Deregulation and Bank Performance: An Empirical Study for the US

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To *Yu* and *Adler*

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Chapter 1 General Introduction

The optimal boundary of banking organizations has been the subject of an active debate on defining the financial market structure of a national economy. The answers provided by banking economists point in two different directions: The theory of scope economies suggests that commercial banks should expand their activities into other financial services like securities and insurance activities, while the theory of specialization suggests banks better concentrate on their core business of loans and deposits. Since both sides are valid in their own rights, the preferred trade-off between the gains from scope economies on the one hand and from specialization on the other, and the risks related to them, defines the landscape of the banking industry with its broader or narrower scope of permitted operations.

While a broader banking boundary, known as the Universal Banking System or the European Continental Banking System, is preferred in most European countries, the banking sector in the world's biggest economy, the US, has maintained a narrow, or separating, banking system, since the Banking Act of 1933.

1.1. Overview on banks' securities activities: Regulatory evolution

1.1.1. The Glass-Steagall Act and its background

Banking conglomerates conducting securities activities were once common in the US until they were forbidden in 1933. The establishment of securities affiliates and the lifting of some of the federal restrictions on underwriting activities by the McFadden Act in 1927 enabled commercial banks to become prominent actors in the securities business by the end of the 1920s. In 1929, for example, 459 US banks were underwriting securities directly through their bond departments and an additional 132 were sponsoring securities issues through an affiliate (Flannery 1985, p. 68). By 1930, commercial banks were underwriting 54.4 percent of all new securities issues (Kennedy 1973, p. 212).

The Great Depression from 1929 to 1933 triggered a nation-wide wave of bank bankruptcy and a stock market crash. Between 1929 and 1933, nearly 10,000 banks went bankrupt; 4,000 banks closed their doors in 1933 alone (Friedmann and Schwartz, 1963). The Banking Act was passed at that critical moment to reconstruct a sound financial system. Section 16, Sections 20, 21, and 32 of the Banking Act (also known as the Glass-Steagall Act), erected a wall between commercial banks and securities firms, restricting commercial banks to mainly deposit taking and loan making.

The Glass-Steagall Act was passed in the context of a series of congressional investigations in the aftermath of the banking crisis. Commercial banks' underwriting and trading of securities through their bond departments or affiliated securities firms were heard in court, and testimonies were produced on a wide variety of abuses in the securities activities of commercial banks, including insider trading and outright fraud. Of particular concern was the possibility that banks' securities affiliates were involved in speculative and fraudulent activities at the expense of depositors and that they threatened financial safety and soundness (Kelly, 1985). Because of their access to the parent banks' resources, the securities affiliates of commercial banks were charged with not being sufficiently cautious in their investment decisions,. It was also alleged that securities affiliates induced the banks to make a variety of ill-advised lending and investment decisions that they otherwise would not have undertaken, including the lending of money to affiliates or their customers on preferential terms and purchasing securities from the affiliates to relieve them of excess holding[1].

The key contents of the Glass-Steagall Act include: Section 16, which bars national banks from investing in shares of stock, limits them to buying and selling securities as an agent, and prohibits them from underwriting and dealing in securities; Section 20, which prohibits Federal Reserve member banks from being affiliated with any organization that is engaged principally in underwriting or dealing of securities; Section 21 which makes it unlawful for securities firms to accept deposits, and Section 32, which prohibits contacts between officers, directors, or

[1] Among others, Shughurt II (1988), Kroszner (1994, 1998), Greenspan (1987), White (1984) also provide description on the historical evidence of imprudent speculation of commercial banks in 1930's.

employees of a Federal Reserve member bank and any organization primarily engaged in underwriting or dealing of securities.

The enactment of the Glass-Steagall Act erected barriers between banks and securities firms. Large banks which engaged in underwriting as well as accepting deposits at that time, such as J.P. Morgan & Co., were split. Other banks which had securities departments or affiliates, like Chase Bank and Citibank, divested them. From 1933 until 1999, although there were limited exceptions such as Section 20 subsidiaries[2], Glass-Steagall essentially stood as a wall between commercial banking and securities activities.

Some banks sought to circumvent bank regulations by forming holding companies. The holding company might acquire non-bank subsidiaries such as investment banks and insurance firms and use bank resources to engage in these activities. To close that loophole, Congress passed the Bank Holding Company Act of 1956 which provided that non-bank companies owned by bank holding companies must be engaged in activities "closely related to banking". Such activities were to be decided and defined by the Federal Reserve System.

1.1.2. The erosion of the Glass-Steagall Act and passage of the Financial Service Modernization Act

By the 1980s, commercial banks faced increasing competitive pressures from less regulated players in the financial market. The increased substitutability between various types of financial instruments has become an important global trend in financial services industries. Many financial instruments are now available to households and corporations that provide similar kinds of services. In many countries bank deposits compete with other liabilities of financial intermediaries, such as money market funds, in the provision of savings and liquidity services, and often also payment services. Many insurance products also have features similar to savings

[2] Starting 1987, the Federal Reserve authorized bank holding companies to establish securities subsidiaries to engage in limited underwriting and dealing of securities. To comply with the Glass-Steagall Act, the revenues from the above bank-ineligible securities activities could not exceed 5 percent of the securities subsidiary's total gross revenues, on an eight quarter moving average basis. Since the ineligible securities activities were authorized by the Fed under Section 20 of the Glass-Steagall Act, these securities affiliates are commonly referred to as Section 20 subsidiaries.

products. The demarcation lines between different types of financial intermediaries and financial services are therefore increasingly blurred. The consumer demands for financial services have changed as well. Consumers, households, and corporations are increasingly becoming more sophisticated and ask for a full package of financial services, preferably from a single provider.

These changes make it increasingly difficult to distinguish between different financial products and different types of financial institutions. A strict division between commercial banking products and other financial products, even if possible, would be rather ineffective in real practice and rather costly in terms of social resources. Based on this context, regulatory authorities gradually set out to relax the Glass-Steagall Act by reinterpreting its provisions. Under Section 20 of the Act, banks were prohibited from affiliating with other financial institutions that were "engaged principally in the issue, floatation, underwriting, public sale, or distribution of financial assets". Over the years however, the term "engaged principally" became subject to reinterpretation. Through a series of court rulings and Federal Reserve Broad interpretations, the type of securities and the proportion of assets that bank affiliates could devote to these securities were broadened[3].

Beginning in 1987, the Board of Federal Reserve (Fed) authorized bank holding companies to establish securities subsidiaries to engage in limited underwriting and dealing of municipal revenue bonds, mortgage-related securities, consumer-receivable-related securities, and commercial papers. To comply with the Glass-Steagall Act, the revenues from the above bank-ineligible securities activities could not exceed 5 percent of the securities subsidiary's total gross revenues, on an eight quarter moving average basis. By satisfying this limit, the securities subsidiary would be considered by the Fed as not engaging primarily in underwriting and dealing of ineligible securities. Since the ineligible securities activities were authorized by the Fed under Section 20 of the Glass-Steagall Act, these securities affiliates are commonly referred to as Section 20 subsidiaries. To isolate the ineligible securities activities from the banking system,

[3] Reviews on some major parts of these deregulation measures are available on the Federal Reserve Board Documents [Docket No. R-0841], 1996, *Revenue Limit on Bank-Ineligible Activities of Subsidiaries of Bank Holding Companies Engaged in Underwriting and Dealing in Securities*.

and to prevent the extension of the bank safety net from covering non-banking activities, the Fed required all bank-ineligible securities activities to be conducted in a subsidiary of the holding company that was independent of the commercial bank. Furthermore, the Fed established a number of firewalls restricting transactions, information flows, and shared management between the banks and the securities subsidiaries.[4]

In 1989 the ineligible revenue limit was raised from 5 percent to 10 percent, and the Fed also authorized underwriting and dealing in all types of corporate debt and equity securities. By 1996, bank affiliates were allowed to underwrite up to 25 percent of revenues in corporate bond and equities. Virtually all large bank holding companies had Section 20 Securities Affiliates (Kwan, 1997). And, following the relaxation of three Section 20 firewalls to allow officers' and directors' interlock, cross-marketing, and inter-affiliate transactions in October 1996, the Fed eliminated most of the remaining Section 20 firewalls and replaced them with a set of operating standards in August 1997.

Along with the deregulation of ineligible revenues, a number of banks made significant inroads into the securities market. The top three banking organizations' Section 20 subsidiaries held a combined 10 percent of the underwriting market for domestic debt and equity issues for the year 1996 (Kwan,1997).

The regulatory tide to ease the separation banking system peaked in 1999 by the passage of the Gramm-Leach-Bliley Act (GLB Act, also known as the Financial Service Modernization Act of 1999). The key provisions of the Act concerning the commercial bank financial services follow below:

Financial holding company affiliations permitted a full range of securities activities and more: The Act permits banks, securities firms, and insurance companies to affiliate within a new

[4] See Walter (1996), Mester (1996, 17-18). Richardson, (1994), Kroszner and Rajan (1994), White (1986), Benston (1990, 1996) and Puri (1994, 1996) for discussion of firewalls.

financial holding company (FHC) structure. Financial holding companies are authorized to engage in a broad array of financially related services including securities underwriting and dealing, insurance agency and underwriting activities, and merchant banking activities.

Moreover, FHCs may also engage in any other activity that the Fed determines to be financial in nature or incidental to financial activities after consultation with the Secretary of Treasury. FHCs could expand even beyond the financial industry into any non-financial activity that the Fed determines to be (i) complementary to a financial activity and (ii) does not pose a substantial risk to the safety or soundness of depository institutions or the financial system. On the contrary, bank holding companies that have not chosen to become FHCs may only engage in activities that the Fed has determined to be closely related to banking under Section 4 (c) (8) of the Bank Holding Company Act.

The procedure to become a financial holding company is simple and largely free of bureaucracy. Bank holding companies and foreign banks that meet certain eligibility criteria can choose to become FHCs, provided that all their depository institution subsidiaries are well-capitalized and well managed, and that all their depository subsidiaries have a satisfactory CRA rating[5]. The decision by a bank holding company to become a financial holding company will be effective on the 31st day after it has been received by the appropriate Federal Reserve Bank, unless the Board has notified the bank holding company prior to that date that its choice was ineffective[6].

Financial subsidiaries of national banks permitted a limited range of securities activities: The Financial Service Modernization Act permits well-capitalized and well-managed national banks to control or own a "financial subsidiary", providing that the banks have a satisfactory or better Community Reinvestment Act rating A financial subsidiary may engage in activities that have been determined under the act to be financial in nature or incidental to financial activities and in activities that the parent bank is permitted to conduct directly. However, a financial subsidiary

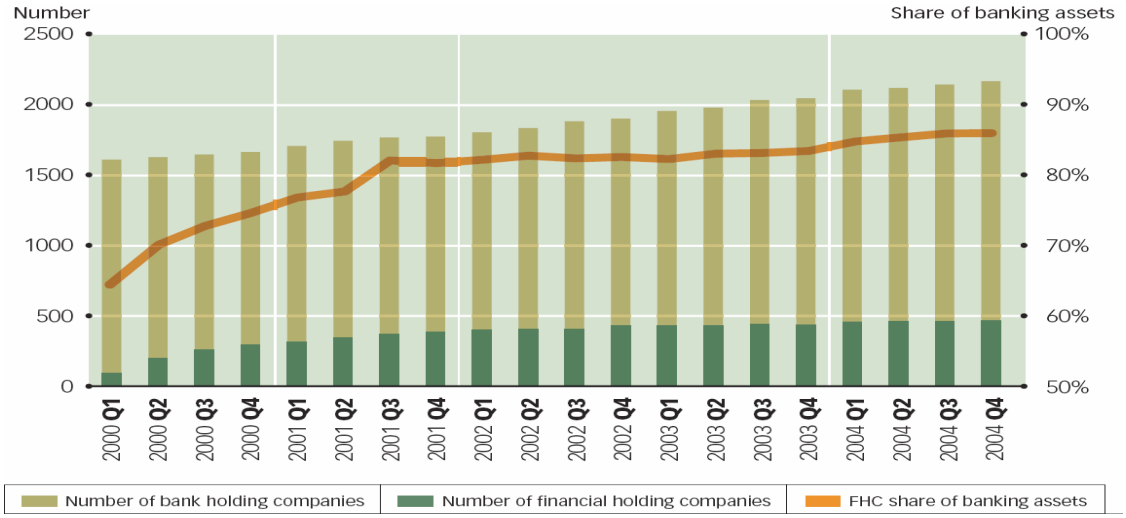
[5] CRA refers to the Community Reinvestment Act of 1977. Federal Reserve banks conduct regular examinations on banks' CRA compliance and assign them CRA performance ratings according to the examination results.
[6] For detailed information on the procedure to become a financial holding company, see Federal Regulation, Part-225, Bank Holding Companies and Change in Bank Control, Board of Governor of Federal Reserve System (Regulation Y). Sources available online: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=635f26c4af3e2fe4327fd25ef4cb5638&tpl=/ecfrbrowse/Title12/12cfr225_main_02.tpl

cannot engage in insurance underwriting, real estate development, merchant banking, or insurance company portfolio investing. A precondition is that the aggregate consolidated total assets of all financial subsidiaries of the national bank cannot exceed 45 percent of the parent banks' total consolidated assets, or $50 billion, whichever is greater. A state member bank may own or control a subsidiary that engages in activities that national banks may conduct through a financial subsidiary, if the bank and its subsidiary comply with the conditions and limitations applicable to national banks.

Regulation: The Act authorizes banking regulators to adopt prudent standards and restrictions on the relationships or transactions between depository institutions and their subsidiaries and affiliates. The Fed serves as the "umbrella" supervisor of all bank holding companies (BHCs), including FHCs.

The US banks apparently welcomed the GLB Act, and actively elected to be FHCs to better exploit the full range of permissible financial services. The following figure illustrates the FHCs' number and their share of banking assets, both exhibiting steady increases. In the left axis of the bar graph, there are only around 100 FHCs in the beginning of 2000, shortly after the GLB Act was enacted. Five years later, at the end of 2004, this number has already risen up to nearly 500, accounting for nearly one fourth of the total BHC number. This increase is quite significant, as the total number of all BHCs only increase 30 percent during the same period. In the right axis of the line graph, we also find a steady increase of FHCs' share of banking assets. To the end of 2004, FHCs already possess 87 percent of the total banking assets in the US, indicating that FHCs have gradually dominated the US banking market.

Figure 1: Increase in Financial Holding Companies



Data Source: Harshmann, F. Yeager and T. Yeager, 2005[7]

1.1.3. Banks in securities activities: why it matters?

An important concern underlying the regulations of banks' securities activities is that they might bring about unfavorable effects on bank soundness and safety. For a long time securities activities were viewed as more risky than commercial banking activities, and, therefore, as a source of instability for the banking sector. Given the banks' core position in the credit market and the payment system, it is widely feared that bank failures will carry significant social costs.[8]

The central role of the banking industry in the financial system is the starting point of the common view[9] that financial difficulties are assumed to be systematic only when the banking system has been hit. When this occurs outside the banking system, turbulence can be managed as long as banks are in a position to support the liquidity needs of other intermediaries, mitigating the risk of an overall market collapse. However, when the commercial banks are now allowed to set their feet into the investment banking field, shocks from the securities markets could directly affect the commercial banks themselves, and the fall-outs of the shocks might cause a decline in

[7] The data include all top-tier domestic banking organizations that file the Federal Reserve's FR Y-9C—the Consolidated Financial Statements for Bank Holding Companies. By including only top-tier organizations, we avoid double counting parent companies and their subsidiaries. Mandatory Y-9C reporters include all domestic BHCs and FHCs with total consolidated assets of at least $150 million. Smaller organizations are omitted from this sample.
[8] Ingo Walter, 1988, *Deregulating Wall Street: commercial banks penetration of the corporate securities market*
[9] Padoa-Schioppa, 2002, *Securities and Banking: bridge and wall*

the liquidity supply of the whole financial system and jeopardize its stability. In one word, the act authorizing banks' securities activities does not only change the nature of banking institutions; it changes the financial environment in general, due to the central role the commercial banks play in the financial system. Its consequences, therefore, are worthy of detailed studies.

Three extensively discussed topics in the area of bank soundness and safety are bank profitability, risk and efficiency. On the positive side, some argue that securities activities will enhance bank profitability, through economies of scope as well as through informational advantages, resulting from the cross-producing of different financial services. Others argue that securities activities generate important diversification effects and liquidity effects for banks, which mitigate banks' risks. It is also claimed that to tear down the wall between banks and securities firms increases competition in the financial market, promoting bank efficiency. However, on the negative side, critics argue that securities activities increase banks' risks by connecting banks with securities market turbulence, by creating more space for moral hazard, by adding possibilities of risk contagion and by increasing the complexity of supervision and safety nets. Empirical studies, however, provide very mixed results when evaluating these effects from both sides.

This dissertation will provide empirical studies on US bank holding companies to clarify the effects of banks' securities activities with more contemporary data, in the context of the new regulation on banks' expansion into securities activities. The Gramm-Leach-Bliley Act of 1999 permits US banks' securities activities primarily in the form of a financial holding company, which is based on a well-capitalized and well-managed banking holding company. Even before 1999, the Fed's deregulation on banks' securities activities also focused on banks holding companies[10]. Therefore, using bank holding companies as sample banks in the dissertation allows us to examine banks' securities activities by way of "real" data, e.g. data from banks, which, in accordance with the financial regulation, "really" conduct securities activities. Compared with most of the previous studies which had to use synthetic universal banks to simulate banks' securities activities or use industrial aggregate data, the presented dissertation

[10] See Federal Reserve Bulletins in 1987, 1989, 1996 for deregulations of securities in bank holding companies. Also see page 4-5 for brief description of these deregulations.

has an apparent advantage by using "real" data[11]. The data distortion problem of simulation is avoided, and the bias of industrial aggregate data does not exist any more.

Surely people might question just how informative and representative this research might be, if we only include bank holding companies in our data set. However, statistical survey on bank holding companies leads us to believe that they actually dominate the US banking market. Federal Reserve data shows that around 85-90 percent of US banking assets are kept by bank holding companies[12]. Therefore, the examination of the profitability, risks and efficiency of bank holding companies holds important policy implications as to the regulation and supervision of the US banking sector.

1.2. Structure of the dissertation:

The main part of this dissertation consists of five chapters. We begin with a review of the theoretical arguments and the existing empirical evidence on the banks' securities activities, both historical and current, in Chapter 2. Theoretically, the banks' securities activities could have various effects on bank profitability, risk and efficiency. However, the effects are so profound and somewhat contradictory to each other, that they bring about confusion when theoretically deciding on the advantages or disadvantages of the banks' securities activities. Empirical evidence is, therefore, of particular importance. When revisiting and rethinking the historical experience prior to the Glass-Steagall Act, no evidence is found to support the culpability of banks' securities activities in the Great Depression from 1929 to 1933. More recent evidence, however, provides very mixed results of the banks' securities activities after the 1980's, which leads to three further empirical studies that we present in the dissertation.

To provide a detailed examination of the exact effect of each individual securities activity, we divide the banks' securities activities into three types, namely: securities trading, underwriting, and fiduciary activities. Chapter 3 provides a preliminary description of the various characteristics of the three different types of securities activities. Securities trading is an in-

[11] Chapter 2 provides detailed discussions of the data problem existing in previous studies, which use aggregate industry data or simulated universal banking data.
[12] See Board of Federal Reserve Annual Report 1995-2004.

balance sheet activity, with trading securities assets being listed in a bank's balance sheet. Securities underwriting involves purchasing and selling commitments of the underlying securities, which are characterized as off-balance sheet items. Fiduciary activity relates to managing assets in the trust of clients, which essentially makes it an intermediary activity.

Chapter 4 builds up a panel data model to study the effects of securities activities on bank profitability. Banks in the US during the period between 1993 and 2004 are examined. We find that securities trading activity enhances bank profitability significantly, in both linear and quadratic functions. Underwriting and fiduciary activities reduce bank profitability in the linear regression, but increase bank profitability in the quadratic function. This indicates that bank profitability begins to rise when the underwriting and fiduciary activities reach certain thresholds. The empirical results suggest that the securities activities enhance bank profitability, but only for a few top banks whose securities activities are above the threshold.

The risk effects of a bank's expansion into securities activities are examined in Chapter 5. The banks' total risk is decomposed into market risk and interest risk through a two-factor model. Empirical results find that fiduciary activities significantly increase a bank's total risk, largely due to the increment of its market risk. Securities trading activities do not touch a bank's total risk, but they significantly increase a bank's exposure to market risk while lower its interest rate risk. Underwriting lowers the total risk of banks and leaves the two specific risks untouched, indicating that the underwriting risk could be properly hedged. The results are interesting in that they find these securities activities to affect various kinds of banks' risks in different ways. This indicates that an appropriate combination of these activities could serve as a useful instrument in bank operations, helping bank managers to adjust banks' risk exposure accordingly.

Chapter 6 explores in what way a bank's expansion into securities activities may have an impact on bank efficiency. Empirical results find that all three types of investment banking activities increase bank efficiency scores significantly, and that the fiduciary activity brings about the largest efficiency improvement. The increased efficiency is attributed to enhanced competition, a higher level of employee working effort, and favorable information resources.

Chapter 2 Banks in securities business: advantages and disadvantages

2.1. Theoretical arguments on banks conducting securities activities

Theoretical debates on whether banks should be permitted to expand into securities activities are largely based on the potential effects of this expansion on bank soundness and safety. The three most intensively discussed topics are: profitability, risk and efficiency.

