	1.21856** (.0001)	.20529 (.1264)	-.41759** (.0001)	-.71731** (.0001)	-.50341** (.0001)	.0047
β_I	-.24398 (.5024)	.06223 (.9407)	3.04783** (.0001)	.17323 (.6893)	.14879 (.7795)	.0007

TABLE 4

Price of Risk Sub-Period Analysis (1974-79, 1979-88, 1988-94)

Using Two-Factor Market Model With 36-Month Rolling Betas

Like in the analysis of the whole sample reported in Table 2, this sub-period estimation is based on equations (1), (5), (6), and (7). Results from Stage-One and Stage-Two regressions are not reported here. Results from Stage-Three regressions are reported below with P-values in parentheses. **, *, and † denotes significance at the 1, 5, and 10 percent level respectively.

Sub-Period January 1974- September 1979

	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
γ_M	17770** (.0001)	-3.26893** (.0001)	-1.751OO** (.0001)	2.81536** (.0001)	-1.43557** (.0001)	.1259
γ_I	.49889** (.0001)	-.90467* (.0497)	-5 .02709** (.0001)	-7.58476** (.0001)	4.34783** (.0001)	.2332

Sub-Period October 1979- June 1988

	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
γ_M	-.30688** (.0001)	-1 .00353** (.0001)	.34517** (.0001)	.25631** (.0001)	1.08536** (.0001)	.1517
γ_I	.37859** (.0001)	.58396** (.0001)	-1 .62397** (.0001)	-.21938** (.0001)	-.95655** (.0001)	.1654

Sub-Period July 1988-December 1994

	b_0	b_{sec}	b_{ins}	b_{mf}	b_{oth}	Adj R^2
γ_M	.45522** (.0001)	-3.58888** (.0001)	-1.26768** (.0001)	-.09990** (.0001)	-.69386** (.0001)	.0907
γ_I	1.63297** (.0001)	-19.80999** (.0001)	2.06668** (.0001)	-.75245** (.0001)	-2.75118** (.0001)	.1477

TABLE 5

Sub-Period Analysis for Different Market Segments vs Universal Banks
Using Two-Factor Market Model With Constant Betas

The estimations are based on $R_{it} = \alpha + \beta_M R_{Mt} + \beta_I R_{It} + e_{it}$, where R_{it} are monthly returns on a sample of 1,023 financial firms. R_{Mt} are value weighted CRSP index of monthly returns. R_{It} are monthly returns on 3-month U.S. Treasury bills. For the purpose of comparison with synthetic universal banks, the sample includes only those banks, securities firms, and insurance companies that existed during the period January 1986 to December 1994. **, *, and † denotes significance at the 1, 5, and 10 percent level respectively.

Whole Sampling Period: January 1986- December 1994

Market Segment	α	β_M	β_I	Adj R^2
Depository Institutions	.01235**	1.11204**	-.02673**	.2215
Securities Firms	.02709**	1.48727**	-.06844**	.3549
Insurance Companies	.00056	.92738**	-.00256	.2667
Synthetic Universal Banks	.01659**	1.25256**	-.03954**	.5613

Sub-Period: January 1986- June 1988

Market Segment	α	β_M	β_I	Adj R^2
Depository Institutions	-.08399**	1.00916**	. 16749**	.3711
Securities Firms	-.10222	1.31148**	.17237	.4812
Insurance Companies	-.20174**	.85475**	.39863**	.4417
Synthetic Universal Banks	-.17388**	1.08607**	.33675**	.7212

Sub-Period: July 1988- December 1994

Market Segment	α	β_M	β_I	Adj R^2
Depository Institutions	.01376**	1.24959**	-.03090**	.1679
Securities Firms	.03015**	1 .73075**	-.06885**	.3092
Insurance Companies	.00478	1.02674**	-.00861	.2054
Synthetic Universal Banks	.02012**	1.47825**	-.04545**	.5187

TABLE 6

Quantity of Risk Analysis for Synthetic Universal Banks

Using Two-Factor Market Model With 36-Month Rolling Betas

Results from Stage-One regressions are not reported here. R_{it} are monthly returns synthetic universal banks. R_{Mt} are value weighted CRSP index of monthly returns. R_{It} are monthly returns on 3-month U.S. Treasury bills. Variables $V_{sec,i}$ and $V_{ins,i}$ are respectively the proportion (based on total assets as of December 1994) of securities firms and insurance companies in the synthetic universal bank portfolio. Results from Stage-Two regressions are reported with P-values in parentheses. "* and * denotes significance at the 1 percent level.