In each of these three fields there exist some points that are strongly debated, both theoretically and empirically. One by one, we present arguments in these three fields by first beginning with some classic theoretical arguments and then proceeding with documenting doubts and cons for them.

2.1.1. Profitability

Economic theory generally supports that securities activities enhance bank profitability, through economies of scope and better informational advantages.

Economies of scope

Conceptually economies of scope are said to exist when the cost of one organization producing a given mix of products is less than the cost of several specialized firms producing the same bundle of products. Baumol, Panzar and Willig (1981) suggest that economies of scope in production arise when there are inputs that are shared or used jointly.

Banks enjoy economies of scope when they offer a variety of related financial services (Saunders and Walter, 1994). Firstly, they can spread the fixed costs of managing a client relationship over a wider set of products (Steinherr and Huveneers, 1990). Secondly, they can use their branch networks and all their other existing delivery channels to distribute additional products at low marginal costs (Llewellyn 1996). Thirdly, they can deal with shifts in the demand for the

products they offer (some of the products offered by financial institutions are, to a certain extent, close substitutes) more easily because they can respond by shifting resources within their organizations. Finally, there are spillovers in reputation of financial service provider, since the public typically treats services as equally credible, as far as they are provided under the same brandname (Rajan 1996). Therefore, "broader" banks can use the reputation gained in offering one service to recommend their other services, enjoying scope economies in terms of reputation.

However, some researchers criticize that scope economies might exist only theoretically, because banks actually cannot or do not choose their optimal institutional structure due to capital constraints or regulatory restrictions. Besides, the results of the empirical studies of scope economies have so far been mixed. The bulk of studies for US banks concludes that economies of scope in banking, if at all present, are exhausted at very low levels of output (Berger et al. 1987; Berger et al. 1993).These studies may have limited relevance, however, as US banks were allowed to only offer very limited investment banking services, and these activities had to be located in a separate subsidiary of the bank holding company.

Empirical studies on European banks, which may be more relevant since European countries generally allow more integrated banking, have been regretfully inconclusive. Lang and Welzel (1995) report scope economies in small cooperative banks, but find absence of scope economies in German universal banks. Vander Vennet (2002), on the contrary, finds universal banks have strong economies of scope, especially for the bank size category above 20 billion Euro.[13]

Informational advantages:

The theory of asymmetric information tells us that firms generally have internal information about their own creditworthiness and about relevant features of their investment projects. This information is usually not readily available to outsiders or might not be credibly conveyed to outsiders. Financial intermediaries, especially banks, heavily rely on the availability and

[13] see Clark (1988), Mudur (1992) and Forestieri (1993) for a survey of the empirical research on economies of scope.

credibility of the information, which help them to correctly screen bad projects out and pick good projects up, thus enhancing their profitability.

It is argued[14] that conducting securities activities helps banks reduce informational asymmetries in several ways. Firstly, informational advantages stem from a more sustainable bank-firm relationship. In establishing a relationship with a firm, a bank incurs costs in gathering information about the firm and its investment opportunity before making lending decisions. The longer the expected duration of the bank-firm relationship, the more willing the bank will be to invest in gathering firm-specific information, which in turn can increase the financing to valuable investment projects. Firms would switch between different financing patterns over their business life cycle, as small firms typically turn to banks for financing due to their poor acknowledgement by the market, while bigger firms tend to go to the open market, based on their readily available information (reduced information asymmetric). Therefore, banks' expansion into securities activities helps to prolong the relationship between firms and banks: when a firm switches from bank financing to raising money on the capital markets, it can continue to be a customer of the same bank if the bank provides both lending and securities underwriting services.

Secondly, a "broader" bank has more information than a specialized bank as it can offer a broader set of financial products than a specialized bank. This allows the bank to learn more about its borrowers and with lower information and monitoring costs. Information derived, for example, from managing a basic bank account can be used in the supply of other financial services.

However, critics argue that the degree to which these informational advantages can be realized depends on the degree of informational asymmetries: only in economies where information is generally poor, close bank-firm relationships could in principle be very useful (Rajan and Zingales 1999).

[14] For a more detailed explanation on this point, see Claessen and Klingebiel, 2001

2.1.2. Bank risks:

Given the unique role of banks in the monetary system, bank risk is the most vigorously discussed topic when arguing the consequences of the securities activities. It is also the most complicated topic, with interactions between some effects mitigating bank risk and other effects increasing bank risk.

Risk-mitigating effects ---- diversification effects

A bank engaged in securities activities may be more stable than a specialized financial institution because of diversification benefits. These benefits can arise from several sources.

First, due to low or even negative correlation between returns from commercial banking and securities activities, the total profits of a bank providing securities services will be more stable than that of a "narrow" bank with a single product. This is supported by empirical evidence from various authors (Kwan and Ladermann 1999, Eisenbeis and Wall 1984).

Secondly, when firms bypass banks and raise money directly from public markets or from wherever they obtain other types of financial products from capital markets, particularly from equity markets, it will affect a bank less because the decline in lending business can be offset by an increase in underwriting and securities trading business. This in turn may reduce the banks' incentives to engage in riskier lending to maintain profits when faced with a client switch. This effect is difficult to show at the individual bank level, but there is some support at the sectoral level that financial systems with fewer restrictions are more stable (Barth, Caprio and Levine, 2001a).

Risk-mitigating effects ---- Liquidity effects

Banks have long been viewed as the liquidity provider of the financial system, offering liquid deposits and finance illiquid loans. The mismatch of banks' illiquid assets and liquid liability makes banks particularly vulnerable to the liquidity shock, resulting either from bank runs or a sudden liquidity contraction. The proponents of banks' securities activities suggest broadening

the set of banks' permissible investments to include various funds, bonds and equities helps balance the mismatched assets and liability.

Bonds and equities are more liquid than bank loans in several ways: firstly, there is an open market for funds and equities so that they are easy to sell instantly, which helps the bank meet any spontaneous liquidity demands, which might be unforeseeable in some cases. Secondly, bonds and equities are typically designed with small face values per unit, allowing the bank to sell or buy any small amount it wishes, without severely damaging their values. This is contrary to loans, which usually can not be decomposed to be sold in parts whose sizes exactly match the banks' liquidity need. Lastly, the continuous trading in the open market offers a continuous yield-risk curve for bonds and equities, so that the bank can choose to buy or sell any specific combination of liquidity, yield and risk, as long as it matches the need of the bank`s' liquidity management and profitability or risk management.

However, critics point out that the liquidity effect of including securities in banks' portfolio is limited, especially when the bank faces a relatively big liquidity demand. For example, when a bank tries to sell a big block of securities, it incurs the risk of having to sell that block at a lower price. Holthausen, Leftwich and Mayers (1987), for example, find that selling large blocks of common stocks affects the stock price by permanently lowering the stock price.

Risk-enhancing effects ---- inherent risks of securities markets

Many argue that the securities activities are inherently more risky than commercial banking activities. A combination of securities and commercial banking activities therefore can increase the risk of bank failure (Saunders 1994). The restrictions on banks' permitted activities thus aim at limiting banks' opportunities to undertake too much risk.

Securities activities can be divided into agency-type activities and principal type activities. In the agency-type, the bank acts as an agent, conducting two-way transactions on behalf of customers, include acting as a securities broker or as a "placement" agent in underwritings. In the principal-

type activities, the bank acts as a principal; that is, it conducts transactions for its own account. These mainly refer to securities trading[15].

Agency-type activities are mainly fee-based, but that does not necessarily mean that they are less risky. Fee-based activities are sometimes more variable than loan activities, as the clients are not bound by relatively long term loan contracts. The switching costs are therefore lower and the incomes are volatile. Besides, the agency-type activities, unlike the principal-type activities and bank loan business, require less capital, which hence promotes banks' financial leverage and further amplifies the income volatility. With the principal-type activities the risk lies in the fact that the bank attempts to profit from acquiring securities in the expectation of reselling them at a higher price. This makes the profitability of the principal-type activities very dependent on the banks' assessment of the value of the securities and on that of the market. Furthermore, even if the bank has accurately and correctly valued the securities, big price swings might still happen due to runs by securities investors, driving the bank out of its balance position in a very short time. Analogous to bank runs, securities investors can run (i.e. rush to sell) in favour of higher liquidity and lower risk. Herding behavior may take place if investors copy the actions of others, who are presumed to be better informed. While herding is more often associated with less informed retail investors, evidence suggests that it might even take place among professional investors. Thus, when rushes to exit particular securities or collective investments cause large swings in market prices, a risk of failure for securities businesses is implied.

Risk-enhancing effects ---- risk contagion

Since securities activities, as well as the aforementioned, are inherently riskier; a further question is how these risks might strike a commercial bank through various tangible and intangible contagious effects. Contagion refers to the situation where a bank is affected by financial problems, such as insolvency or illiquidity, arising in another financial service provider which is capitally or managerially linked to it. One contagious channel is the potential transfer of capital from a bank, as might occur when it attempts to rescue an associated securities firm from financial difficulties. Such transfers may be evident, as in the case of loans, investments and

[15] For a more detailed explanation, see Santos, 1998

guarantees, or may be obscured, most often through devises such as the off-market pricing of internal transactions. Another contagious channel is the potential for negative events involving an associated securities firm to trigger a liquidity crisis or a substantially diminished flow of business for a bank.

However, empirical evidence does not confirm this risky effect as a general proposition. An empirical analysis of bank failure in the 1920s in the US, for example, found that banks undertaking securities activities were no more likely to fail than banks with no connection to the securities business (White, 1986). More generally, there is no strong evidence that the combination of financial activities increases risk, they might as well reduce risks. [16]

Risk-enhancing effects ---- moral hazard

Moral hazard exists extensively in various fields of banking economics. As to banks' securities businesses, however, moral hazard is mainly concerned with the possibility of risk shifting and asset substitution, namely the substitution of highly risky securities assets with banks' other safer assets, and shifting the risks from bank shareholders to bank debtors.

As in any other debt-financed firm, banks' managers acting in the shareholders' interest have an incentive to take excessive risks, because the debt holders bear the downside risk while the shareholders benefit from the upside potential. This problem of "risk shifting" is particularly acute in the banking sector where a large proportion of the liabilities are in the form of debt (deposits). (Allen and Gale, 2000, p. 271-273) Allowing banks to participate in securities markets therefore gives banks opportunities to realize their risk shifting incentive and results actually in the substitution of high-risk assets.

Risk-enhancing effects ---- complexity for financial supervision and safety net

Supervision of commercial banks and securities entities aims at different objectives. Supervision of commercial banks is aimed at systemic stability by protecting the net worth of the entity (and

[16] For example, Wall and Eisebeis 1984.

thus the rights of creditors, particularly depositors) as the bank will primarily be intermediating third party money. In securities firms, the regulators' objective is aimed at consumer protection. Regulations are geared to safeguard the investment made by investors through these firms: as long as investors can recover the assets they have invested in, insolvency of a securities firm does not need to present a systemic risk. Therefore, from a systemic stability point of view, supervisors would care more about the risks that arise from commercial banking as they relate to the safety net. The combination of securities and commercial banking activities can make supervision and monitoring more difficult as the two activities can not easily be monitored separately and therefore supervised according to their respective regulatory aims.

The risks, as argued by Claessens and Klingebiel (2001), may be amplified through the ambiguous business boundary between commercial banking activities and the banks' securities activities. Some of these two types of activities are closely linked or even partially substitutable to each other. This makes it possible for similar activities to be treated differently or for some activities to remain unsupervised, which creates incentives for regulatory arbitrage and can thwart the intent for regulation. Moreover, the consolidated position of a bank with securities affiliates may not be transparent due to complex internal exposures which may have adverse effect on the health of the banking entity. Consequently, the effectiveness of prudential requirements and supervisory indicators applicable to individual institutions may be diminished.

2.1.3. Efficiency:

Efficiency is important in that it is an indicator for bank soundness and that it is closely related to bank risk. Various studies demonstrate that institutions would display low efficiency prior to failure. Cebenoyan, et al. (1993) use annual accounting data in 1988 for 511 S&Ls in the US They firstly compute inefficiency scores for these S&Ls through a stochastic frontier approach, then employ the inefficiency scores as explanatory variables for the binary consequence of whether a S&L failed or not. A highly significant, positive coefficient of inefficiency scores implies that inefficient S&Ls are more likely to fail. Barr, et al. (1994) quantify a banks'

managerial efficiency, using a data-envelopment analysis model that combines multiple inputs and outputs to compute a scalar measure of efficiency. They find that failure-prediction models for detecting a banks' troubled status which incorporate this explanatory variable have proven to be robust and accurate. In short, banks and S&Ls with a low efficiency failed at greater rates than institutions with higher efficiency levels and this relationship was evident a number of years ahead of eventual failure. As a result, efficiency measures have been shown to improve the predictive accuracy of failure prediction models and thus may represent a useful addition to current modeling efforts by regulatory agencies.

Although there is no doubt about the importance of bank efficiency, theoretical arguments are not convergent on how the securities activities might affect bank efficiency. On one side, deregulating the wall between banking and securities activities promotes competition in financial services, which would force inefficient banks out of the market and enhance the average bank efficiency; on the other side, however, conducting securities activities means banks have to adopt the complicated organizational structure of a holding company, which might be economically and managerially inefficient.

Competition enhance efficiency

Tearing down the wall between banking and securities activities increases competition in financial services. One effect of separating banking systems was to divide the financial market into the narrow functional banking fields of commercial banking and investment banking and therefore limit the competition between commercial and investment banks (Shughart II, 1998). However, this market segmentation effect has been diminished under the current regulatory framework. Banks nowadays have to operate in an increasingly challenging environment, resulting from commercial banks entering a new competition environment of the securities market and investment banks in turn entering into commercial banking markets. Whether and how banks may survive in this new financial era depends in part on how efficiently they operate.

It is typically argued that competition enhances efficiency. Leibenstein (1966) points out that competition affects the intensity with which firms and people work. He claims that people and

organizations normally work neither as hard nor as effectively as they could, and that they discretely choose their optimal working effort according to their own utility maximization. As a result, a given set of inputs produces various outputs, depending on how efficiently they work. Where the competitive pressure is light, people will trade the disutility of greater effort; therefore produce fewer outputs than maximally feasible outputs. In this way, the economic resources are inputted in an inefficient way and the average cost for per unit output is higher than the feasible minimal level. Under tighter competition with more newcomers to the banking and securities industries, however, the quantity of financial service outputs increases and the price falls to a lower level which makes it difficult for the inefficient banks to make profits. Banks whose costs are above the new price level now face stronger pressure: either they reorganize themselves to produce more efficiently or they are forced out of the market. As a result, after a certain period only more efficient banks stay in the market and the average efficiency is promoted.

More complicated organizational structure decreases efficiency

Each organization has its internal inertia. Bureaucracy, misunderstandings, ambiguous entrust and buck-passing behavior between various internal divisions, all these increase the organizational inertia and decrease organizational effectiveness. In principle the organizational effectiveness has a negative relationship with the size of the organization. When an organization grows bigger and contains more complicated internal structure, the bureaucratic behavior inside and the inertia become more serious.

The present organizational structure for banks to conduct securities activities is typically a financial holding company, as proposed by the Gramm-Leach-Bliley Act. However, it is criticized that the holding company structure is uneconomic, as it has to establish a holding company which can not produce any profit (Santos 1997, Claessens and Klingebiel 2002). Besides, the complicated holding company structure makes it more difficult to conduct a proper corporate governance and increases the opportunities for agent rent-seeking. By using a sample of 412 multi-bank bank holding companies (MBHCs) from 1990 to 1994, Klein and Saidenberg (1997), for example, suggest that some organizational inefficiencies are inherent in the holding

company structure. They argue that banks should be allowed to realize the benefits of diversification without limiting them to a particular organizational form.

2.2. The effects of bank securities activities revisited: historical evidence

Profound but contradictory theoretical arguments fail to reach conclusions. In the following section, we interpret empirical evidence to clarify the real effects of banks' securities activities. Since the division between banks and securities firms was legitimated in the aftermath of the Great Depression, it is helpful to revisit and rethink the historical experience of banks' securities activities at that time.

2.2.1 Introduction

The prohibition of banks' securities activities was introduced in the context of the Great Depression 1929—1933. The Depression, triggered by a sudden stock market crash in October 1929, caused enormous hardships for tens of millions of people and the failure of a large fraction of the nation's banks, businesses, and farms. By 1933, 11,000 banks had failed, or 40 percent of the total bank number in 1929; about $2 billion in deposits had been lost since 1929; money supply had contracted 31 percent since 1929. Instability in the banking system disrupted savings and investments, with investments dropping from $16.2 billion to a third of one billion dollars since 1929.[17]

Commercial banks were not only among the biggest victims of the Great Depression; they were also blamed to be partly responsible for it, having themselves engaged in speculations in the stock market or through their affiliated securities firms.

The involvement of commercial banks in the securities business predates the 1920s. However, national commercial banks were essentially forbidden to engage in equities underwriting until the McFadden Act of 1927, when "the Controller of the Currency was given the power to allow

[17] Data from: Timeline of the Great Depression. Sources available online: http://www.huppi.com/kangaroo/THE_GREAT_DEPRESSION.htm

banks to underwrite securities at his discretion" (Geist, pp. 178). This boosted the involvement of commercial banks in the underwriting business and helped the stock market to explode.

Cocurrent with the commercial banks' large expansion into the securities activities sector, the stock market in the US exhibited rampant speculations. The use of credit and leverage to buy stocks was common place. Investors were able to buy stocks on up to a 90 percent margin with the banks and brokerage houses charging high interest rates on margin or call loans. The bull market rose more than 200 percent between 1925 and 1928. Such rampant speculations forced the stock market to new highs and was a factor in facilitating its ultimate collapse (Bauer and Kelly, 2001).

Since the active expansion of commercial banks in the stock market was almost synchronized with the rampant stock market speculations, many people believe that the former phenomenon is a major cause of the latter. Notorious cases of a few commercial banks' outright fraud in stock trading [18] also contributed to the public feeling that commercial banks and their securities subsidiaries were speculative and fraudulent in the stock market. Critics argue that these frauds and speculations did not only hurt bank clients' interest and stock market's soundness, but also impaired banks themselves: When the stock market crashed, commercial banks were also pulled down, due to their large credit involvement with their securities subsidiaries. And, furthermore, the fall-outs of commercial banks' collapse triggered the economic crash.

Decades after the Depression, however, rethinking and revisiting that catastrophe provides different historical evidence. The following points were researched, which help to clarify the real role that banks' securities activities played in the economic crash.

2.2.2. Relatively low risk of banks with securities activities

Accumulated evidence shows that the banks' securities activities actually were inculpable in the banking crisis. Furthermore, the securities activities might have mitigated the banks' risk exposure.

[18] Shughart II (1988) and Walter (1994) cite some juristic charges on commercial banks' fraud and speculations in stock market.

Negative correlation between the banks' securities affiliates and the bank failure constitutes the strongest evidence against the culpability of bank securities activities. It was the smaller, rural institutions that accounted for the majority of bank failures throughout the 1920s and early 1930s, and virtually none of these were likely to have been much involved in underwriting activities. Eighty-eight percent of the banks that suspended operations between 1921 and 1929, for example, had capital of less than $100,000 (Kelly 1985, p. 44). This is the pattern that continued into the 1930s. The institutions that failed over the next four years were similarly smaller, on average, than those banks able to weather the storm.

Table 2-2. Average size of failed bank versus all banks: deposit per bank ($1,000), 1929--1933

year	failed banks	all banks
1929	349.99	1,977.77
1930	620.07	2,165.08
1931	737.13	2,183.29
1932	486.69	1,903.38
1933	899.18	2,257.90

Source: See Shughart II 1988, data from Friedman and Schwartz (1963, *p.* 438) and US Department of Commerce (1975, pp. 1021—22).

Furthermore, by examining the securities subsidiaries of failed banks, White (1986, p.40) notes that while 26.3 percent of all national banks failed between 1930 and 1933, "only 6.5 percent of the 62 banks which had affiliates in 1929 and 7.6 percent of the 145 banks which conducted large operations through their bond departments closed their doors." More importantly, using data for 1931, the year when the largest number of banks with securities affiliates failed, White (p.41) finds that the presence of an affiliate appears to have reduced the probability of bank failure.

Friedman and Schwartz (1963, p. 354) observe that "if there was any deterioration at all in the ex ante quality of loans and investments of banks, it must have been minor, to judge from the

slowness with which it manifested itself." Simply put, banks would have failed at a much higher rate as the economy moved into depression if the composition of the asset and loan portfolios they had built up during the 1920s had been a major contributor to impaired safety and soundness.

Case to case studies also rejected the culpability of securities activities in explaining the wave of bank failures. Despite the fact that congressional hearings on the subject generated much rhetoric on the harm to the safety and soundness of commercial banks allegedly caused by their investment banking activities, securities affiliates were identified as a proximate cause of failure only in the case of the Bank of the United States (Flannery 1985, p. 75). Moreover, although the collapse of the Bank of the United States in December 1930 was spectacular and contributed greatly to a weakening of public confidence in the banking system, it was due less to the operations of the banks' securities affiliate per se than to inept management and outright fraud (Kennedy 1973, pp. 1—5).

2.2.2. Weak evidence on conflicts of interest:

The traditional conflict of interest argument is that banks' securities affiliates could -- and did -- systematically fool the (naive) public investor. It was alleged that opportunistic commercial banks systematically duped naive investors into buying low-quality securities, which helped to undermine the confidence in the public markets (Kroszner and Rajan, 1994) . A typical argument is that since a commercial bank has loans outstanding to firms, it could favor the interests of its own equity holders in the following manner: if a bank had private bad news about a firm it had lent to, it could use its underwriting arm to certify and distribute securities on behalf of the firm to an unsuspecting public and have the firm to use the proceeds to repay the outstanding bank loan. However, empirical research on the conflicts of interest associated with commercial banks' securities activities has not uncovered strong evidence supporting the claim that banks did exploit these conflicts (Puri 1993,1994, 1996; Kroszner and Rajan, 1994,1997) .

The conflicts of interest are generally difficult to determine because they emerge precisely in situations where information is poor ex ante, and it is difficult ex post to distinguish between malfeasance and bad luck. However, an intuition is that if conflicts of interest exist extensively, the securities placed by the commercial banks should systematically have a quality that is below average. Kroszner and Rajan (1994) use this idea to examine the conflicts of interest for the period before Glass-Steagall: comparing the ex post default performance of ex ante similar securities underwritten by commercial banks (either through trust departments or through affiliates) with those underwritten by investment banks, they find no evidence that commercial banks systematically fooled the public by offering low-quality securities. Instead, their findings indicate that commercial banks underwrote higher-quality securities, which performed better than comparable securities brought to the market by investment banks.

2.3. Contemporary survey on banks' securities activities

Compared with the historical survey, contemporary surveys on banks' securities activities benefit a lot from enriched empirical methodologies but suffer severely from poor data availability. 66 years of regulatory prohibition on banks' securities activities leave this long period absent of data, leading to great difficulties in conducting empirical studies.

To circumvent the weak data availability, researchers conceived various methods as alternatives: early literature of the 1970's and 1980's typically uses industry aggregate data, to compare the risk and profitability between securities industry and banking industry. Others try to compose synthetic universal banks conducting securities activities, by simulating mergers between banks and securities firms. Some literature compares US banks with their European counterparts, who have been permitted to conduct securities activities for a long time. Later, when the Federal Reserve Board gradually deregulated the commercial banks' securities activities beginning from late 1980's, some papers examine the consequences of securities activities within a very short period by looking into the very limited samples of bank holding companies with Section 20 Subsidiaries[19]. Alternatively, a few others checked the effects of banks' securities activities by conducting event studies on Federal Reserve's deregulation actions.

All these methods have their own drawbacks. Some have been questioned for using industry-level data, which introduces an aggregation bias[20]. The studies of hypothetical mergers between banks and securities firms have also been questioned for not taking into account the effects of policy changes that usually follow a merger. The outcome of a merger between two firms is not the same as the combination of their balance sheets, as firms change their policies after the merger in order to take advantage of, for example, the scope economies associated with the new

[19] By re-explaining the section 20 of the Glass-Steagall Act, the Fed allows the banks' securities affiliates to expand into activities on those so-called "non-illegible" securities as equity and corporate bonds. These affiliates are called "Section 20 Subsidiaries".
[20] See Boyd, Hanweck and Pithyachariyakul (1980) for a discussion of the aggregation bias in these studies.

mix of activities that they undertake. Studies on Section 20 Subsidiaries are criticized for restricting their samples to a very limited number of BHCs with subsidiaries while neglecting all other BHCs which count for the majority of banks. Besides, studies within a very short time window are also affected by market turbulances which particularly occur in these short period. Despite of this criticism, however, the abovementioned methods appear to serve as good alternatives during the 66 years without systematic data on banks' securities activities.

Nowaday, 16 years after the Federal Reserve first loosened the Glass-Steagall Act in 1989, and 6 years after the Gramm-Leach-Bliley Act completely abolished the prohibition on banks' securities activities, more than 600 financial holding companies chose to conduct securities activities, which creates space for our surveys in this dissertation, with more comprehensible data for a longer time window.

Following we present reviews and comments on contemporary surveys in the fields of bank profitability, risk and efficiency.

2.3.1. Bank profitability:

The empirical studies on the profitability consequences of US banks' securities activities present very mixed results. Some report significantly higher profits of banks' securities activities (Litan 1985, 1987; Wall et al. 1984, 1993; Estrella 2001; Boyd et al. 1988, 1993), while others argue that securities activities lower banks' profitability (Santos and Walter 1994; Kwan 1998).

To facilitate our review and comments on the literature, we classify the previous studies into two main strands according to the different methodology they are using: The first uses an aggregate industry comparison between securities and banking industry, while the second uses simulated mergers among banks and securities firms to form "synthetic universal banks". Both methodologies have their advantages and disadvantages. Indeed, regardless of what methodology they use, there is no consensus among these empirical findings.

Among the first strand of literature on aggregate industry comparisons, Wall and Eisenbeis (1984), Litan (1985, 1987), and Wall et al. (1993) strongly support the profitability of securities activities. They examine the aggregate accounting measures of profitability, including ROA and ROE, over periods from the 1960's to the 1980's, and report that the securities industry tends to have higher profits than the banking industry.

On the contrary, Saunders and Walter (1994, p. 191)[21] compare the compounded 5-year return, compounded annual return and mean daily returns for five groups of financial service providers, namely: money center banks, regional banks, life insurance, fire and casualty insurance, and securities firms. They find securities firms exhibit the poorest profitability over these five years, with a negative compounded 5-year return and an extremely small mean daily return. They report that the regional banks and money center banks are ranked as the second and the third highest profitable group over the five sample years between 1984 and 1988. Even after they exclude 1987 as the stock market crash year, the securities firms have only a slightly higher average daily return over the period between 1984 and 1988 (excluding 1987), which still ranks the lowest among all the five groups. A further comparison of compound annual return for each year also suggests that securities firms have the lowest return in four of all the five sample years except for the year 1985. Since they also find regional banks and money center banks steadily keep having above-average returns, their study indicates that commercial banks' expanding into securities activities might not bring about higher profitability.

Reichert and Wall (2000) find that the relative profitability of securities activities critically depends on which time period is examined and which profitability measure is employed. They employ accounting data of banks and securities firms included by the IRS Major Group 60 over the 25 years window between 1974 and 1997. Their descriptive analysis of ROA suggests that the securities broker/dealer firms averagely exhibit a higher ROA than banks for the subperiods between 1974 and 1980 and again between 1981 and 1989. From 1990 to 1997, however, the average ROA of securities firms is lower than that of the banks. On the contrary, when ROE is employed as profitability measures, securities broker/dealers on average have a higher ROE than

[21] Anthony Saunders and Ingo Walter, Universal banking in the United States, Oxford University Press, 1994.

banks in all the above three subperiods. This significant difference between ROA and ROE comparison maybe results from the securities brokers/dealers typically having a much higher financial leverage than banks.

Very similar to these studies is the paper from Estrella (2001). He uses equity return instead of accounting ROA to adopt industries comparisons. Seven groups of finanical institutions in the US are selected, covering the time period from January 1989 to December 1998: three groups are from the banking industry (10 largest, 10 medium and 10 smallest bank holding companies), the other four groups are composed of 10 biggest companies from each of the four non-banking financial service industries, namely: securities firms, life insurances, property and casualty insurances, and commercial firms. He finds that securities firms exhibit the highest median return (21.4 percent) among all these 7groups.

It is very hard to judge which profitability measure is better, using accounting data of ROA and ROE as Wall (1984, 1993), Litan (1985, 1987) and Santos and Walter (1994), or using market return as Estrella (2001). The drawback of using accounting data is that they might not perfectly unveil the real economic return. Firms often try to smooth accounting data through time, producing reported returns that are deliberately low in the good years and high in the bad years. If firms across different industries have unequal ability to smooth their accounting earnings, then accounting-based risk measures may not provide accurate inter-industry comparisons of risk. Using accounting data has some appeal, however. First, market data is typically available only for the largest firms in an industry, so it clearly is more limited than accounting data. In addition, regulators rely heavily on accounting figures in their evaluation of a banks' financial condition.

All the above mentioned literature employ industrial aggregated data to compare profitability between commercial banks and securities firms. However, the industry comparison methodology is criticized[22] as introducing aggregation bias by using industry-level data. The banking sector provides many more sample banks than the securities industry does. Besides, the banking industry is in many ways different from securities industry, in minimal capital requirement and

[22] See Kwan and Ladermann (1999) for discussion of the aggregation bias in these literatures.

in average asset sizes. These differences make a direct comparison between bank profitability and securities firm profitability very difficult, as the two industries are so heterogeneous. Nevertheless, the ROA and ROE comparisons are still popularly adopted by various studies (Wall and Eisenbeis 1984; Litan 1985, 1987; Wall, et al. 1993), given their simplicity and intuitiveness.

The second strand of literature adopts simulated mergers between banks and securities firms, which include both commercial banking and securities activities in "synthetic universal banks". Boyd, et al (1988, 1993) find the synthetic universal banks to have higher returns. They simulate mergers by randomly matching the 146 BHCs and 11 securities firms, resulting in on-average higher returns than the returns from BHCs alone, which also indicates a potential profitability enhancement of banks' expansion into securities activities.

However, Saunders and Walters (1994, p. 195--205) get differing results by conducting similar studies. Data from nine money center banks, 24 regional banks, 11 securities firms, 13 life insurance companies and eight fire & casualty insurance firms are examined by Saunders and Walters for the period up to 1988. They indicate that the combination between commercial banks (both money center banks and regional banks) and securities firms produces the lowest return, compared with the combination between commercial banks and other financial service providers, no matter whether we look at the 2-industry combination or the 3- or 4-industry combination. Their findings also suggest that a combination of commercial banks (namely, between money center banks and regional banks) and a combination of commercial banks and insurance firms result in higher profitability, implying that commercial banks might better expand into the insurance field or expand geographically, rather than expanding into the securities industry.

The idea of synthetic universal banks is appealing in that it uses firm-level data instead of industrial aggregate data, and therefore avoids an aggregation bias. But an obvious drawback is that "synthetic" universal banks can not incorporate the scope economies of cross-selling securities and banking products, as the "real" universal banks do. Besides, banks typically are

much larger in size than securities firms, which introduces a bank-dominated bias through simulated mergers.

Since US banks were principally not allowed to do securities business in over six decades, most previous studies use "synthetic" data due to data absence. However, some researchers still tried to use very limited but "real" data. Kwast (1989) for example realizes that some commercial banks have already been trading limited types of government securities in house or through separated securities subsidiaries. He therefore examines the return relationship between commercial banks' trading account securities and non-trading assets from 1976 through 1985, and finds that banks' trading account securities on average have a higher ROA than banks' non-trading assets. But his results only partly provide answers to the profitability effects of securities activities, as banks' trading activities have been restricted to very limited sorts of government securities at his time. The large parts of equity securities are neglected in his study.

Kwan (1997) also manages to get "real" data of US banks' securities activities, although he works with only a small number of sample banks during a short time window. He studieds the implications of securities activities on bank safety and soundness by comparing the *ex-post* returns between banking firms' Section 20 subsidiaries and their commercial bank affiliates. His sample covers 26 bank holding companies (BHCs) with Section 20 subsidiaries from 1990 to 1997. Kwan found that the profitability effects depend on different types of securities activities as well as on different market players. By comparing the mean of returns (both ROA and ROE) for banks and their securities affiliates, he comes to the result that the securities activities in overall have brought higher profits than the (commercial) banking activities. He then classifies the securities activities into two types, namely securities trading and securities underwriting, and examines their effects respectively. The securities trading has been found to have a higher ROA than banking, regardless of whether the Section 20 subsidiary has been a primary or a non-primary dealer. However, securities underwriting performed by nonprimary dealer Section 20 subsidiaries has been found to have a lower ROA than banking, while underwriting by primary dealers has a level of return similar to that of banking activities. Compared with previous literature, Kwan's study on Section 20 subsidiaries focuses on those banks that truly conduct

securities activities, but he apparently suffers from the limited sample banks and the short time period.

2.3.2. Bank risks:

The research on the potential risk to banks from conducting securities activities results in mixed findings. The generally adopted risk measures to account for the banks' securities activities are volatility of and/or correlation between accounting returns, volatility of and/or correlation between market returns, and bankruptcy probability. The higher the volatility of bank returns or the more positive the correlation between commercial banking and securities activities, the higher the risks would be. A high bankruptcy probability also indicates high risks. The empirical methods to examine banks' securities activities are: groups (or industries) comparisons and correlations, event studies, simulated mergers and Section 20 subsidiaries studies.

Groups (or industries) comparisons and correlations are the most popularly adopted method, due to its simplicity and intuitiveness. Heggestad (1975) correlates the annual profitability (return on assets) of commercial banks with the profitability of investment companies over the period of 1953-1967. He finds a correlation coefficient of -.12, which indicates that combining the activities would reduce the variance of total returns. Wall and Eisenbeis (1984), using accounting data at the industry level, find that there was a negative correlation between bank earnings and securities broker/dealer earnings over the period of 1970-80. Stover (1982) uses the similar methodology but finds a relatively large, positive correlation between the earnings of commercial and investment banks, suggesting that the variance of commercial banks' return would be higher were the two activities combined. Litan (1987, 1985) conducts a similar study for the period of 1962-1982 on the basis of Internal Revenue Service profit data. He claims that the correlation between bank profits and securities broker/dealer profits is time-dependent: a correlation coefficient of -.11 for the whole period and a correlation coefficient of .06 for the subperiod of 1973-1982 are found. Kwast (1989) also finds, on the basis of firm-level data on banks' trading accounts for the period of 1976-85, that the correlation between the return on securities activities and the return on banking activities is time- and bank-size dependent.

Brewer, Fortier and Pavel (1988) use the variation of daily stock returns to measure risk. They examine that variation over the years 1980, 1982 and 1986 for a sample of banks and non-banking firms, finding that securities brokers and dealers exhibit a much greater variation (3.07) than bank holding companies (0.47). The correlation between the returns, however, was relatively low (0.30). By setting various thresholds of securities activities, they also calculate the variation of daily stock returns for a hypothetical combination of a bank holding company and a securities broker-dealer. With securities activities at five percent of the total business operation of the hypothetic universal bank, the standard deviation of daily returns is .51; with securities at 10 percent, the standard deviation is .65; with securities at 25 percent, the standard deviation is .94. This result implies that combining commercial banking and securities activities increases bank risk.

Deyoung and Roland (1999) examine the fee-based securities activities like securities underwriting, by using data from 472 US commercial banks between 1988 and 1995. In their model they argue that banks' profit is determined by two independent components: banks' sale revenue which is determined largely by forces exogenous to the bank, and the banks' combined degree of operating and financial leverage which transmit the revenue into profit. The volatility of a banks' profitability is thus decomposed into the banks' revenue volatility and the banks' degree of total leverage. Their regressions find that both components of earnings volatility significantly increase with the share of revenues generated by fee-based activities. Their intuition is that either the banks' revenues become less stable as information costs are low and competitive rivalry is high for fee-based activities or that the fee-based activities increase banks' degree of total leverage, which amplifies the volatility of banks' earning stream.

As for an event study method, Bhargava and Fraser (1998) examine the risk effects of the Federal Reserve's four deregulatory actions on banks' securities activities from 1987 to 1996. The sample includes the 50 largest BHCs by assets as of the end of the year preceding the event. They employ the variation of sample banks' stock return over a 121 days time window as the total risk measure, which is then further decomposed to get the banks' systematic risk and firm

specific risk. The effects of the events are then studied by using dummy variables to indicate whether the stock return data is in the events windows or not. Their findings suggest that three deregulatory events among these four significantly increase the banks' total risk and firm specific risk.

Some researchers have examined the bankruptcy probability effects of banking firms' expansion into the securities business by studying hypothetical mergers between BHCs and securities firms. Boyd and Graham (1988) use both accounting and stock market data for a sample of 146 bank holding companies and 11 securities firms over the period of 1971-84. By randomly combining a bank holding company with a securities firm, they build "synthetic universal banks". Calculating the z-score of bankruptcy probability, ,they find that the probability is greater for the combination of securities and banks than for banking alone. Therefore, they conclude that mergers between BHCs and securities firms generally increase BHCs' risk of failure (measured by an indicator of the probability of bankruptcy). Their empirical study is later extended to a longer period (1971—1987) by Boyd, Graham and Hewitt (1993), resulting in similar findings. However, this synthetic combination is critized for the fact that the bank holding companies are typically much larger than securities firms, the banks thus dominating the risk effect of the synthetic universal banks.

Similar to Boyd, Graham and Hewitt, Estrella (2001) also adopts the methodology of synthetic financial conglomerates, by using equity return instead of accounting ROA. He selects the 10 largest, 10 medium and 10 smallest bank holding companies in the US from 1989 to 1998, and matches them with the 10 largest firms from each of the other four financial service industries, namely securities firms, life insurance companies, property and casualty insurance companies, and commercial firms. By examining the equity return volatility and default risk z-score as risk measures, he claims that securities firms are inept partners for bank holding companies. Although the correlation between equity returns of securities firms and bank holding companies is the third lowest among all seven groups (only 0.69 and 0.41, for the biggest and smallest banks respectively), the volatility of the securities firms' equity return is too high (31 percent, which is

the highest among the seven groups), which more than offsets the low correlation, and hence brings banks into a riskier position.

Santomero and Chung (1992) also use the hypothetical merger approach to examine the probability of bankruptcy, using market data over the period of 1985-89. Their approach, however, differs from other studies, as they use the option-pricing theory to estimate the implied volatility of the rate of return on assets and the market value of assets, instead of the volatility of accounting return and book value of assets. Santomero and Chung find that mergers between BHCs and regional securities firms usually lead to a reduction in the BHCs' risk. Mergers between BHCs and large securities firms, however, generally lead to an increase in the new organizations' risk of failure.

Default risk of the z-score is also adopted by Stiroh and Rumble (2005) with more recent data from 1800 bank holding companies. Using quarterly data from 1997 to 2002, they regress banks' z-scores on their trading revenue, their fiduciary income and their other non-interest income. Fiduciary income is found to significantly reduce the default risk, while the coefficients of trading revenue and other non-interest income are both insignificant.

Kwan (1998) is, to the best of our knowledge, the first one to examine bank securities activities by checking Section 20 Subsidiaries. Using data from 23 US bank holding companies with Section 20 Subsidiaries from the second quarter of 1990 to the second quarter of 1997, he divides bank securities activities into trading activities and underwriting activities. Trading activities conducted by primary dealer securities subsidiaries tend to reduce the banking organization's overall risk. Non-primary dealers' trading activities were found to increase the firm's total risk due to their aggressive trading behavior. By contrast, securities underwriting is found to be riskier.

Geyfman (2005) also examines the risk effects of securities activities by looking at BHCs' Section 20 subsidiaries. His sample covers all of the 52 publicly traded US BHCs over the period of 1985-1999, among which are 32 BHCs with Section 20 subsidiaries and 20 BHCs without.

Each BHC is examined using three risk measures: total risk which is estimated using the variance of market-based returns, the systematic risk and the unsystematic risk which is composed of the total risk through a single factor capital asset pricing model. The author finds evidence of a significantly lower total risk and an unsystematic risk for BHCs that expanded into securities activities, suggesting that these activities provided diversification benefits. Evidence, however, also suggests that these BHCs were exposed to a higher systematic risk.

The method for examining BHCs' Section 20 subsidiaries has its obvious drawbacks, though. Firstly, there is only a small number of BHCs with Section 20 subsidiaries (23 in Kwan's paper and 32 in Geyfman's), which may not be viewed as representative and informative enough. Secondly, the characteristics of BHCs that participate in securities underwriting differ markedly from that of those BHCs that do not. BHCs that participate in securities activities are much larger (in terms of both total assets and total equity) than BHCs without Section 20 subsidiaries. Hence, it is hard to compare the risk between these two different groups of BHCs.

2.3.3. Bank efficiency

The literature on efficiency in banking is vast; most of it has focused on issues of X-inefficiency. Bank efficiency is important in that it is closely linked with the banks' competitiveness and managerial quality, therefore becoming an early predictor for bank failure. [23]

There already exists a bulk of literature on the efficiency of the financial industry. Berger and Humphrey (1997), for example, document 130 studies of financial institution efficiency, using data from 21 countries, from multiple time periods, and from various types of institutions including commercial banks, bank branches, savings and loans, credit unions, and other non-bank institutions like insurance firms. These studies report various levels of bank efficiency, stemming from different financial institutional and market structures in each individual country. But in general, many studies have found large inefficiencies, in the order of 20 percent or more

[23] Berger and Humphrey, 1992a; Cebenoyan, Cooperman, and Register, 1993; Hermalin and Wallace, 1994; Barr, Seiford, and Siems, 1994, for example, report that Banks and S&Ls with low efficiency failed at greater rates than institutions with higher efficiency levels, which was evident a few years before the failure eventual happened.

of the total banking industry costs, meaning that the average bank could produce a cost savings of more than 20 percent if it eliminated X-inefficiency.

However, the idea of linking bank efficiency with commercial banks' securities activities is relatively new. Using the concept of OBS (off balance sheet activities), Siems and Clark (1997) belong to the first contemporary explorers in this field. They construct a sample of 9831 banks with 1995 FFIEC (Federal Financial Institutions Examination Council) condition and income data, and estimate bank profit efficiency measures with two product mixes: a conventional product mix without OBS and a broader one with OBS. By comparing bank efficiencies resulting from these two measures, they find that traditional bank efficiency measures, which omitted OBS in the estimation of bank efficiency, seriously understate bank output. Following them, Rogers (1998), Clark and Siems (2002) test US commercial banks during different sample periods, confirming that including OBS items result in a more accurate specification of bank output and lead to higher efficiency scores.