Stage One Estimation:

$$R_{it} = \alpha_{it} + \beta_{Mit}R_{Mt} + \beta_{Iit}R_{It} + e_{it} \quad (1)$$

Stage Two Estimation:

$$\hat{\alpha}_{it} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (8)$$

$$\hat{\beta}_{Mit} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (9)$$

$$\hat{\beta}_{Iit} = b_0 + b_{sec}V_{sec,i} + b_{ins}V_{ins,i} + e_{it} \quad (lo)$$

Whole Sampling Period: January 1986- December 1994

	b_0	b_{sec}	b_{ins}	Adj R_2
Intercept: α	.01375** (.0001)	.00534** (.0002)	.01480** (.0001)	.0012
Market Index: β_M	1.26814** (.0001)	.25147** (.0001)	.29348** (.0001)	.0310
3 mo T-Bill Rate: β_I	-.02248** (.0001)	-.01242** (.0001)	-.03189** (.0001)	.0015

TABLE 7

Price of Risk Analysis for Synthetic Universal Banks

Using Two-Factor Market Model With 36-Month Rolling Betas

Results from Stage-One and Stage-Two regressions are not reported here. R_{it} are monthly returns synthetic universal banks. R_{Mt} are value weighted CRSP index of monthly returns. R_{It} are monthly returns on 3-month U.S. Treasury bills. Variables V_{sec} and V_{ins} are respectively the proportion (based on total assets as of December 1994) of securities firms and insurance companies in the synthetic universal bank portfolio. Results from Stage-Three regressions are reported with P-values in parentheses. *“ and * denotes significance at the 1 percent level.

Stage One Estimation:

$$R_{it} = \alpha_{it} + \beta_{Mit} R_{Mt} + \beta_{Iit} R_{It} + e_{it} \quad (1)$$

Stage Two Estimation:

$$R_{it} = \gamma_{0i} + \gamma_{Mi}(\beta_{Mit} | \Omega_{t-1}) + \gamma_{Ii}(\beta_{Iit} | \Omega_{t-1}) + e_{it} \quad (11)$$

Stage Three Estimation:

$$\gamma_{Mi} = b_0 + b_{sec} V_{sec,i} + b_{ins} V_{ins,i} + e_{it} \quad (12)$$

$$\gamma_{Ii} = b_0 + b_{sec} V_{sec,i} + b_{ins} V_{ins,i} + e_{it} \quad (13)$$

Whole Sampling Period: January 1986- December 1994

	b_0	b_{sec}	b_{ins}	Adj R_2
Market Risk Premium: γ_{Mi}	0.07674** (.0001)	0.04084** (.0001)	-0.03066** (.0001)	.0322
Interest Rate Risk premium: γ_{Ii}	0.00093 (.2651)	0.04125** (.0001)	0. 10747** (.0001)	.0200

APPENDIX I

List of Financial Firms Used in Forming Synthetic Universal Banks

Depository Institutions:

Company Name	Company #	CUSIP	SIC Code	Symbol
1. Citicorp	20456	173034	6711	CCI
2. Bank America Corp.	437	066050	6711	BAC
3. Morgan JP & Co. Inc.	21222	616880	6711	JPM
4. Bank New York Inc.	20265	064057	6022	BK
5. Chase Manhattan Corp.	20432	161610	6025	CMB
6. Bankers Trust NY Corp.	20266	066365	6025	BT
7. Bank One Corp.	606	059438	6711	ONE
8. Fleet Financial Group Inc.	20734	338915	6712	FLT
9. Wells Fargo & Co.	21902	949740	6025	WFC

Securities Firms:

Company Name	Company #	CUSIP	SIC Code	Symbol
1. Advest Group Inc.	420	007566	6211	ADV
2. Inter Regional Financial Group	2286	458351	6211	IFG
3. Morgan Keegan Inc.	5960	617410	6211	MOR
4. Edwards AG Inc.	20634	281760	6211	AGE
5. Bear Stems Co. Inc.	20282	073902	6211	BSC
6. Interstate Johnson Lane Inc.	21000	460892	6211	IS
7. McDonald & Co Investment Inc.	21176	580047	6211	MDD
8. Merill Lynch	21190	590188	6211	MER
9. Quick & Reilly Group	21477	748376	6211	BQR

Insurance Companies:

Company Name	Company #	CUSIP	SIC Code	Symbol
1. Aetna Life & Casualty Co.	20026	008140	6311	AET
2. Lincoln National Corp. Inc.	21105	534187	6311	LNC
3. American General Corp.	20082	026351	6311	AGC
4. CNA Financial Corp.	20363	126117	6321	CNA
5. General Re Corp.	20803	370563	6331	GRN
6. Providian Corp.	20390	744061	6311	PVN
7. AFLAC Inc.	92	001055	6321	AFL
8. AON Corp.	20203	037389	6311	AOC
9. USF & G Corp.	21799	903290	6311	FG