The paper by Rime and Stiroh (2003) is based on a similar idea and looks at the Swiss universal banks over the period of 1996-1999. The conceptual change here is that they examine the banks' securities trading business and brokerage activity instead of the broad term of OBS. To do so, three definitions on the production structure of Switzerland's universal banks are defined: the "naive" definition includes only traditional measures of bank outputs --- various loans; the "intermediate" definition encompasses a fourth output --- securities and participations in addition to the output vector; and the "universal" definition goes one step further to include trading activities, and brokerage and portfolio management. A comparison of the efficiencies scores resulting from these three output definitions leads to the conclusion that failure to account for trading, brokerage and portfolio management activities significantly underestimates the profit efficiency.

Using a somewhat different methodology, Van Vennet (2002) also draws the conclusion that financial conglomerates and universal banks with securities activities have a higher efficiency than the "specialized" commercial banks. With a sample of 2375 EU banks from 17 countries for

the years 1995 and 1996, he finds profit efficiency to be about 68 percent and 70 percent for financial conglomerates and universal banks respectively, both being higher than the profit efficiency of around 50 percent for US "specialized" banks reported by Berger and Mester (1997). Both studies from Van Vennet and from Rime and Stiroh, however, focus on the European banks that have a long tradition to conduct securities activities. Empirical research on the just deregulated US banks remains a blank.

2.4. Conclusion

This chapter is devoted to some discussions on banks' securities activities, both theoretically and empirically. Theoretical arguments provide profound but contradictory views on banks' expansion into securities. Empirically, historical evidence prior to 1933 fails to find enough support to impeach the culpability of banks' securities activities. Contemporary examinations of banks' securities activities, however, present mixed results on the profitability and risks of US sample banks, and focus almost exclusively on the efficiency of European banks only. Therefore, further work is necessary in this field.

One important reason for the mixed results of the profitability and risk effects might stem from the complexity of the banks' securities activities. Securities activities are conceptually very complex, covering various sub-items which differ from each other in their characteristics of both profitability and risk. If we ignore their differences and just simply mix all these sub-types together, their effects would exhibit very controversial results, depending on which one (or ones) of these sub-type activities dominates. A clear classification helps to examine the exact effect of each individual securities activity in detail, and provides better policy implications. Kwan (1997) is the only one who divides bank's securities activities into trading and underwriting activities, but his dichotomy classification of trading and underwriting might have neglected other important bank securities activities like banks' mutual fund management.

In this dissertation we categorize the banks' securities activities into three types, according to their individual profitability and risk characteristics. These three types will then be regressed to see their individual effects on banks' profitability and risks. Empirically we find results from

these three types pointing into different directions, which helps to explain why previous literature presents very mixed findings. Particularly, bank risk is also decomposed into two different risk measures: market risk and interest rate risk, in order to find out the effects of securities activities on these two risks. The consequences of US bank efficiency are also examined, which supplements the literature on European banks' securities activities, and pushes the literature on efficiency of US banks' OBS activities further into the particular direction of securities activities. The dissertation does not focus on conflict of interests, not because it is unimportant, but only because earlier literature has already pointed out that opportunities for conflicts of interests have been greatly reduced by the stricter supervisory arrangement and by monitoring from rating agencies.

Chapter 3 Banks' Securities Trading, Underwriting and Fiduciary Activities

The securities activities conducted by US bank holding companies cover securities trading, underwriting and fiduciary activities. We classify these three types of activities according to their different risk and profitability characteristics. Securities trading is an in-balance sheet activity. A bank's position of trading securities is an intrinsic part of the bank's in-balance sheet asset. Once the bank calls in a certain number of trading securities, the price fluctuation of the securities directly affects the market value of the bank's assets. The losses or profits of the securities trading thus directly constitute the losses or profits of the bank. This way, a bank is directly exposed to the risk of the securities trading. Securities underwriting belongs to a bank's off-balance sheet activities. The underwriting bank commits to buying the underwritten securities at a certain price. This commitment constitutes the off-balance liabilities of the bank. Although the bank doesn't possess the underwritten securities, they have to face the price fluctuation of the underwritten securities during the underwriting periods.

Securities trading and underwriting activities are regarded as the mainstream securities activities of banks, and have been studied in various research. Kwast (1989), for example, examines the securities trading activities of US banks; Kwan (1998), and Kwan and Ladermann (2001) observe the securities trading and underwriting activities. Economic literature, however, improperly omitts dealing with fiduciary activities. This is probably due to the fact that fiduciary income counts for only a small proportion of US banks' total incomes, and is also attributed to the understanding that fiduciary activities' risks are all born by the fiduciary assets holder instead of the banks themselves. To the best of our knowledge, present research concentrates on the discussion of the juristic and regulatory framework of fiduciary activities. The impact of fiduciary activities on a bank's profitability, risk and efficiency have never been observed in present economic research.

For two reasons, we strongly recommend not to neglect fiduciary activities when examining banks' securities activities: Firstly, fiduciary activities largely involve activities in the securities

market. The Federal Reserve Board (Fed) argues that buying and selling securities is "an essential part of the trust and fiduciary operations of banks"[24]. The Office of Controller of Currency (OCC) also defines fiduciary activities in terms mainly relating to securities activities[25]. Secondly, fiduciary activities differ from securities trading and underwriting in that they are intermediary activities. Fiduciary activities mainly involve managing the assets trusted by their clients. Neither are these assets in-balance sheet items nor do they involve any off-balance commitment.

In the following sections we will provide preliminary descriptions of the three types of securities activities. Definitions, regulations as well as costs and benefits of these activities will be introduced. These contents provide useful hints to help understand their profitability, risk and efficiency characteristics that will be addressed in later chapters.

3.1. Securities trading

Securities trading refers to buying and selling securities, including stocks, bonds, notes and bills (Kwan).[26] Under the framework of the Glass-Steagall Act, securities trading activities of banks have long been restricted to certain types of "safe" securities, primarily government securities, Federal Reserve funds and municipal bonds. Starting 1987, the Board of Federal Reserve has up to a certain extent allowed US bank holding companies to expand their trading into the formally "illegal" securities, namely investment grade corporate bonds and equities, given that revenues from these trading activities do not exceed certain thresholds. The unlimited trading of a full range of securities, however, comes in force only after the enactment of the Financial Service Modernization Act of 1999.

[24] The Board of Governors of the Federal Reserve System, Testimony of Governor Laurence H. Meyer, *The securities activities of banks, b*efore the Subcommittee on Financial Institutions and Consumer Credit and the Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises of the Committee on Financial Services, US House of Representatives, August 2, 2001

[25] Section 3.3.1. provides a detailed discussion of the OCC's definition. The original information is available in the OCC letter on March 26, 2005.

[26] This includes only the securities transaction with banks' own assets. Trading on behalf of clients will be classified as fiduciary activities.

3.1.1. Definition of trading securities

Securities trading is an in-balance sheet activity, in that trading securities held by a bank represent part of the bank's asset. We gauge a bank's securities trading activities by measuring the amount of trading securities.

Trading securities refer to securities that are acquired for the purpose of selling in the near term or otherwise with the intent to resell in order to profit from short-term price movements. This nature clearly distinguishes trading securities from investment securities, in that trading securities would be held only for short-term. According to the regulation of Federal Reserve banks, a bank should determine whether it intends to hold an asset for trading (that is, as available-for-sale securities, also know as trading securities) or for investment (that is, as held-to-maturity securities, also know as investment securities), when a security or other asset is acquired. A bank holding company should not record a newly acquired asset in a suspense account and later determine whether it was acquired for trading or investment purposes. Given the nature of the trading account, transfers into or from the trading category should be rare.[27]

Based on the nature of trading accounts, all trading securities are to be reported at their fair value (also known as market value). The difference between the historical costs and the present market value is treated as unrealized gains and losses recognized in the income sheet. The market value of securities should be determined by time references to the best available source of current market quotations or other data on relative current values. For example, securities traded on national, regional, or foreign exchanges or in organized over-the-counter markets should be valued at the most recently available quotation in the most active market. Securities for which no organized market exists should be valued on the basis of a yield curve estimate.

3.1.2. Costs and benefits of securities trading activities:

A bank could profit from securities trading activities if it correctly exploits the price fluctuation of the securities. This requires an accurate assessment of the value of the underlying securities

[27] For more detailed interpretations on trading account securities, see the Board of Federal Reserve System: Instructions for Preparation of Reporting Form FR Y-9C, March 1996.

and of the movement of the market. The assessment must be based on abundant information as well as professional processing and profound understanding of the information. If the securities trading team makes a wrong assessment, the bank could suffer from a great amount of losses, depending on how large a position it holds on the securities and how volatile the securities are.

Securities trading activities are closely connected with other banking activities such as liquidity management, underwriting and hedging, so that the effectiveness of securities trading is rather to be judged by the collaboration between trading and other banking activities, while keeping all operations of a bank in mind.

Securities trading activities provide important instruments for managing a bank's cash and credit position. Selling and buying securities relate to cash flow in different directions. Thus, a bank could balance the fund gap between its deposits and loans through buying or selling securities, especially when we look at the money market securities like treasury bills or notes. Transactions on these securities involve the lending (purchasing bills or notes) or borrowing (selling bills or notes) of immediately available funds, which helps to adjust the liquidity of a bank.

Securities trading sometimes also collaborates with underwriting activities. During the process of underwriting, a bank may temporarily hold a certain amount of securities, in case that these securities remain unsold until the underwriting closes. Usually these securities will be put into the account of trading securities. Sometimes the bank tries to sell out the securities later, which is defined by the Federal Reserve banks as "when-issued securities transactions". In other cases the bank, as part of the underwriting commitment, will serve as a market maker of the underlying securities. Thus, the bank will keep an active net position in the underlying securities by offering or buying them.

A bank's derivative hedging activities also involve securities trading. There is a form of securities trading named program trading, also known as index arbitrage (Walter 1994). Program traders exploit the price discrepancies between indexes of stocks and future contracts by using sophisticated computer models to hedge positions. Program trading has arisen with the advent of

computer and telecommunication technologies, whereby trade in different markets can be monitored simultaneously and be manipulated accordingly.

These multi-channel connections demonstrate the distinctive role that securities trading activities play in a bank's operation, but also add difficulties when measuring the real performance of the securities trading team. Ambiguous performance measurement, according to the industry organization theory, sometimes results in more sluggishness and lowers efficiency.

3.1.3 Regulation on the securities trading activities

Securities are volatile and trading can be risky. The risk born by a bank depends on the size of the exposed position and the volatility of the underlying security. Since the enactment of the Financial Service Modernization Act of 1999, regulatory authorities no longer place quantitative and qualitative restrictions on banks' trading activities. A bank can decide by itself which kinds of trading securities it tends to hold and how many securities assets it holds. Instead, the regulation's focus shifts to two fields: information disclosure and capital requirement.

Information disclosure is regarded as playing a vital role in a supervisor's effort to encourage a sound risk management and foster financial market stability (BIS, 1998, 2005).

Information disclosure helps banks to better evaluate their counterparties' risk and to price the risk more accurately, so that information disclosure provides a basis for reasonable comparisons across firms involved in similar activities. It also reduces the likelihood that they become susceptible to market rumors and misunderstandings during periods of financial stress.[28]

Under the present regulatory framework, banks are required to disclose both qualitative and quantitative information relevant to their trading activities. Quantitative information includes the high, average and low trading value-at-risk (VAR), for all trading securities aggregated as well as for various other securities categories (that is, fixed incomes, equities, and funds). Market

[28] *TRADING AND DERIVATIVES DISCLOSURES OF BANKS AND SECURITIES FIRMS*, Joint report by the Basle Committee on Banking Supervision and the Technical Committee of the International Organization of Securities Commissions (IOSCO), November 1998.

value and trading revenue also belong to a vital quantitative information disclosure. The qualitative information involves the description of the employed risk measuring model, including methodology of the model design and the accuracy of the model. Federal Reserve banks encourage banks, especially large ones with assets above 10 billion ollars, to provide the information in quarterly or annual reports.[29] According to surveys conducted by the BIS (Bank of International Settlement), more than 90 percent of the large banks have followed this encouragement to provide relevant trading information.

Regulatory authorities also encourage banks to keep an adequate capital to cover risks from their trading positions. As proposed by the Basle Capital Adequacy Accord, the standard capital charge for trading securities is a 4 percent charge on the gross position against a specific risk and an 8 percent charge on the net position[30] against the general market risk (BASLE).[31] The capital requirement is calibrated not only based on the size of the exposed securities position, but also on the risk weight of the counterparty. Depending on the rating degree of the counterparties, the risk weight can vary between 20 percent and 350 percent.[32]

3.2. Underwriting

For a long period of time, US banks have been prohibited by the Glass-Steagall Act of 1933 from any affiliations with organizations engaged in underwriting activities.[33] In the last two decades, however, US banking organizations have sought broader domestic securities underwriting

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[29] Board of Federal Reserve: Enhancements to Public Disclosure, SR 01-6 (SUP), March 23, 2001

[30] The net position is calculated by deducing the short position from the long position. The gross position, on the contrary, is the addition of the absolute value of both short position and long position.

[31] There is another methodology used by the Securities Exchange Commission in the US, which is only binding for public listed banks. The SEC rules require that a capital of 15 percent be held against the gross position of the portfolio. Hedging of long or short positions is permitted to the extent of 25 percent of the longer side of the portfolio, and is deducted from the capital charge on the gross position. The SEC approach does not attempt to separate risks into specific and general market risk.

[32] Source: Office of the Comptroller of the Currency, Treasury; Board of Governors of the Federal Reserve System; Federal Deposit Insurance Corporation; and Office of Thrift Supervision, Treasury, *Risk-Based Capital Guidelines; Capital Adequacy Guidelines; Capital Maintenance: Domestic Capital Modifications*, Federal Register, October 20, 2005

[33] The Glass-Steagall Act refers to Sections 16, 17, 20 and 21 of the Banking Act of 1933. This act resulted in the separation between commercial and investment banks. Section 20 of the Act relates to the underwriting activities of banks, requiring banks to eliminate any affiliations with organizations "engaged principally in the issue, flotation, underwriting, public sale, or distribution at wholesale or retail or through syndicate participation of stock, bonds, debentures, notes, or other securities." (12 USC. § 377).

powers. Starting in 1987, the Board of Federal Reserve has gradually authorized limited underwriting activities for previously prohibited securities such as corporate debt and equity securities, for example.[34] The Financial Services Modernization Act of 1999 brings the deregulation of domestic securities underwriting to the climax, when all limitations are fully removed.

3.2.1 Definition of securities underwriting activities

To understand the concept of underwriting, one must consider a firm wishing to raise capital by issuing securities. To facilitate the issuance, the firm hires a bank (or a group of banks) as underwriter. The underwriting bank assists with the documentation of the prospectus and with pricing and selling of the underlying securities. The issuer pays a fee to the underwriter for his services (Yasuda 2001[35], Saunders and Walter 1994, 1996).

In detail, underwriting involves three major phases: origination, risk-bearing, and distribution. Origination relates to decisions on the type, quantity, pricing, timing, and other features of the new securities issue. Choice of the underwriting syndicate is also an important part of the origination. Risk-bearing refers to the agreement of the underwriting bank to purchase the issued securities at a fixed price, thus putting the investment bank at risk in terms of the eventual sale of the issue to the public. Distribution involves selling the securities to the public.

According to different criteria, there are various types of underwriting. Taking the scope of issuance as criteria, securities underwriting can be either public offerings or private placements. Considering the familiarity of issuance to the investors, there can be underwriting for primary

[34] Thus, underwriting covers both bonds and equity securities. However, hereinafter in the paper we discuss the underwriting activities of banks, without distinguishing whether they underwrite bonds or equities. This simplification is justified by Walter et Al. (1994, p. 163). They examine the respective underwriting of bonds and equities, and come to the conclusion that risk and profitability characteristics of underwriting depends not so much on the riskiness of the underlying security, but rather on the pricing, the spread, and the length of time the securities are held.

[35] Ayoko Yasuda, January 2001, *Relationship Capital and Competition in the Corporate Securities Underwriting Market,* Department of Economics, Stanford University,

new issues (so-called initial offerings) or secondary new issues (new issues of seasoned firms whose debt or equity is already traded). However, the most important distinctions are usually made between negotiated and competitive-bid underwriting and between firm commitment and best efforts underwriting.

Regarding how the origination function is handled, we distinguish the negotiated and the competitive bid underwriting. In negotiated underwriting, the issuer firstly chooses a bank as leading manager of the underwriting. In discussions with the issuer, the leading manager designs the timing, quantity and pricing of the issued securities. He also organizes a group of underwriting banks to form a syndicate, in order to spread the risk and to provide a better distribution. The manager chooses members of the syndicate and decides on each member's degree of participation. Usually, the leading manager is entitled to an additional fee due to his controlling the syndicate. In a competitive-bid underwriting, the issuer decides timing and quantities of the underwritten securities, thus enacting much of the origination function. Banks then bid for the issue, vying to become the leading underwriter. The winning bank forms a syndicate in order to spread the risk and to expand the distributional channels.

If the issuer chooses underwriting through a competitive bid, the choice of the underwriting bank is based upon the quantitative conditions of the bids, for example, the agreed price of the issued securities and the lump sum payment. However, in a negotiated underwriting, the issuer chooses an underwriting bank before the details of the issue, including price, are determined. Thus, for a negotiated underwriting, factors other than price influence the choice of the leading underwriting bank. Empirical studies suggest that these factors are: the reputation of the underwriting bank, expertise in corporate finance, retail distribution capabilities, institutional distribution capabilities, expertise in their industry; general research capability, and capabilities in international corporate finance and international distribution (Hayes, Spence, and Marks 1985).[36]

[36] See Hayes et al., Competition in Banking.

Equally important is the point that the distinction between firm commitment and best efforts underwriting is made according to the variation in how the risk-bearing aspect of underwriting is handled.

Firm commitment underwriting is the most popular form of securities underwriting. The syndicate signs an agreement to purchase the issued securities at a certain price (known as the agreed price), and then attempts to distribute the securities to the public at a slightly higher price (also known as the publicly offered price). The spread between the agreed price and the offered price constitutes the underwriting premium of the syndicate. In the best efforts underwriting, on the contrary, the syndicate does not buy the securities. Instead, the syndicate just attempts to distribute as much securities as possible, and transmits funds to the issuer when the securities are sold. Thus, the unsold securities remain with the issuer, and the risk of an unsuccessful issue is born by the issuer.

Except for small and regional issues, firm commitment underwriting is dominant in the underwriting market (Walter, 1994, pp. 98). Firm commitment underwriting generally undergoes the following process:

First, the managing or leading underwriter inspects timing and volume of the issuance, and observes market sentiment or "appetite" for the issuance. When the demands of the market are perceived as promising, the investment bank will assist the issuer in preparing "red herring" prospectus documents. After the SEC (Securities Exchange Commission) permits the prospectus to be "effective", the managing underwriter sets out to form an underwriting syndicate. An underwriting agreement between the underwriting syndicate and the issuer will be signed, stipulating the time, price and volume at which the syndicate commits to purchasing the securities. Also, an agreement among all underwriting syndicate members will then be settled, and each member commits to purchasing his share of the issue at the agreed price. The par value of securities that underwriting banks commit to purchasing is classified by the Federal Reserve banks as ''gross commitments to purchase". After the agreements of purchase are signed, the underwriting banks begin to solicit the issued securities to the public, either to institutional

investors or to individual customers. If the sale is agreed upon by both the banks and the investors, the par value of the underlying securities will be regarded as ‘‘gross commitments to sell’’. Thus, one can clearly observe that underwriting activities are indeed off-balance sheet commitments.

The issuance closes approximately one week after the underwriting begins. On the closing date, the securities are delivered and the issuer is paid. If the securities remain unsold until the closing date, they will be held by the underwriting banks and displayed in the banks’ balance sheets. However, literature reports that underwriters usually have a strong incentive to sell all shares before the closing date, even if doing so may mean suffering a loss(Walter 1994, pp146).

3.2.2. Costs and benefits of securities underwriting

The above mentioned description of firm commitment underwriting also illustrates the mechanism of how a bank makes profits and incurs risk. The spread between the agreed price and the offered price constitutes the underwriting revenue of a bank. This revenue must be high enough to cover all the expenses related to providing underwriting services, so that the underwriting bank can make a profit. The market is volatile, however, and the issued securities could suffer from a declining market price. In such a situation, a bank’s expected premium from underwriting may be eroded and even become negative. Thus, an underwriting bank bears the risk that the market has a poor assessment of the value of the issued securities, and that it is difficult to solicit the securities with sufficient spread.

Underwriting risk is unavoidable when the underwriting deals with volatile securities. However, the risk can be effectively managed, given proper financial instruments and adequate inspection of market and issuer.

Firstly, underwriting risk can be hedged by proper derivatives. An underwriter is exposed to risk after he signs an agreement to commit to purchasing the underwritten securities at a certain price. He suffers losses if the offered price of the securities is lower than his purchasing price. Walter (1994) argues that this commitment is similar to writing a put option, with which the issuer is

entitled to put securities at the strike price to the underwriter. Therefore, to hedge the risk, the underwriter can buy another put option on the securities. This option will allow the underwriter to sell the securities to other parties, in an amount equal to the amount underwritten and with a strike price equal to the offer price. If the option on the newly issued securities is unavailable in the market, an option on other highly correlated securities might also work well. The gains from holding a put option will offset the losses from price falls, whereas the losses (if the stock rises) are limited to the purchase price of the option. The only disadvantage is that the cost of the option premium will wipe out a portion of the spread.

Secondly, the risk borne by the underwriters depends largely on their ability to gauge the market demand for the issue by estimating how much would be bought at what prices. Asymmetric information is essential in underwriting activities. Potential investors have incomplete information about issuers; potential issuers have incomplete information about investors. Underwriters serve as an intermediary specialist collecting information about investors (so as to advise issuers) and issuers (so as to assure investors that purchases of the issuer's securities are good investments.) Therefore, by enhancing the information assessment, an underwriter promotes his skill to line up potential buyers, and effectively reduces the risk.

3.2.3. Conflicts of interest and regulatory firewalls

Regulatory mandates are imposed on underwriting activities of US banks to insulate a bank and its customers from the potential hazards of combining commercial and investment banking. A focus of the firewalls lies between underwriting and lending.

It is frequently argued that banks could "tie in" underwriting and lending (Drucker and Puri 2002; Laux and Walz 2004) in order to facilitate the underwriting. This tying-in exists in many ways, and the banks could tie in loans either to the buyers of the securities or to the issuer of the securities. In the first case, a bank gives out loans to investors to encourage them to buy securities underwritten by it. Bank loans are made at relatively favorable rates to investors, on the understanding that part or all of these funds will be used to purchase certain new issues underwritten by the bank and its syndicates. In the second case, a bank makes imprudent loans to

issuers of securities, before underwriting, during underwriting or after. Before the underwriting, a bank may promise to make loans to the issuer at favorable rates in order to convince the issuer to choose the bank as underwriter. During the underwriting, the loans are made to the issuer to "beautify" the financial statements of the issuer. Imagine an issuer facing some negative financial situation which could increase its default risk. The underwriting bank may lend loans to the issuer, increase his cash flow, and allure investors into buying the issued securities at a higher price. Even after the underwriting, an underwriting bank could continue supplying imprudent loans. Consider a bank underwrites bonds of a firm, who later faces strong financial difficulties to repay the bonds. To prevent the firm from failing, and to avoid possible litigation costs arising from investors' suits against the underwriter (relating to insufficient informational disclosure and lack of due diligence), the bank may infuse loans to the firm, in the hope that its financial situation will improve in the future (Walter 1994).

These conflicts of interest constitute the incentive of a bank to pursue its own interests by sacrificing the interests of its deposit holders. They disturb the fairness of the market competition by cross-tying. They also jeopardize the market transparency and efficiency by sending out false signals to their securities investors. Without effective control, these conflicts of interest will result in a weaker financial stability and financial soundness.

To oppose the conflicts of interests and prevent possibly tying, regulators have set up various firewalls. Section 23A and 23B of the Federal Reserve Act impose quantitative and qualitative restrictions on the internal transactions between a bank, its securities affiliates and securities clients. The two sections require the transactions to be on "market terms" and on an "arm-length" basis. In order to generate underwriting business for its securities affiliate, a bank is not to offer any credit below market prices to customers. Section 23B specifically prohibits a bank from purchasing any security for which its securities affiliate is a principal underwriter during the existence of the underwriting or selling syndicate, unless such a purchase has been approved by a majority of the bank's board of directors. These directors are neither officers of any bank nor of any affiliate. If the bank acts as fiduciary, the purchase must be permitted by the fiduciary agreement, court order, or state law. Similarly, the federal anti-tying statute prohibits a bank

from offering discounted credit enhancements on the condition that an issuer obtains securities services from a section-20 affiliate. These firewalls have effectively prevented banks from providing imprudent credit involving their securities activities, and help maintain financial soundness and stability[37].

3.3 Fiduciary activities

3.3.1. Definition of fiduciary activities

Fiduciary activities refer to the activities that banks (namely fiduciaries) hold and manage assets on behalf of their clients (namely trustors). The assets must be prudently managed in a manner required by the fiduciary agreement, while banks as fiduciaries have a duty to act primarily for the client's benefit and not for the fiduciary's own personal interest.[38]

Our current study classifies fiduciary activities as one type of securities activities, based on the understanding that a primary part of fiduciary activities involves buying and selling securities for customers. Banks that have a discretionary investment authority over a trust or fiduciary account purchase and sell securities for the account to ensure that the account is properly diversified and managed in the manner required by the governing trust agreement and applicable fiduciary principles. Banks also provide investment advice concerning securities, real estate, and other assets to non-discretionary fiduciary accounts, and execute securities transactions for these accounts.

This understanding is in accordance with various supervisory and regulatory arrangements for fiduciary activities. The SEC (Securities Exchange Commission) conducts regular examinations of banks' fiduciary activities. The Federal Reserve Board also claims that buying and selling securities is "an essential part of the trust and fiduciary operations of banks". The OCC (Office

[37] The effectiveness of these firewalls are discussed in detail by Federal Reserve Governor Susan M. Phillips, in her testimony *Restrictions on securities underwriting and dealing,* before the Subcommittee on Financial Institutions and Regulatory Relief of the Committee on Banking, Housing, and Urban Affairs, United States Senate, March 20, 1997

[38] For the definition of fiduciary activities, see, among other, The New Palgrave Dictionary on Economics and Laws, vol 2. p. 127-128. Sources also available online in http://cyber.law.harvard.edu/trusting/unit5all.html.

of Comptroller of Currency) defines fiduciary activities as including eight items altogether: among these, six are closely related to securities transactions, covering a wide range from collective investment funds (CIFs) to collective trust admissions and withdrawals, common trust funds, investments of employees benefit account assets and short-term sweeping funds.[39]

A major category of fiduciary activities are collective investment funds. As defined by the OCC's regulatory standards, collective investment funds consist of two types of funds: index funds and model-driven funds. Index funds seek to replicate the performance of a specified index, such as the Standard and Poor's 500 Index. Trading decisions are made according to a formula that tracks the rate of return of the index by replicating the entire portfolio of the index or by investing in a representative sample of that portfolio. The model-driven funds seek to outperform a specified index or benchmark based on a pre-determined investment strategy. The index or benchmark must represent the investment performance of a specific segment of the public market for debt or equity securities. In addition, the index or benchmark must be established by an independent organization. In short, the objective of the collective investment funds management is to choose an asset allocation to beat specified performance benchmarks.

Collective investment funds and other similar trust funds have witnessed a rapid growth in recent decades. Total assets of the fund industry have exceeded total deposits of the commercial banking system since 1996.[40] US banks have begun to get actively involved in the fund industry since 1972, when the Board of Federal Reserve authorized bank holding companies to act as mutual fund advisers, transfer agents, and custodians. Up to now, banks manage nearly 900 billion dollars in fund assets, more than one fourth of the total assets of the whole fund industry.[41] These facts stand for our argument that the asset management activities, particularly

[39] These eight items are: (1) *Collective Investment Funds,* (2) *Collective Investment Trust Admissions and Withdrawals,* (3) *Collective Investment Trust Withdrawals,* (4) *Collective Investment Funds/common trust funds,* (5) Investment of Employees Benefit Account Assets*,* (6) Nationwide Trust Services, (7) Real Estate Brokerage and Related Activities as a Fiduciary ,(8) Self-deposit in Short-term Investment Fund (Sweeping fund). See Office of the Comptroller of the Currency, March 26, 2005.

[40] Board of Federal Reserve System, Governor Edward W. Kelley, Jr**,** June 26, 1996, testimony before the Subcommitte on Capital markets, Securities, and Government-sponsored Enterprises of the committee on banking and financial services of the US house of representatives.

[41] Source: Investment Company Institute, ICI Statistics & Research.

those related to mutual funds, should not be neglected while examining the BHC's securities activities.

Fiduciary activities, although closely related to securities transactions, are not touched by the Glass-Steagall Act of 1933. Banks continue to buy and sell securities for their customers, under the supervision of relevant federal and state banking agencies. The Financial Service Modernization Act of 1999 also permits banks to effect securities transactions which comply with fiduciary principles. To ensure that banks do not attempt to operate a full-scale brokerage operation out of their trust department, the GLB Act has established two limitations. First, a bank relying on the trust and fiduciary exception must be "chiefly compensated" for the securities transactions it effects for its trust and fiduciary customers on the basis of certain types of traditional trust and fiduciary fees specified in the act. Second and more importantly, the act prohibits the bank from publicly soliciting securities brokerage business other than in conjunction with its trust activities.

3.3.2. Conflicts of interest and regulations

Fiduciary activities can involve potential conflicts of interest. The legal role of fiduciary requires a bank to serve the best interests of its trustors, but the profit-driven nature of the bank indicates that the bank also has an incentive to run for its own above the trustors' interests. Scotland (1980) has documented an extensive list of potential conflicts that arise during fiduciary activities of banks.[42] One of the most notorious examples of the conflicts of interest is that banks used their trust accounts as a "dumping ground" for the "unwanted" securities during the 1920s and early 1930s.[43] When underwritten securities are unsold until the underwriting closes, an underwriting bank tries to dispose the securities into its fiduciary department. The losses then have to be born by the trustors.

Given the explicit potential of interest conflicts, federal and state fiduciary laws have developed strong external control mechanisms to limit the probability of conflict exploitation. Common law

[42] Scotland, Abuse on Wall Street, 1980, p. 134.
[43] Report by the Senate Committee on Banking and Currency, 1934. See also *Stock Exchange Practices: Hearings before the Senate Comm. on Banking and Currency on S. Res. 84 and S. Res. 56, 73d Cong. , 2d Sess. 7986,8063-68.*

rules prohibit self-dealing between a trustee (that is, a bank serving as fiduciary) and its affiliates.[44] These rules also apply to purchases by a corporate trustee from a syndicate of which it is a member and whose profits it shares. The common law prohibition against self-dealing has been reinforced by federal and state trust laws and statutes. The Investment Company Act of 1940 and the Employee Retirement Income Security Act of 1974, for example, treat self-dealing as a "prohibited transaction", and substantial penalties are imposed for any violation by fiduciaries.

At the same time, banks conducting fiduciary activities are subject to multiple supervisions and examinations from various supervisory agencies, including the Federal Reserve Banks, the OCC, and the SEC. These supervisions are quite strict and sometimes prove to be to much, imposing significant burdens on banks (Meyer, 2001).[45]

A frequently cited critique of the burdensome examinations alludes to the SEC's rule on examining fiduciary accounts of banks. The Financial Service Modernization Act of 1999 exempts a bank from registering as broker under the condition that the bank's fiduciary activities are "chiefly compensated". The SEC defines the term "chiefly compensated" as meaning that the "relationship compensation" (that is, an administration or annual fee, a per order processing fee, or any combination of these fees) exceeds sales compensation. The SEC also requires this definition to be determined generally on an account-by-account basis.[46] In order to fit with the condition of the Act, a bank must provide evidence that each of its fiduciary accounts is chiefly compensated. This requirement is based on the understanding that each account is a separate contractual relationship that contains specific obligations. However, it imposes significant burdens on the banks, since a moderately sized bank trust department may have around 10,000 separate trust and fiduciary accounts, and a large trust department may have even more than

[44] Banks' fiduciary activities are subject to extensive regulatory standards under 12 CFR part 9 as well as under state laws that are made applicable to national banks' fiduciary activities by 12 USC. 92a.
[45] Federal Reserve Governor Laurence H. Meyer, *The securities activities of banks,* testimony before the Subcommittee on Financial Institutions and Consumer Credit and the Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises of the Committee on Financial Services, US House of Representatives, August 2, 2001
[46] See Securities Exchange Commission, June 15, 2004 in its document 2004-73: SEC Votes to Propose Provisions Implementing Gramm-Leach-Bliley Bank Broker Rules.

100,000 such accounts[47]. And, in order to comply with the rule, a bank has to establish complex and costly systems and procedures for tracking the amount and types of fees received from each trust and fiduciary account. These further increase the operating costs of banks' fiduciary activities.

Another supervisory authority in the multiple-supervision system are the Federal Reserve Banks (Fed). The Feds argue that the risk of conflicts of interest exists when the fiduciary activities are not observed and documented. Based on this understanding, a bank is required to document all its assessments and executions of fiduciary investments, even if the bank does not exercise any investment discretion on the fiduciary assets. These documents are to be tracked by the Feds during their examination of a bank's fiduciary department or affiliate, which for big banks recurs annually.

The OCC also conducts regular examinations of banks' fiduciary activities, and has developed a rating system named UITRS (Uniform Interagency Trust Rating System). Under the UITRS, each bank is assigned a composite rating based on an evaluation of five components of its fiduciary activities. These components address: the capability of management; the adequacy of operations, controls and audits; the quality and level of earnings; compliance with governing instruments, applicable laws (including self-dealing and conflicts of interest laws and regulations), sound fiduciary principles; and the management of fiduciary assets.

3.3.3. Costs and benefits of fiduciary activities

Revenue and expense

We measure a bank's fiduciary activities by the revenue that these activities generate. Principally, a bank's income from fiduciary activities is composed of the management fee charged on the assets managed by them.[48] Management fees are expressed as a percentage of the fund's total value.[49]

[47] Sources: Meyer 2001, Board of Federal Reserve System.

[48] In our database, and under the current regulation of Federal Reserve banks, income from fiduciary activities mainly consists of management fees. The distribution fee, which banks earn through their selling of investment funds, is classified under the Federal Reserve statistical item of "other services charged". We acknowledge this

The management fee is paid for the bank's services such as security analysis, security selection, trade placement, office space, administrative support personnel, portfolio recordkeeping, and preparation of regulatory filings. In consistence with the services, the bank occurs the following expenses: (1) management expense, including salaries of the fund's managers and analysts, and marketing costs; (2) dealer and advisor compensation, that is, fees paid for dealer operations, fees paid to advisors whose expertise proves valuable for the successful investment of the managed assets; (3) administrative costs, for example, regulatory costs, client relationship costs, documentation costs, data processing, custody and audit fees, and (4) tax.

Most compositions of the above expenses are relatively fixed. In other words, most costs do not increase proportionally when the managed assets increase. A SEC survey reports that in collective investment funds, the average management expense ratio falls with the increase of fund assets. Other things held equal, a fund's management expense ratio falls 11 basis points as fund assets rise from $1 million to $10 million. A fund's management expense ratio falls 42 basis points as fund family assets rise from $1 million to $10 billion.[50] Thus, economies of scale are evident in the fund industry (Keil, 2004).[51]

Duty and risk

When a bank serves as fiduciary, it is subject to certain fiduciary duties, as stipulated by various laws, regulations, standards and guidelines. The bank's fiduciary duties include:

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classification as justified, since these selling activities do not involve any transaction in the securities market. Therefore, the item of "income from fiduciary activities" exclusively relates to banks' fiduciary activities concerning securities transaction and advising.

[49] This might be different for some very actively managed fiduciary instruments. Hedge funds, for example, typically charge a fee greater than 1 percent of the fund assets, plus a "performance fee" of 20 percent of the fund's profit.

[50] Report on Mutual Fund Fees and Expenses, December 2000, Division of Investment Management, SEC.

[51] Testimony of Jeffrey C. Keil, *Global Fiduciary Review,* before the Subcommittee on Financial Management, the Budget, and International Security Committee on Governmental Affairs, United States Senate, *January 27, 2004,* Washington, DC.

(1) Loyalty: Administer the trust solely in the interest of the beneficiary. This duty prevents the fiduciary from putting itself in a position where its own interests conflict with those of the trust that it is representing.
(2) Prudence: Exercise the same care and skill in administering the trust, as a person of ordinary prudence would exercise in dealing with his or her own property.
(3) Compliance: comply with the terms of the fiduciary will (fiduciary agreement), trust or pension plan. A bank should also comply with the common law of trusts, state and federal statutory law and regulation, jurisdiction rulings and orders.
(4) Due diligence: the duty to diversify investments of the plan. A bank could be liable when an obvious mismanagement of the fiduciary assets is observed.

Fiduciary assets do not stand in a bank's balance sheet, and the profits or losses of the assets are born by the trustors. However, as a fiduciary, the bank is far from risk-free. The risks of fiduciary activities involve the following several points:

Strategic Risk: This is the risk that arises from improper business planning, poor decision-making, failure to implement decisions or inadequate responses to changes in the industry. This risk focuses on the management's ability to develop sound business strategic goals, implement processes compatible with these goals and deploy appropriate resources to achieve them. The strategic risk can seriously jeopardize the bank's reputation as a professional and due diligent asset manager.

Compliance Risk: There are two aspects to the compliance risk. On one side, the bank may fail to comply with the investment guidelines stipulated in a particular fiduciary agreement. Among these guidelines are sometimes even ethnic or moral-based restrictions. Compliance risk increases with the rapid development of collective investment funds. A large fund or a fiduciary department of a large bank could have more than 5,000 different fiduciary agreements, and it is a great task to keep accordant with each of these agreements (Morony, 1999). On the other side, the bank faces compliance risk if it does not properly adhere to the regulations and requirements of governmental and regulatory bodies.

Counterparty Risk: This is the risk that a counterparty (for example, an issuer, or a securities broker) fails to meet the commitment. An example of the counterparty risk is that a broker defaults, owing money to the fiduciary clients. In such a case, the clients may indemnify the bank for it has failed to evaluate the creditworthiness of the broker.

Market Risk: Financial market fluctuation leads to profits or losses of the managed fiduciary assets. Although the profits or losses are in principle born by the trustors, they also affect the bank as fiduciary. Market fluctuation increases the difficulty to keep track of the pre-determined benchmark, and adds "tracking errors" to the fiduciary assets management. Particularly, portfolio management models are based upon historic volatility, which can and indeed often changes over time. Besides, even if the bank has successfully followed the pre-determined benchmark, market fluctuation may still affect the bank's fiduciary income. Morony (2005) points out that investors sometimes confuse the relative performance with the absolute performance. Although the fiduciary agreement requires the fiduciary bank to follow the relative return of the benchmark, most investors, especially individual investors, still concentrate on the absolute return. When the market index and the benchmark exhibit a significant rise, the clients are happy with the bank even if their fiduciary assets slightly underperform the benchmark. On the contrary, if the market index and the benchmark slide down, the clients feel frustrated even if the fiduciary outperforms the benchmark to a small degree. Thus, the market fluctuation affects the investors' assessment of the bank, and exposes the bank to market risk.

Chapter 4 The consequences of securities activities for the profitability of US banks

4.1. Introduction

Do securities activities enhance bank profitability? Literature provides inconsistent answers. Theoretical arguments suggest that banks benefit from scope economies when conducting securities activities, which helps promote bank profitability (see Santos 1994; Claessens 1998; Claessens and Klingebiel 2002). Empirical findings, however, do not widely support these arguments. Several empirical studies come to very mixed results concerning banks' securities activities profitability. Early literature uses an aggregate industry comparison between securities and banking industry. Wall and Eisenbeis (1984), Litan (1985, 1987), and Wall et al. (1993) report that securities firms exhibit a higher aggregate ROA and ROE than US commercial banks. Saunders and Walter (1994, p. 191)[52], on the contrary, find that commercial banks have a much higher profitability than securities firms. Later developed models use simulated mergers between banks and securities firms to form "synthetic universal banks". Boyd and Graham (1988) and Boyd, Graham, and Hewitt (1993) report a significantly higher profitability when banks are combined with securities firms. Saunders and Walters (1994, p. 195--205) use a similar simulation method but get to very different results. They find that a simulated expansion into securities activities strongly reduces bank profitability. Dale (1988)[53] also argues that entering investment banking is tougher and less profitable than what commercial bankers had hoped for.

A possible explanation for these mixed results in literature might lie in the classification of banks' securities activities. Securities activities are conceptually very complex, covering various sub-items which differ from each other in both profitability and risk. If we ignore their differences and simply mix all these sub-types together, their effects will show very controversial

[52] Anthony Saunders and Ingo Walter, *Universal Banking in the United States*, Oxford University Press, 1994.
[53] Dale, Betsy, "The Grass May Not Be Greener: Commercial Banks and Investment Banking," Economic Perspectives, Federal Reserve Bank of Chicago, Vol. 12, no. 6, November/December 1988, pp. 3-15.

results, depending on which one (or ones) of these sub-type activities dominates. A clear classification helps to examine the exact effect of each individual securities activity, and provides better policy implications.

In Chapter 3 we categorize the bank's securities activities into three types---------securities trading, underwriting, and fiduciary activities-------according to their individual profitability and risk characteristics. In the present chapter, we regress bank profitability on these three securities activities, to see their respective effects on bank profitability. Profitability is measured in both return on assets (ROA) and return on equity (ROE). Several control variables that could directly influence bank profitability are also incorporated in the regression.

Based on the data from 620 US banking holding companies, our empirical results confirm that the profitability effects of banks' securities activities are sub-type dependent. We firstly develop a linear model to analyze the effects of these three securities activities on bank profitability. The linear regression finds that securities trading significantly enhances the profitability of US banks, thanks to the banks' professional assessment on the securities value. Underwriting and fiduciary activities lower bank profitability. Various market barriers make it very costly for banks to conduct securities underwriting activities. Fiduciary activities suffer from heavy operating costs, imposed by regulatory complexity. Only banks whose underwriting and fiduciary incomes are high enough to compensate for the heavy costs could make a profit. To test this issue we further develop a nonlinear model. We find that banks' securities activities bear a positive quadratic relation to bank profitability. This indicates that banks whose securities incomes are above a certain threshold could make a profit from securities activities.

Our sample period covers the 12 years between 1993 and 2004. This period is very interesting due to the fact that during that time US banks were allowed to legally participate in and gradually expand their securities activities. It is important to remember that US banks had been banned from undertaking securities activities for more than half a century since 1933. This is the reason why previous studies have usually suffered from "bad" sample periods during which banks have been allowed to conduct only a very limited number of securities activities such as specializing in government bonds. Those studies largely had to conduct an aggregate industry

comparison or "synthetic mergers" which are not for real (see Kwast 1987, Wall 1984, Litan 1985 and 1983). From 1987 on, however, the Federal Reserve Bank began to deregulate banks' securities activities step-by-step. Allowing for some time lag for banks' response in the securities market after the Fed's deregulatory action, our sample period which starts in 1993 can examine banks' "real" securities activities better than previous studies:

The rest of the paper is organized as follows. Section 4.2 presents the data sources. Section 4.3 and Section 4.4 derive econometric models with both linear function and quadratic function, providing discussion and economic interpretation of the empirical results. Conclusions are drawn in Section 4. 5.

4.2. Data

The dependent variables of our empirical model are banks' return on assets (*ROA*) and return on equity (*ROE*). On the right side of the regressions, assets and incomes from the banks' three securities activities------securities trading, underwriting and fiduciary activities---- are used as explanatory variables. We also adopt several control variables that directly influence bank profitability including banks' loan assets ratio (*LOANratio*), cash assets ratio, equity to assets ratio (*EQUITYratio*), banks' overheads expenses (*Overheads*) and loan loss reserves to total assets (*LOANLOSSratio*).

All the aforementioned variables are calculated from banks' financial statements. Our data set is taken from Bankscope (Version 2002, 2003, 2004, 2005) and includes data for 620 US bank holding companies that provide consolidated financial statements. The sample period covers the 12 years from 1993 to 2004. We use yearly data from the sample banks' financial statements, including banks' balance sheets and income statements. The data are provided in unit of million dollars.

Apart from that, population data from the US Census Archive and bank number data from the Federal Deposit Insurance Corporation and the Federal Reserve System are also used. We use them to calculate the competition intensiveness of the banking industry in each Federal Reserve

District, which is also a control variable in the regression. The average population number per bank is 40,573, indicating that an average bank has forty thousand potential customers. A lower average population per bank suggests a strong competition among local banks. Only residents are counted in the population number, since mobile population is difficult to census.

Table 1 supplies an overview of the 11 variables in our empirical model. The data is rounded to 2 decimals. Any data, which is smaller than 0.005, is shown as 0 in the table.

Table 1: Descriptive statistics of dependent variables and regressors:

Variable	Mean	Std. Dev	Min	Max
Return on average assets (ROA) %	1.18	0.83	-6.24	16.53
Return on average equity (ROE)%	12.66	7.08	-120.00	122.01
Loan assets ratio (loanratio)	0.62	0.13	0.00	0.95
Loan loss reserves to total assets (loanlossratio)	0.01	0.01	0.00	0.10
Cash assets ratio (cashratio)	0.04	0.02	0.00	0.33
Equity to asset (equityratio)	0.10	0.05	0.00	0.97
Fiduciaryincome ratio (fidratio)	0.05	0.07	0.00	0.77
Underwriting income ratio (feeratio)	0.08	0.06	0.00	0.85
Trading securities assets ratio (traratio)	0.02	0.07	0.00	0.57
Overheads per dollar assets (overheadsta)	0.02	0.01	0.00	0.41
Population number per bank (competition proxy, unit: thousand)	40.75	23.23	5.81	96.15

An average bank has a *ROA* of 1.18%, while the average ROE is 12.66%. The *ROE* is much larger than the *ROA* in absolute value, due to high financial leverages in the banking industry. The equity ratio suggests that US banks averagely hold only 10% of equities compared to their total assets, which also confirms that the *ROE* should be 10 times larger than the *ROA*.

The average overhead to manage per dollar banking assets is 0.017$. The loan assets ratio is 0.62, indicating that credit lending still dominates US banks' operations. All three kinds of securities activities----trading, underwriting and fiduciary----together account for nearly 15% of banks' business. Underwriting activities is the most important securities activity of US banks. Banks earn almost 8% of their total operating income from underwriting activities, through both private placement channels in local markets and public offering channels in national stock markets. This is even more than the aggregate of trading securities (2%) and fiduciary income (5%).

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4.3. Empirical evidence on the profitability effects of securities activities: Linear regression with time effects

In this section we present econometric models and discuss their empirical results. As described in Chapter 3 and in the above sections, banks' securities activities are classified into three different types: securities trading, underwriting, and fiduciary activities. Bank profitability is regressed on these activities and a group of control variables. We firstly assume the model follows a simple linear form, as discussed in Section 4.3. After realizing that there might exist a possible non-linear relationship, we adopt a refined approach in Section 4.4. This examines the quadratic relationship between the profitability and banks' securities activities.

For the linear regression, we use the following econometric model to test the empirical impact of investment banking activities on the profitability of banking institutions. We regress bank profitability, measured in return on average asset (*ROA*) and return on average equity (*ROE*), on a bank's involvement in three different types of investment banking activities. Particularly, admitting that omitting important latent variables might bring with it a serious bias, we adopt time dummies to catch these effects. These omitted variables include incomes from underwriting and fiduciary services influencing both the dependent and independent variables simultaneously.

Unlike securities trading activities, a bank's underwriting and fiduciary activities are both off-balance-sheet activities. They provide incomes for a bank without explicitly using the bank's own financial assets. In fact, the main base of a bank's underwriting and fiduciary activities is its personnel expertise, the bank's brand name, and parts of its client network. For this reason, we find it difficult to use an assets ratio to describe a bank's involvement in underwriting and fiduciary activities. Therefore, the only alternative is to use the income ratios (i.e., the incomes of these two activities divided by the total operating income of a bank) as proxies for a bank's involvement in these two activities.

However, this approximation could raise the question about the regression's endogeneity. The numerator of our dependent variables, *ROA* and *ROE*, is the bank's return (namely, a bank's net

income). This equals a bank's gross revenue deducted by total costs. Furthermore, the gross revenue is an aggregation of a bank's various incomes, including incomes from underwriting activities and fiduciary activities. At the same time, underwriting income and fiduciary income are also numerators of two explanatory variables----*FEEratio* and *FIDratio*. Thus, underwriting income and fiduciary income are endogenous in both sides of our regression. We see the dependent variable and explanatory variables move simultaneously, since they are all affected by the same factors. Endogeneity, therefore, comes with the omitted variables. If we ignore the endogeneity caused by the omitted factors behind them, there will be a significant bias.

Are *FEEratio* and *FIDratio* endogenous in a bank's profitability? What are the effects of omitted factors? Part of the answer lies in the use of time dummies. We feel that time dummies may considerably reduce the effects of endogeneity problem of the fee income and fiduciary income, since these two kinds of income have strong time effects.

We believe that a bank's underwriting and fiduciary incomes have strong time effects for two reasons: Firstly, as described in Chapter 1, the Glass-Steagall Act's restrictions on a commercial bank's securities activities have been released step-by-step since the Fed's re-explanation of the G-S Act starting at the end of the 1980s. Therefore, over our sample period, the bank's engagement in these two securities activities should exhibit an upwards trend over time. Secondly, these two securities activities may be strongly affected by specific market situations, which happen in each specific year. Canals (1997, p. 280), for example, claims that incomes from securities activities are very sensitive to business cycles[54]. A bank's underwriting income and fiduciary income are strongly related to the US stock market cycle. For these two reasons we use year dummies to describe the time effects of the omitted variables of underwriting and fiduciary activities. The coefficients of year dummies should be compositive effects of both the deregulation time trends and the stock market cycle effects.

[54] Canals, Jordi, 1997, Universal Banking International Comparison and Theoretical Perspectives, Clarendon Press.

4.3.1. Linear Regression Model

The model, as defined in Equation (1), is used to test the profitability effect of the investment banking activities.

$$R_{j,t} = \delta_1 + \delta_2 * FEEratio_{j,t} + \delta_3 * TRAratio_{j,t} + \delta_4 * FIDratio_{j,t} + \delta_5 * X_{j,t} + \delta_6 * T_{j,t} + \varepsilon_{j,t} \quad (1)$$

Where:

$R_{j,t}$ denotes the return of average asset (ROA) or return on average equity (ROE) of bank *j* in time *t*;

$FEEratio_{j,t}$ denotes the underwriting fee and commission income proportion of bank *j* in time *t*;

$TRAratio_{j,t}$ denotes the net securities trading position of bank *j* in time *t*;

$FIDratio_{j,t}$ denotes the fiduciary and fiduciary income proportion of bank *j* in time *t*;

$X_{j,t}$ is a vector of control variables on the individual bank level;

$T_{j,t}$ is a group of year dummies catching time effects from the years 1993 to 2004

$\varepsilon_{j,t}$ is the error term.

Dependent Variables

The two following dependent variables are used for measuring a bank's profitability.

ROA (return on average asset): the bank's post tax profit over a bank's average assets (an algebra average of a bank's total assets at the beginning of a year and at the end of a year).

ROE (return on average equity): the bank's post tax profit over the bank's average equity (an algebra average of a bank's total equity at the beginning of a year and at the end of a year).

Both ROA and ROE are popularly adopted to measure a bank's profitability (see Wall and Eisenbeis, 1984, Saunders and Walter, 1994; Estrella, 2001; Stiroh, 2003, 2005). However, they slightly differ from each other.

ROA is relatively independent of a bank's financial leverage ratio and its equity policy. Therefore, it is more objective to compare a bank's ROA than to compare ROEs. ROE, on the contrary, can be strongly affected by a bank's equity policy. Managers may easily manipulate the ROE, by reducing or increasing a bank's equity reserves through various equity policies.

ROE, nevertheless, also has its own advantage. Modern capital adequacy accords[55] usually require banks to hold equity in accordance with the riskiness of their assets. If a certain kind of investment is particularly risky, it would be assigned a high risk weight. This promotes a bank's minimal equity requirement and reduces its ROE. Therefore, a highly risky investment might have a lower ROE, even if it had a high ROA. Thus, ROE actually measures a bank's risk-adjusted profitability, provided all banks conform to capital adequacy principles.

Since ROA and ROE both have their advantages, we use both as dependent variables in the regressions. Coefficients of most independent variables have similar signs and significances for ROA as for ROE. For those that are not similar, we provide explanations.

Explanatory Variables

To measure the respective impact of various investment banking activities on bank profitability, we employ as explanatory variables the proportions of the following three types of investment activities in a bank's total operation.

[55] For example, the BASEL Capital Adequacy Accord I and II for international banking industry, and the CAMEL principle adopted in the US

TRAratio: To estimate the impact of securities trading activity we include as a regressor the assets ratio of a bank's securities trading, defined as the ratio of a bank's trading securities over total assets (TRAratio). Trading securities refer to securities that are acquired for the purpose of selling in the near term or otherwise with the intent to resell in order to profit from short-term price movements[56]. This includes trading securities held by the banks themselves and their consolidated subsidiaries.

FEEratio: The explanatory variable FEEratio is included in the effects of underwriting, measured by the ratio of a bank's fee and commission income to the total operating income. This includes fees and commissions from underwriting (or participating in the underwriting of) securities, private placements of securities, merger and acquisition services, investment advisory and management services, and other related fees from the banks themselves and their consolidated subsidiaries. The dataset reports a zero or "missing" underwriting activity income if the bank has no income from these services and no consolidated subsidiaries that render these services.

FIDratio: The bank's fiduciary activity is measured by FIDratio, the ratio of fiduciary activity income to total operating income. The fiduciary activity income is the gross income from services rendered by the bank's trust department or by any of its consolidated subsidiaries acting in any fiduciary capacity. Commissions and fees on sales of annuities that are executed in a fiduciary capacity by the bank's trust department (or by any of its consolidated subsidiaries) are included. The dataset reports a zero or "missing" fiduciary activity income if the bank has no trust department and no consolidated subsidiaries that render services in any fiduciary capacity.

[56] Banks report their trading securities each year in their financial statements. According to the regulations of Federal Reserve banks, a bank should determine whether it intends to hold an asset for trading when a security or other asset is acquired. Nevertheless, there might be some speculation as to defining trading securities. Banks may define some assets as trading securities with the intent to resell them soon. But in certain cases, unexpected price movements might force a bank to keep these securities longer than expected. However, for simplicity, we do not question a bank's reported trading securities assets, supposing that banks generally have rational expectations when defining their assets.

Control variables:

Several control variables are included in the econometric models. They are variables that have direct influence on a bank's profitability, so that we think it necessary to control their effects. Among them are variables from bank balances sheets, which are used to catch the impacts of a bank's assets portfolio: the ratio of a bank's total loans, the ratio of non-earning assets (cash and due from banks). A bank's equity also has impact on its profitability in that equity provides free capital (which is free of interest expense) for a bank's operation. A bank's overheads expenses and loan loss reserves are also included as control variables, in that they are directly related to bank profitability. We also introduce a competition variable to control its effect on a bank's profitability.

These control variables are:

LOANratio: the ratio of a bank's net loans (netting loan loss reserves) to total assets. The coefficient of *LOANratio* measures the impact of loan activities on bank profitability (Brewer, 1989; Espahbodi, 1991).

CASHratio: the ratio of a bank's cash and due from other banks to total assets. Since cash and inter-bank dues are primarily non-interest bearing, they are regarded as non-earning assets, which do not contribute to bank profitability. A higher *CASHratio* indicates too many resources allocated in non-earning assets, and therefore is expected to be negatively related to bank profitability.

EQUITYratio: A bank's equity over its total assets. Compared with the interest-bearing liabilities like deposits and bonds, bank equity provides free capital for a bank's operation. It lowers a bank's interest expense and promotes its profits. The return on assets (*ROA*) is therefore expected to be positively related to *EQUITYratio*. But a higher *EQUITYratio* also raises the denumerator of the return on equity (*ROE*), so that the coefficient on ROE could be either insignificantly positive or negative .

LOANLOSSratio: a bank's loan loss reserves over its total assets. Loan loss reserves directly refer to bank profits, so that they must be controlled when testing bank profitability. *LOANLOSSratio* is expected to have a significant negative sign for both ROA and ROE regressions.

OverheadsTA: a bank's overhead expenses over its total assets. It measures how many overhead costs a bank has in order to manage one dollar in assets. Overheads are compositions of a bank's operating expenses; they directly refer to a bank's profits. Overhead per unit assets is an important measurement for bank management efficiency. The more overheads/assets a bank has, the lower should be its profitability. Its coefficients are therefore expected to be negative.

LNTA: The natural logarithm of bank total assets. It adjusts for size differences in the aforementioned relationship between the profitability control measures and profitability. The relationship between bank size and bank profitability, however, is not clear-cut. Keeping other factors unchanged, a bigger bank could either have a higher profit due to its larger market power and greater possibility for scope economy, or have a lower profit owing to difficulties in management and internal control. Therefore, the coefficient could be positive or negative, depending on which one of these two forces dominates.

Competition: Competition influences bank profitability because inadequate competition gives a bank a certain monopoly to charge more for its products. We divide our 620 sample banks into 12 Federal Reserve districts, according to the state they register in. The competition variable is then calculated for each district, defined by population number per bank (equaling the total population in one FED district divided by the number of total FDIC registered banks in this district). A lower average population per bank suggests a strong competition among local banks. This will reduce bank profitability. We therefore expect the coefficients of competition variable to be positive in regressions for both ROA and ROE.

4.3.2 Estimation results and discussion

In the current subsection we present the results of the linear analysis of the impact of various securities activities on bank profitability, measured by both ROA and ROE. Indeed, the estimated results - especially the signs of the three explanatory variables - are very similar in the regression of ROA and ROE, thus enhancing the results' credibility..

Table 2 illustrates the results of the regressions on bank profitability. Generally speaking, it suggests that a bank's securities trading enhances bank profitability, but finds the profitability effects of securities underwriting activities and fiduciary activities to be negative. Coefficients of year dummies are presented in the appendix.

We find coefficients in the ROE regression to be typically much larger than coefficients in the ROA regression. This, however, is fully understandable. Since banks have very small equity/asset ratios (averagely 10% for our sample banks), the ROE are also averagely 10 times larger than ROA. This difference has an impact on the absolute value of the coefficients in the ROE and ROA regression, but does not affect the economic meaning of the regression.

In general, the coefficients in ROA regression and ROE regression are similar in signs and significance, which makes our empirical results more convincible. All 11 pairs of coefficients have the same signs for ROA and ROE; only 3 pairs of coefficients (Equityratio, Traratio, Loanratio) show different significant levels for ROA and ROE. We will provide an explanation for the difference in these three coefficients in the following discussions.

Table 2: Estimation results with time effects

	ROA (R-square=0.77)			ROE (R-square=0.49)		
	Coef.	*Std. Err.*	*t-ratio*	Coef.	*Std. Err.*	*t-ratio*
Trading securities assets ratio (traratio)	**1.45*** **	*0.41*	*3.56*	**4.98**	*5.03*	*0.99*
Underwriting fee income ratio (feeratio)	**-0.76*** **	*0.25*	*-3.04*	**-6.18** **	*3.09*	*-2.00*
Fiduciary income ratio (fidratio)	**-1.12*** **	*0.33*	*-3.37*	**-12.12*** **	*4.12*	*-2.94*
Logarithm of total assets (lnta)	-0.03*	*0.02*	*-1.68*	-0.76***	*0.24*	*-3.11*
Loan assets ratio (loanratio)	0.14	*0.12*	*1.15*	3.01**	*1.47*	*2.04*
Loan loss reserves to total assets (loanlossratio)	-	*1.80*	*-13.37*	-	*22.28*	*-11.92*

	24.04***			265.65***		
Cash assets ratio (cashratio)	-3.04***	*0.72*	*-4.24*	-32.00***	*8.88*	*-3.60*
Equity to asset (equityratio)	8.05***	*0.32*	*25.41*	0.53	*3.93*	*0.13*
Overheads per dollar assets (overheadsta)	-3.07**	*1.45*	*-2.11*	-71.58***	*18.01*	*-3.97*
Population number per bank (competition proxy, unit: thousand)	0.005**	*0.002*	*2.200*	0.086***	*0.026*	*3.300*
_cons	0.68***	*0.22*	*3.13*	16.14***	*2.68*	*6.02*

The regression suggests that securities trading activity (TRAratio) enhances profitability. Coefficients of TRAratio are 1.45 and 4.98 for ROA and ROE respectively. The impact on ROE is much greater than on ROA, due to the high equity/assets leverage in the banking industry.

However, we find the coefficient of TRAratio on ROE is much more insignificant than the coefficient on ROA. This might be due to a stricter capital requirement on trading securities. Banks, according to the Basel II Capital Requirement, should hold their equity capital in accordance with different classes of assets safety. Trading securities are exposed to short- term price volatility. Basel II therefore classifies trading account securities into risky assets categories with 100% risk weights. Thus, trading activities increase a bank's required equity, and to some extent reduce a bank's return on equity (ROE). Although trading securities have a significantly high return on assets (ROA), they tend to have very insignificant positive effects on ROE.

Various previous studies confirm our results of bank securities trading activities. Kwan (1997) studies bank holding companies (BHCs) with Section 20 subsidiaries from 1990 to 1997. Securities trading is found to have a higher ROA than banking, regardless of whether the Section 20 subsidiary is a primary or a non-primary dealer. Kwast (1989) also finds that a bank's trading account securities on average have a higher ROA than a bank's non-trading assets.

The positive profitability of securities trading could be interpreted by a bank's professional assessment of securities prices. Santos (1994) points out that banks acquire securities in the expectation of reselling them at a higher price. The profitability of securities trading activities is therefore very dependent on the bank's assessment of the value of the securities and on the market, he argues. Banks have for a long time collected credit information on various corporate clients. This information would could easily be reutilized in assessing corporate securities,

helping banks make the right decision in securities trading activities. Claessens and Klingebiel (2002), and Claessen (1998) all agree that banks enjoy informational advantages when evaluating securities.

The relationship between bank profitability and underwriting activity is found to be significantly negative. FEEratio's coefficients on ROA and ROE are -0.76 and -6.18 respectively, indicating that underwriting activity lowers a bank's profitability. Although this comes a bit as a surprise, this result is consistent with the finding of Kwan (1998) who also claims that underwriting activities lower the profitability of nonprimary banks.

The reason that commercial banks' underwriting activities do not bring about positive profits as expected might be the high barriers to entering and competing in the underwriting field. Pugel and White[57] (1985, p. 112) suggest that barriers to entering the underwriting market are substantially high. The key aspects appear to be personnel and reputation. A commercial bank, as a new entrant of the underwriting playfield, must prove to its clients that it is able to design and price the issues, and to form a syndicate in order to manage a successful distribution. Much depends on the quality of personnel, especially on their expertise and capability in corporate finance advising. People with this expertise are limited in number. An entrant may have difficulties luring them away from the established firms to participate in its own, relatively risky operations. The entrant also faces a marketing-based barrier, because the established firms already have a reputation and track record, whereas the entrant's capabilities are relatively untested.

Besides, the structure of syndicates might also enhance barriers in the underwriting industry. Syndicates are widely adopted in both debt and equity underwriting in the US (Walter, 1994). The issuers choose a leading underwriter as syndicate manager. The syndicate manager is then responsible for organizing a group of investment banks to jointly undertake the issue, setting underwriting spreads and sharing underwriting fees. A syndicate manager may not invite new

[57] Thomas A. Pugel and Lawrence J. White, An Analysis of the Competitive Effects of Allowing Commercial Bank Affiliates to Underwrite Corporate Securities, Chapter 5 in "Deregulating Wall Street", edited by Ingo Walter, Press John Wiley & Sons, 1985.

commercial banking entrants to join the syndicate, thus effectively shooing new entrants away from the market. Commercial banks may face difficulties and high costs to break into the syndicated underwriting group, if they do not have strong customer relationships with the issuers or keep versatile marketing ties with the syndicate managers. All these barriers could result in highly expensive operating costs for a bank's underwriting activities. Most small banks whose income is not high enough to compensate these costs would experience difficulties in making a profit from underwriting activities.

Fiduciary activities (FIDratio) also lower a bank's profitability. A one percent increase in fiduciary activities brings down the bank's ROA 1.12%. The finding is in accordance with DuBay (1993)[58]. He claims that banks are dragged into offering funds by a need to serve longstanding customer relationships, rather than by aiming at a higher profitability. Various other studies also suggest that banks tend to shrink in the fiduciary industry (Comizio and Hare, 2004; LoBue industry research 1998; Investment Company Institute Annual Report 2000—2005).

A possible explanation for the negative profitability consequences of fiduciary activities might be the stringent regulation in this field. Regulators and academic personae have long been concerned about the potential conflict of interests in a bank's fiduciary activities (see Tillmann 1986; Saunders 1985; Kroszner and Rajan 1992, Walters 1994). A good example of this is that banks may "dump" unwanted securities into fiduciary accounts, given that banks have difficulties selling these securities to outsiders. To avoid such conflicts of interests, numerous juristic restrictions are placed on banks' fiduciary activities in the US by federal and states laws[59]. Besides, banks involved in fiduciary activities have to accept dual supervisions from both banking regulators and securities regulators like the Securities and Exchange Commission.

Although strict regulations efficiently protect customers from a bank's potential abuse of its fiduciary power, they also put high operating costs on a bank's fiduciary activities. An example

[58] DuBay, Keith, 1993, " IBAA worries that bank rush into funds will backfire," American Banker, 158 (September 23), pp.15 and 17.
[59] For a detailed discussion on these jurisdictions, see Baris (1994). Also see Herman (1980) for a full discussion of all regulatory approaches to conflicts control.

is the bank fiduciary capacity examination rules by the Securities and Exchange Commission[60]. These rules require a bank to provide review over every single trust and fiduciary account, in order to demonstrate that each and every account has been "chiefly compensated".[61]. A survey by the Federal Reserves[62] finds that a moderately sized bank trust department may have around 10,000 separate trust and fiduciary accounts, whereas a large trust department may have more than 100,000 such accounts. Therefore, the account-by-account approach imposes significant burdens on a bank. Banks must adopt a highly expensive system in order to track their fiduciary activities through each individual account. Those banks whose fiduciary incomes are not high enough to compensate these costs suffer losses.

As a result of the high operating costs imposed by the complex regulatory requirements, banks are increasingly losing their market share in trust and fiduciary activities. Surveys find that in 1990, banks used to take 65 percent of the market share in the US trust and fiduciary industry while this share dropped to 40% in 1996 and to 30% in 2004[63]. Comizio and Hare (2004)[64] also confirm that banking institutions tend to shrink in the fiduciary market. The number of collective investment funds at depository trust institutions has dropped 27% since 1996. The number of banking institutions with trust powers and assets under management has also decreased 20.1% since 1996, despite the pleasing market environment for the fiduciary industry in general.

Although we find no literature exploring banks' fiduciary activities, our empirical results in banks' underwriting and trading activities are consistent with conclusions of Kwast (1989) and Kwan (1998). Kwast reports that banks' trading account securities have an averagely higher ROA than banks' non-trading assets, indicating that trading securities enhance a bank's

[60] For the current version of the rules, see Securities and Exchange Commission File No. S7-12-01.
[61] Under certain conditions,the Securities and Exchange Commission may also allow an exemption from this account-by-account examination. But this can only be viewed as an exceptional rule for banks that comply with strict preconditions.
[62] Testimony of Governor Laurence H. Meyer, The securities activities of banks, before the subcommittee on Financial Institutions and Consumer Credit and the Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises of the Committee on Financial Services, US House of Representatives, August 2, 2001.
[63] See LoBue industry research (1998) and Investment Company Institute's Annual Report (2005).
[64] Gerard Comizio and Jeffrey L. Hare, Regulatory Development for Banks and Thrifts Conducting Trust and Fiduciary Activities, The Business Lawyer, Annual Banking Law Survey, Vol. 59, Number 3, May 2004.

profitability. Kwan finds that banks' securities trading activities result in higher profits, and that banks' underwriting activities lower a bank's profits or leave profits untouched, depending on different bank groups.

Our empirical results help explain the reason why previous studies have mixed results on banks' securities activities profitability. Since each type of securities activities has its own profitability profile, banks with a full range of securities activities may have very different profitability effects, depending on which type of securities activities dominates.

Coefficients of control variables and year dummies

The coefficients of control variables all meet their economic expectation.

Competition lowers a bank's profitability. The population number per bank has significant positive coefficients in the regressions of both ROA and ROE. This fits well with our expectation. A lower average population per bank suggests a strong competition among local banks, which reduces bank profitability. A higher average population number per bank means more people rely on fewer banks. This implies banks have certain monopoly powers and could utilize them to reap higher profits.

Overhead per dollar assets (OVERHEADSTA), as expected, also significantly reduce a bank's profitability, measured in both ROA and ROE.

A higher equity/assets ratio significantly increases a bank's ROA, but, as anticipated, has insignificant effects (0.53, t-ratio=0.13) on a bank's ROE.

As expected, we see non-earning assets like cash bring down bank profitability. Coefficients of CASHratio to ROA and ROE are both significantly negative.

Loans significantly increase a bank's ROA and ROE. As we have anticipated, the coefficients of the loan loss reserves ratio exhibit very significant negative signs. This clearly illustrates the deductive effects of loan loss reserves on bank profitability.

Bank size, measured by the logarithm of a bank's total assets, reduces bank profitability significantly. Its effect on a bank's ROA is -0.03 (p-value 0.06) and on a bank's ROE -0.76 (p-value 0.002). This fits with various research surveys on banking profitability. The US Treasury Department and FDIC[65], for example, suggest that the profitability of small banks has remained relatively strong and stable over the past years. They find that banks with assets under $1 billion have on average achieved higher returns on assets (ROAs) than larger banks in seven of the last ten years. Small banks operate and make decisions closer to their customers, which in that way is difficult for large banks to replicate, as suggested by the US Treasury Department. Starkmann and Meyer (2005) cite a case analysis on mega big banks like the Bank of America and Citigroup. They claim big banks often stumble into a range of regulatory complexity.[66] Hanley (2004)[67] finds that big banks are too big to manage. As banks become large and complex, they get farer away from and slower to the market. The information reporting structure becomes too complex, bureaucracy increases. Processes and departments disconnect. Units focus on achieving their own goals and often lose sight of the overall demands of the customer. Consequently, it is hard for large banks to organize themselves around customer's individual requirements and to deliver solutions and service that satisfy the customer.

For time effects we observe that the coefficients of the year dummies display deregulation effects in the period before 1997 and that they are strongly influenced by stock market cycles over the whole period. During the first half period from 1993 to 1997 the deregulation effects seem to dominate the year dummies (except for an interruption in 1995, which is very insignificant when measured by p-value), pushing the coefficients of year dummies for both ROA and ROE steadily

[65] Remarks of Under Secretary of the Treasury Peter R. Fisher to the independent community bankers of America, US Treasury, office of public affairs, May 13, 2002, PO-3090.
[66] Dean Starkman and Caroline E. Mayer, Washington Post, July 1, 2005
[67] Claude A. Hanley, Jr. ,Too big to manage: does the law of diminishing returns apply to synergies? 2004.

upwards. We interpret this with the deregulation on banks' ineligible securities activities[68], which start at the end of 1989. The deregulation effects peak in the year 1997. This is one year after the FED's take another deregulatory action in 1996, allowing bank holding companies to earn as far as 25% of their total revenue from securities activities. Deregulation actually continues and peaks in 1999 when Congress passes the Financial Modernization Act. But the stock market cycle also exerts its effects on the year dummies. The coefficients show a sudden drop in 1998, probably due to the shrinking effects caused by the Russian Default[69]. This effect lasts only very shortly; in 1999 the coefficients of year dummies pick up again and reach a high point. The upwards trend is broken in the years 2000 and 2001 with very small and even negative coefficients, probably due to the significant downfall of the stock market from 11,000 to around 7400 at end of the year 2000. The coefficients then once again rise up for the years 2002 and 2003 (the year dummy for 2004 is dropped to avoid multicollinearity), when the Dow Jones Industry Average (DJIA) comes back from a low of 7400 to around 10000.

4.4. Empirical evidence on the profitability effects of securities activities: Regression with quadratic function

In the aforementioned regression we find bank underwriting and fiduciary activities both to have negative profitability effects. Discussions suggest that banks encounter high market barriers in the underwriting industry, thus incurring high expenses imposed by complex regulatory mandates for fiduciary activities.

These discussions, however, encompass an implicit proposition: both underwriting and fiduciary activities could probably bring about profit if the banks are strong enough to generate sufficient incomes. This implies their overcoming the highly expensive costs imposed by market barriers for underwriting. On the other hand, for a bank to be strong enough to generate a high fiduciary income in order to compensate the regulatory costs could also bring about profit. Were these

[68] For detailed explanation of the 1989 deregulation on banks' ineligible securities activities from the Board of Federal Reserve System, see Chapter 1. See also 75 Federal Reserve Bulletin 192 (1989).
[69] See Jonathan Broader for further discussion on the Russian Default's influence on US markets, 1998, Salon Research Archive. Also see: Mark P. Taylor and Elena Tchernykh Branson, Asymmetric Arbitrage and Default Premiums Between the US and Russian Financial Markets, IMF staff paper, Volume 51, Number 2, 2004.

claims true, the relationship between bank profitability and FEEratio (for underwriting) or FIDratio (fiduciary activities) might follow a non-linear function: a low FEEratio or FIDratio brings down bank profitability, while a high FEEratio or FIDratio promotes it.

To test this proposition, we now include SquaFEEratio (FEEratio square) in our regression, to see whether it takes a high FEEratio to make profits. We also indiscriminatingly include SquaFIDratio (FIDratio square, for fiduciary activities) and SquaTRAratio (TRAratio square, for trading activities) as well. Other control variables stay the same as in the regression in Section 3.1.

We now augment Equation (1) in the linear regression with the square variables, to get Equation (2):

$$R_{j,t} = \vartheta_1 + \vartheta_2 * FEEratio_{j,t} + \vartheta_3 * TRAratio_{j,t} + \vartheta_4 * FIDratio_{j,t} + \vartheta_5 * (FEEratio_{j,t})^2 + \vartheta_6 * (TRAratio_{j,t})^2 + \vartheta_7 * (FIDratio_{j,t})^2 + \vartheta_8 * X_{j,t} + \vartheta_9 * T + \varepsilon_{j,t}$$

(2)

Estimation Results and Discussion

The estimation results are presented in Table 3. Coefficients of year dummies are presented in the appendix.

Table 3: Regression with interaction effects between bank size and securities activities

	ROA (R-square=0.77)			ROE (R-square=0.49)		
	Coef.	*Std. Err.*	*t-ratio*	Coef.	*Std. Err.*	*t-ratio*
Trading securities assets ratio (traratio)	**0.27**	*0.89*	*0.31*	**-13.27**	*11.00*	*-1.21*
---------- TRAratio Square	**2.91**	*1.93*	*1.51*	**45.14***	*23.98*	*1.88*
Underwriting fee income ratio (feeratio)	**-1.93*****	*0.60*	*-3.24*	**-17.91****	*7.40*	*-2.42*
---------- FEEratio Square	**3.04****	*1.31*	*2.33*	**30.70***	*16.21*	*1.89*
Fiduciary income ratio (fidratio)	**-4.41*****	*0.75*	*-5.84*	**-48.00*****	*9.36*	*-5.13*
---------- FIDratio Square	**6.27*****	*1.28*	*4.90*	**68.79*****	*15.86*	*4.34*
Logarithm of total assets (lnta)	-0.04**	*0.02*	*-2.05*	-0.83***	*0.24*	*-3.41*
Loan assets ratio (loanratio)	0.14	*0.12*	*1.14*	3.01**	*1.47*	*2.04*
Loan loss reserves to total assets (loanlossratio)	-23.64**	*1.80*	*-13.1*	-260.75**	*22.30*	*-11.69*

	*		5	*		
Cash assets ratio (cashratio)	-2.59***	0.72	-3.60	-27.42***	8.95	-3.07
Equity to assets (equityratio)	7.98**	0.32	25.26	-0.32	3.92	-0.08
Overheads per dollar assets (overheadsta)	-4.01***	1.46	-2.74	-81.18***	18.14	-4.47
Population number per bank (competition proxy, unit: thousand)	0.005**	0.002	2.200	0.087***	0.026	3.330
_cons	0.89***	0.22	4.01	18.36***	2.76	6.64

A bank's underwriting activities have a significantly positive square relationship with bank profitability. The minimum value of this square function is 31% for ROA and 30% for ROE[70]. If a bank's FEEratio is beyond 30%, the profitability slides down with expanding underwriting activities. Only after this 30%-threshold, a bank's underwriting activities begin to promote its profitability. In our data set, only 26 bank holding companies (BHCs) out of the total 620 BHCs successfully climb above this threshold. All other 96% of banks lie below the threshold. The quadratic function means that after crossing the threshold, bank profits rise overproportionately to underwriting incomes. This might be due to the improved market position, that is, a better position in the underwriting syndicate and a wider client network to facilitate its underwriting.

Thus, the findings implicate a concentration potentiality in bank underwriting activities. Most small banks have to either contract their underwriting activities, or suffer from losses. Only very small numbers of "top players" make a profit and survive[71]. Previous studies confirm our findings. Pugel and White (1994) suggest that US securities underwriting is dominated by about

[70] By taking the first order condition, we can calculate this inflex point through the coefficients of Feeratio and SquaFeeratio:
ROA= 3.04* SquaFeeratio- 1.93*Feeratio +(effects of other control variables and constant)
ROE= 30.70* SquaFeeratio- 17.91*Feeratio +(effects of other control variables and constant)
The F.O.C. provides the inflex point: 1.93/(3.04*2) =31% for ROA, and 17.91/(30.70*2)=30% for ROE.
However, it might be important to understand that the inflexion point is not the same as the break-even point. The break-even point is where the profitability of underwriting equals zero. Since we can not decide how many effects of other control variables and constants should be attributed to the underwriting activities and how many should be attributed to trading and fiduciary activities, the F.O.C provides no information about the break-even points.

[71] The "top player" here refers to the very small number of banks which lie above the threshold. They are relatively specialized in securities activities, with a higher underwriting income ratio. In most cases, they are big-sized banks in our data set, equipped with better expertise and broader client network. Descriptive statistics also find that larger banks generally have a higher average FEEratio than smaller banks. However, some small banks could also have an FEEratio that is quite high, depending on their business strategies. Here in the paper we focus on the banks' securities activities income ratio threshold, not on the bank size. The relationship between bank size and their specialization in securities activities, however, could be another very interesting topic. Kwan 1997 has done some valuable work in this field. The same goes for FIDratio and TRAratio.

20-25 large investment banking firms. Heyal, Spence and Marks (1983)[72] explore the average concentration in securities underwriting. They find the first 15 firms to hold 89% of market shares in US negotiated securities underwritings, as well as 85% of market shares in competitive-bid underwriting.

In the light of fiduciaries, the results indicate that a bank's fiduciary activities exhibit a positive square function in relation to bank profitability. The inflexion point of the square function lies at 35% for ROA and 34% for ROE[73]. Thus, most banks whose fiduciary incomes count for less than 34% of their total operating income, feel negative profitability effects. Only a few top banks, whose Fidratio lies above the threshold, benefit from a positive fiduciary profitability.

Similar to the results of bank underwriting activities, the findings suggest a "top player" rule in the fiduciary market. This is consistent with conclusions drawn in various studies. Kane (1995)[74] suggests that only relatively large banks have truly stampeded into fiduciary funds. He clarifies that only 1,835 banks, among a total of 12644 US banks in 1994, offer fiduciary funds. Even among this small number of banks that offer funds, most small and midsize banks essentially act only as brokers who sell funds for an unaffiliated third-party fund provider. Another survey conducted by American Banker (1996) also finds that the 100 leading banks have significantly increased their market share in the fiduciary industry over the last decades[75]. Latzko (1999)[76], Mack (1993)[77], Malhotra and McLeod (1997)[78] come to a similar conclusion.

Trading activities also share a square function with profitability. The coefficient of SquaTRAratio is significantly positive with ROE (45.14, with p-value=0.06) and nearly as

[72] Samuel L. Hayes, III, A. Michael Spence, and David Van Prang Markes, Competition in the Investment Banking Industry: Harvard University Press, 1983, Table 3,4, and 5.
[73] This inflexion is calculated through the coefficients of Fidratio and SquaFidratio: 4.41/(6.27*2) =35% for ROA, and 48.00/(68.79*2)=34% for ROE.
[74] Edward J. Kane, What is the value-added for large US banks in offering mutual funds, NBER working paper, April 26, 1995.
[75] Ranking the Banks, American Banker, 1996.
[76] David A. Latzko, 1999, Economies of scale in mutual fund administration, Journal of Financial Research.
[77] Mack, P., 1993, Recent trends in the mutual fund industry, Federal Reserve Bulletin 79, 1001-12.
[78] Malhotra, D.K. and R. McLeod, 1997, An empirical analysis of mutual fund expenses, Journal of Financial Research 20, 175-190.

significant with ROA (2.91, with p-value=0.13). The coefficients of TRAratio itself, however, are insignificant for both ROA and ROE. Starting from a statistics point of view we interpret coefficients of TRAratio as not being significantly different from zero. The threshold for TRAratio is therefore zero, too[79]. This indicates that trading activities result in a positive profitability for all banks. This conclusion is also consistent with the positive coefficients of TRAratio in Section 3.1.

The quadratic function suggests that bank profitability increases overproportionately with trading assets. The reason may lie in the concave structure of securities trading costs. Demchuk(2002)[80], Konno and Wijyanayake (2001) all suggest that the securities trading cost rate is assumed to be a decreasing step function of the trading volume. They argue that if investors trade more, they receive a transaction cost rate discount and pay a lower cost fraction for the trading volume. Madhavan and Cheng (1997) examine the upstairs market of NASDAQ for big block trading. They also find that the marginal cost of trading upstairs is significantly lower than the marginal trading cost downstairs.[81]

The quadratic model helps to further understand why previous studies show very mixed results. The profitability effects of a bank's securities activities are both sub-type dependent and level-dependent. Only when a bank's securities activities reach certain levels (the threshold), do they begin to exhibit positive profitability effects for all three kinds of securities activities. If a bank's securities activities ratio lies below the threshold, only securities trading brings about profit, while underwriting and fiduciary activities will have a negative impact on bank profitability. Since banks have various levels of securities activities, it is quite understandable that previous studies come to very inconsistent results.

[79] This threshold is calculated through a method similar of that for FEEratio and FIDratio, see page 22.
[80] Andriy Demchuk, Portfolio Optimization with Concave Transaction Costs, International Center for Financial Fiduciary and Engineering, FAME Research Paper Series, Nr. rp103.
[81] Ananth Madhavan and Minder Cheng, In Search of Liquidity: Block Trades in the Upstairs and Downstairs Markets, Review of Financial Studies,vol. 10, no. 1 (Spring 1997):175–203.

The empirical findings of the quadratic model came up very recently but still have some linkage to previous studies. Although no previous literature uses nonlinear regression as we do, we find one author (Kwan 1998) using categorized regression. This categorized regression also distinguishes between banks with higher securities activities ratios and those with lower ones. Although Kwan does not mention a bank's fiduciary activities, his conclusion fits our findings in both underwriting and trading activities.

Kwan divides his sample bank holding companies into two groups: Primary dealers and non-primary dealers. Primary dealers engage in many more securities activities than non-primary dealers. The average securities underwriting ratio is 19.13% for primary dealers and 0.94% for non-primary dealers. The mean trading securities to banking assets ratio is 29.97% for primary dealers but only 1.02% for non-primary dealers. Kwan reports that securities trading activities of bank holding companies have a higher ROA than their commercial banking activities, regardless of the banks being primary securities dealers or not. Therefore, his findings essentially confirm our conclusion that trading activities result in a positive profitability for all banks. Kwan also reports that securities underwritings performed by non-primary dealers have a lower ROA than commercial banking activities, and that underwritings by primary dealers have a similar level of return to commercial banking. Since primary securities dealers have a much higher securities activities ratio than the non-primary dealers, Kwan's conclusion is consistent with our findings that underwriting lowers bank profitability if the FEEratio is small. Only banks whose FEEratio is high enough can reach their break-even point or gain a positive profitability from underwriting.

4.5. Conclusion

In this paper we present evidence on the profitability effects of a bank's expansion into investment banking activities. Bank securities activities are categorized in three types according to their different characteristics.

The empirical section creates panel data models of the effects of a bank's securities activities on bank profitability. 620 US bank holding companies in the US were examined between 1993 and

2004. Linear regression suggests that securities trading (TRAratio) enhances bank profitability significantly. For their part underwriting (FEEratio) and fiduciary (FIDratio) activities reduce bank profitability. We argue that high market barriers restrain a bank's underwriting profitability. Fiduciary activities suffer from regulatory complexity, which imposes heavy costs on banks. Only securities trading seems to reap profit for banks, thanks to the banks' professional assessment of financial products.

A further non-linear regression finds a positive quadratic relationship between bank profitability and FEEratio, FIDratio, and TRAratio. Only above a certain threshold, the fiduciary and underwriting activities begin to promote bank profitability. This implies a "top player" rule in bank securities activities. Only a very small number of banks who generate a sufficient income from securities activities can enjoy a high profitability. All other banks whose securities activities income is not high enough to cover the high costs have to be cautious when stepping into the securities market.

These findings suggest that the profitability effect of a commercial bank's expansion into the securities market is sub-type dependent. Mixing all these different sub-types together, like previous literature typically does, might thereby result in a severe bias.

Appendix:

Panel regressions of three types of investment banking activities on bank profitability

	ROA		ROE	
	Linear regression (with timeEffects)	Non-linear regression (with timeeffects)	Linear regression (with timeEffects)	Non-linear regression (with timeeffects)
	(R-square=0.77)	(R-square=0.77)	(R-square=0.49)	(R-square=0.49)
Trading securities assets ratio (traratio)	**1.45*** **	**0.27**	**4.98**	**-13.27**
----------TRAratio Square	**-----**	**2.91**	**-----**	**45.14***
Underwriting fee income ratio (feeratio)	**-0.76*** **	**-1.93*** **	**-6.18** **	**-17.91** **
---------- FEEratio Square	**-----**	**3.04** **	**-----**	**30.70***
Fiduciary income ratio (fidratio)	**-1.12*** **	**-4.41*** **	**-12.12*** **	**-48.00*** **
---------- FIDratio Square	**-----**	**6.27*** **	**-----**	**68.79*** **
Logarithm of total assets (lnta)	-0.03*	-0.04**	-0.76***	-0.83***
Loan assets ratio (loanratio)	0.14	0.14	3.01**	3.01**
Loan loss reserves to total assets (loanlossratio)	-24.04***	-23.64***	-265.65***	-260.75***
Cash assets ratio (cashratio)	-3.04***	-2.59***	-32.00***	-27.42***
Equity to asset (equityratio)	8.05***	7.98**	0.53	-0.32
Overheads per dollar assets (overheadsta)	-3.07**	-4.01***	-71.58***	-81.18***
Population number per bank (competition proxy, unit: thousand)	0.005**	0.005**	0.086***	0.087***
_cons	0.68***	0.89***	16.14***	18.36***
y1993	0.09	0.06	1.59**	1.36*
Y1994	0.09*	0.06	1.68***	1.37**
Y1995	0.04	0.01	0.70	0.46
Y1996	0.12***	0.10**	1.79***	1.55***
Y1997	0.15***	0.13***	2.15***	1.96***
Y1998	0.09**	0.07*	1.29***	1.15**
Y1999	0.10***	0.09**	1.56***	1.46***
Y2000	0.04	0.03	1.19***	1.13***
Y2001	-0.02	-0.02	0.40	0.33
Y2002	0.07**	0.06**	1.11***	1.03***
Y2003	0.05	0.04	0.71*	0.64
Y2004	(dropped)	(dropped)	(dropped)	(dropped)

Chapter 5 The effect of securities activities on risks of US public listed banks

5. 1. Introduction

Bank risk is one of the most vigorously discussed topics when arguing the consequences of securities activities, given the unique role of banks in the monetary system. Commercial banks offer continuous access to liquidity by jointly supplying deposits and loans. When financial turbulences occurred outside the banking system, they could be controlled as long as banks were in a position to support the liquidity needs of other financial institutions. When commercial banks are now allowed to set their feet into the field of securities activities, however, shocks from the securities market could directly hit the commercial banks themselves. These fall-outs might shrink the liquidity supply of the whole financial system and jeopardize financial stability.

The purpose of this paper is to empirically analyze the effects of commercial banks' expansion into securities activities on banks' risks. The analysis is based on micro level data on 436 public listed US bank holding companies dating from 1993 to 2004. We derive three risk dependent variables to measure banks' total risk, market risk and interest rate risk, and regress them on banks' various securities activities. The empirical study finds evidence of the risk reduction effects of banks' engagement in various securities activities. The results are interesting in that they find these securities activities to affect various kinds of banks' risks in different ways. This indicates that an appropriate combination of these activities could serve as a useful instrument in bank operations, helping bank managers to adjust banks' risk exposure accordingly.

Over decades, a rich array of literature has been published, debating the rationality of the old regulation to separate and the proposal of current legislation to integrate commercial and investment banks. On the one hand, it is widely argued that an expansion into the securities business may increase the risks banks may face, because securities activities are inherently riskier than traditional commercial banking activities (See Boyd and Graham, 1986; Boyd, Graham, and Hewitt, 1993, Wall 1993). A bank may become exposed to the losses of its securities affiliates, particularly if the firewalls are not adequately enforced. On the other side,

however, another body of evidence points out that banks conducting securities activities may benefit from diversification. Some literature reports a low or even negative correlation between returns from commercial banking and securities activities, suggesting that banks providing securities services tend to have a broader and more stable income base than "narrow" banks with a sole commercial banking product(see Kwan and Ladermann 1999, Eisenbeis and Wall 1984 et.al).

Both sides of the argument have been supported by empirical literature. This leads to a puzzle as to why the empirical results are not generally uniform on the same question. We presume that one important reason comes from the complex nature of securities activities of banks which in the current study we divide into securities trading, underwriting and fiduciary activities. We believe that a clear classification helps to examine in detail the exact effects of each individual securities activity, and to provide better policy implications.

The methodology of our empirical model has its roots in two strands of modern literature, utilizing various risk measures to investigate the effects of commercial banks' expansion into securities activities on bank risks.

The first strand of literature uses a variation of bank returns to measure bank risk. The standard deviation of ROA, the standard deviation of ROE, and the standard deviation of stock returns are among the most widely adopted risk measures. Wall and Eisenbeis (1984), Litan (1985), and Wall et al. (1993) report that the levels of both earnings and cash flows in the securities industry exhibit a higher degree of variability than in the banking industry. Boyd et al. (1988, 1993) and Walter (1994) report that securities firms have a higher variance of ROE than banking firms.

The second strand of literature uses the market beta to measure risk, which is the coefficient of regressing bank stock return on the market portfolio according to the Capital Asset Pricing Model (Sharpe and Lintner, 1972). Stone (1974) expands the Sharpe-Lintner asset pricing theory into a two-factor model, adding the interest rate index as the second risk factor. This helps to examine both the market beta and interest rate beta, the latter of which captures the interest rate

risk as a special characteristic of financial institutions. Flannery and James (1984a, 1984b), Neuberger (1992), Choi and Elyasiani (1996) all report that the inclusion of an interest rate factor adds substantial explanatory power when examining the stock movement of financial institutions.

Both strands of literature provide good methodology in their sense. The first kind is widely adopted as it is both simple to use and comprehensive in economic meaning. The standard deviation of banks' stock return provides information for bank risk in a comprehensive meaning, covering market risk, interest rate risk and even other risks that are not clearly classified. However, the second strand of literature decomposes banks' total risk into market risk and interest risk, so that we can keep better track of each specific risk.

In our model we use both methodologies. We calculate both a bank's total risk, as measured by bank stock return deviations, and a bank's market risk and interest rate risk, decomposed through the two-factor model. This allows us to fully analyze and understand the total and each specific risk. We then regress these three risk measures on banks' different types of securities activities. This way, we follow the former literature in their risk measures, but develop them a step further by examining the different risk effects of each individual securities activity respectively.

This methodology, however, has the disadvantage that it restricts the data sample to public listed banks. Since the calibration of stock return variation and of market beta are dependent on the monthly stock return data which is only available from a limited number of public listed banks, previous literature is basically built on relatively small samples. Flannery and James (1984b) for instance release a sample with only 67 banks contrary to the thousands of banks in the US. Neuberger (1992) also only works with 119 banks.

Therefore, it is positive that the current study provides 436 sample bank holding companies. The sample accounts for more than 70% of the total 620 bank holding companies collected by Bankscope from 1993 to 2004. To the best of our knowledge, this is the largest sample in existing banking studies using stock market data.

The rest of the paper is organized as follows. Section 5.2 presents the data sources. Section 5.3 provides the two econometric models in the study, while results of the estimations are discussed in Section 5.4. Section 5.5 follows up with the conclusion.

5.2. Data sources

The data set consists of 436 US bank holding companies from 1992 to 2004, based on the combination of the databanks Bankscope and Datastream. Indeed, Bankscope (Version 2002—2005) covers a total of 620 US bank holding companies, but only 436 among them are public listed. Datastream provides monthly stock data of all these listed banks, and the annual financial statement data is delivered by Bankscope. Besides, Datastream also provides other financial data, like the interest rate and the stock market indices.

In the regression we use the banks' three risk exposures as dependent variables. They are total risk, market risk and interest risk, calculated on the basis of the banks' monthly stock return. The total risk is measured by standard deviation of the banks' monthly stock return; the market risk and interest risk are calculated through a two-factor model, by regressing the banks' monthly stock return on the stock market return and interest rate change, as illustrated in Section 3. The bank stock return is calculated on the basis of composite return, that is, a combination of the stock dividend yield and the capital gains from bank stock price fluctuation. In the regression we use the Wilshire 5000 Index as a proxy for the stock market index, and 1 year Constant Maturity Treasury (CMT) interest rate as the interest rate index. Both of these indices are provided by Datastream.

We calculate the three risk measures on the basis of two-year period rolling windows, so that we have 24 monthly stock return observations for each rolling window regression per bank. We employ bank stock return data in Datastream from the year 1992 to 2004, altogether 13 years for 12 rolling windows, that is, the years 1992—1993 construct the 1st rolling window, years 1993—1994 the 2nd rolling window, and so on. The three risk measures are calculated for each bank in each rolling window, enabling us to obtain a panel with 12*436 observations for each risk

measure. The panel is unbalanced, however, since not all banks are listed during all 12 rolling windows.

We then regress the three risk measures on the annual data of balance sheet ratios and income statements, to examine how securities activities impact on banks' risk exposure. We draw out 12 years of data from Bankscope for the 436 banks dating from 1993 to 2004, which also provides an unbalanced panel of 12*436. The risk betas of each rolling window are regressed on banks' securities activities in the last year of that window, that is, risk betas of the 1st window (1992-1993) are regressed on bank data of the year 1993. This is based on the understanding that stock returns in the early months of the window have already incorporated rational expectations as to a bank's operation in a later period of the window.

The three explanatory variables describing the banks' three types of securities activities are: *FIDratio* (banks' fiduciary income over total operating income) to measure fiduciary activities; *FEErati*o (banks' underwriting fee and commission income over total operating income) to measure underwriting activities; and *TRAratio* (banks' trading securities assets over total assets) to measure securities trading activities. A group of control variables is also included in the regression. They are basically banks' assets, liabilities and income terms, which have non-negligible effects on the banks' risks. The P/E ratio (price to earning) is also included as a control variable.

Table 1 delivers an overview of the variables in our empirical model. The data is rounded to two decimals. Any data which is smaller than 0.005, is shown as 0 in the table.

Table 5- 1: Descriptive statistics of dependent and independent variables:

Variable	Mean	Std. Dev.	Min	Max
Interest rate (%)	4.51	1.82	1.07	8.56
Wilshire 5000 Index	8045.21	3423.80	2856.92	14329.94
r_m (Percentage change of stock market index, in %)	0.68	4.04	-12.83	11.78
r_{int} (Percentage change of interest rate, in %)	-0.30	7.31	-32.25	26.30
r_i (monthly stock return of banks, in %)	1.10	11.87	-550.13	529.83
Fidratio (fiduciary income over total operating income)	0.05	0.07	0.00	0.67

Feeratio (underwriting fee and commission income over total operating income)	0.08	0.06	0.00	0.86
Traratio (trading securities assets over total assets)	0.02	0.05	0.00	0.42
Lnta (logarithm of total assets)	7.60	1.70	4.09	14.21
Patio (P/E price to earning ratio)	15.76	28.25	-534.10	362.60
Liquidratio (liquid assets over total assets)	0.09	0.09	0.00	0.71
Loanratio (total loan to total assets)	0.62	0.13	0.00	0.92
Loanlossratio (deducted loan loss reserves to total assets)	0.004	0.004	0.00	0.062
ddratio (demand deposits over total liabilities)	0.16	2.25	0.00	1.00
Mmfratio (money market funds liabilities over total liabilities)	0.09	0.09	-0.08	0.80

The average monthly return of bank stock is 1.1%, indicating an annual return of nearly 13%. The monthly stock market return is 0.68%, which brings about more than 8% of the annual yield. Although this high yield appears to be unexpected, it is consistent with empirical studies of the US stock market. Bernanke (2003)[82] shows that the US equity market provides a pretty high return as risk premiums, thus justifying the reported high return in our sample. The average interest rate with 1 year maturity is 4.52%.

We find that the average loan ratio is 0.62, indicating that credit lending is still the most important banking activity. The average loan loss ratio is 0.004. It accounts for less than 1% of the total loan, implying the credit risk of lending activities of US banks stays at a relatively low level. Deposits account for 85% of the total liability of banks, among which demand deposits come to 16% on average and time deposits make up 69% of the total liabilities. Among the three types of securities activities, underwriting activities are the most important. Banks earn almost 8% of their total operating income from underwriting activities, through both private placement channels in local markets and public offering channels in national stock markets. This amounts to even more than the aggregate trading securities (2%) and fiduciary activities (5%).

5.3. Risks effects of securities activities: Econometric models

The current study utilizes two models to regress the three risk exposures on banks' securities activities: Model 5.3.1 explores the impact of securities activities on banks' total risk, measured

[82] Federal Reserve Governor Ben S. Bernanke, Remarks at the Fall 2003 Banking and Finance Lecture, Widener University, Chester, Pennsylvania, October 2, 2003

by the standard deviation of the banks' monthly stock return. Model 5.3.2 examines the banks' market risk and interest rate risk, calculated through a two-factor model proposed by Stone (1974).

5.3.1 Total risk regression

The model, as defined in Equation (1), is used to test the impact of securities activities on the banks' total risk. The dependent variable is the standard deviation of bank stock return, which is used to measure total risk of banks. The total risk is regressed on the three types of securities activities and a group of control variables.

$$\sigma_{j,t} = \eta_1 + \eta_2 * TRAratio_{j,t} + \eta_3 * FEEratio_{j,t} + \eta_4 * FIDratio_{j,t} + \eta_5 * X_{j,t} + \eta_6 * T_t + \xi_{j,t} \quad (1)$$

where we introduce:

$\sigma_{j,t}$ as the variation of stock return for bank j in period t, denoting the banks' total risk;

$TRAratio_{j,t}$ denotes a bank's trading securities assets over the total assets for bank j in period t;

$FEEratio_{j,t}$ denotes a bank's gross underwriting fee and commission income over the total operating income for bank j in period t;

$FIDratio_{j,t}$ denotes a bank's gross fiduciary income over the total operating income for bank j in period t;

$X_{j,t}$ is a vector of control variables on the individual bank level;

$T_{j,t}$ is a group of year dummies catching time effects from the years 1993 to 2004;

$\xi_{j,t}$ as the error term.

5.3.2. Market risk and interest rate risk regressions

There is, however, a problem arising from the total risk regression: Bank risk consists of both stock market risk and interest rate risk. If, for example, securities activities increase one of these two risks and decrease the other, the composite effect of these two forces on the banks' total risk is quite ambiguous. The empirical result of regressing the bank's variance of returns on its securities activities may thus seem to be very insignificant. Therefore, in this section we decompose bank risk into market risk and interest rate risk. This helps us to track down the two important specific risks of banks, and to make up for the deficiency of the total risk model.

The model is defined by the following three equations. Equation (2) decomposes the banks' risk into market risk and interest risk by employing a two-factor model, calculating the stock market risk beta and interest rate risk beta for each bank j in period t. Equations (3) and (4), respectively, further examine the impact of securities activities on these two risks.[83]

Equation (2) is built on the two-factor model proposed by Stone (1974) and Stover (1977). They expand the single-factor market index asset pricing model of Sharpe and Lintner (1972) by adding an interest rate factor to the model. Empirical research has found that the inclusion of an interest rate risk factor adds substantial explanatory power to bank stock movement. Since banking institutions usually function by borrowing funds and lending them out to earn the interest spread, the interest rate risk is widely regarded as one of the most important risks faced by banks, as pointed out by various studies (Flannery and James 1984a, 1984b; Merton and Bodie 1998; Mishkin 1995 and 1998.). The current study therefore follows the two-factor model to decompose bank risk into market risk beta and interest rate risk beta, and then examines the two betas accordingly.

[83] Thus, the model essentially consists of a two-stage regression. In the first stage, Equation (2) calibrates the two risk betas, and in the second stage, Equations (3) and (4) regress the risk betas on banks' securities activities.
The methodology of a two-stage regression is sometimes criticized as it introduces the measurement error of the first stage into the regression of the second stage, hence lowering the accuracy of the regression. A two-stage regression, however, is in many cases more informative than a single-stage regression, and is therefore widely adopted in banking research literature (for example, Flannery and James 1984a, 1984b; Choi and Elyasiani 1996; Gallo, Apilado and Kolari 1996, 1997).

The two-factor model, however, faces a possible multicollinearity problem between stock market movement and the change of interest rate. Various studies report that changes of interest rate can move asset prices, including stock prices, at least during short periods. This indicates a possible interaction between r_m and r_{in}, which could introduce a bias into our regression. Estimating the size and duration of these effects, however, we find no straightforward relationship between interest rate change and stock market.[84] Because traders in stock markets generally have rational expectations, any interest rate change that is widely anticipated will already have been taken into the stock prices' account and will elicit little reaction when it really happens. Further reflection on our data set also denies the multicollinearity between stock market return and interest rate change: the correlation between r_m and r_{in} is only 10%, enabling us to ignore the multicollinearity without causing bigger problems to our calculations.[85]

$$r_{j,tc} = \alpha_{j,t} + \beta_{1j,t} * r_{m,tc} + \beta_{2j,t} * r_{in,tc} + \varphi_{j,t} \quad (2)$$

$$\beta_{1j,t} = \theta_1 + \theta_2 * TRAratio_{j,t} + \theta_3 * FEEratio_{j,t} + \theta_4 * FIDratio_{j,t} + \theta_5 * X_{j,t} + \theta_6 * T_t + \psi_{j,t} \quad (3)$$

$$\beta_{2j,t} = \gamma_1 + \gamma_2 * TRAratio_{j,t} + \gamma_3 * FEEratio_{j,t} + \gamma_4 * FIDratio_{j,t} + \gamma_5 * X_{j,t} + \gamma_6 * T_t + \upsilon_{j,t} \quad (4)$$

where, in addition to the notations in Equation (1),

$r_{j,tc}$ denotes the stock return of bank j in month c in period t;

$r_{m,tc}$ denotes the market return in month c in period t;

[84] Federal Reserve Governor Ben S. Bernanke, Remarks at the Fall 2003 Banking and Finance Lecture, Widener University, Chester, Pennsylvania, October 2, 2003

[85] Here we follow Maher (1997), who suggests that the simultaneity problem can be ignored if the correlation between the two indices is below 30%. See Maher, Matt (1997), Bank Holding Company Risk from 1976–1989 with a Two-Factor Model, Financial Review **32** (2), 357-371.

$r_{in,tc}$ is the change of interest rate in month c in period t;

$\beta_{1j,t}$ is the sensitivity of bank stock return to the market return for bank j in year t, denoting the bank's market risk beta;

$\beta_{2j,t}$ is the sensitivity of bank stock return to the interest rate change for bank j in year t, denoting the banks' interest risk beta;

$\varphi_{j,t}$, $\psi_{j,t}$, $\upsilon_{j,t}$ are error terms.

The two risk factors in Equation (2), r_m and r_{in}, are the percentage change of stock market index and the change of interest rate. In the choice of the stock market index, we use the Wilshire 5000 Index, a market capitalization-weighted index that includes virtually all stocks traded in the US. The Wilshire 5000 is considered to be the most broad-based domestic market proxy available (Radcliffe, 1994, p. 105). The reason why we choose the Wilshire Index instead of the Dow Jones Index lies in the fact that the 436 sample banks are listed in various stock exchanges like the New York Stock Exchange, the American Stock Exchange, the Nasdaq National Market as well as in local stock exchanges countrywide. So the Wilshire Index is used as a proxy for a composite market index of all sample banks in the US. To choose the interest rate proxy we follow Flannery and James (1984b) to adopt the Treasury Constant Maturies 1-year interest rate[86].

The coefficient of the market return, $\beta_{1j,t}$, measures the sensitivity of bank stock to the movement of the stock market. It is a proxy for the banks' exposure to market risk[87]. The coefficient of the interest rate term, $\beta_{2j,t}$, measures the return of a bank's stock to changes in interest rates,

[86] Stone (1974), Flannery and James (1984b) point out that time characteristics of interest rates can have an impact on the calibration of the interest rate beta. Utilizing very short term interest rates (like 1-month interest rates) and very long term interest rates (up to 7-year interest rates) might bring about different results. A 1-year interest rate is seen as a compromise in between.

[87] For a detailed illustration of the Capital Asset Pricing Model and its two-factor expansion, see Sharpe and Lintner (1972), and Stone (1974).

controlling for changes in the return on the market. In that sense it can be interpreted as a measure of a bank's interest rate risk exposure. $\beta_{1j,t}$ and $\beta_{2j,t}$ are also known as the co-movement of an individual bank's stock and stock market index or stock and interest rate index, respectively. Stone (1974) argues that the market risk beta $\beta_{1j,t}$ can be given by Cov (r_j, r_m)/ Var(r_m) and the interest rate risk beta $\beta_{2j,t}$ by Cov (r_j, r_{in})/ Var(r_{in}) respectively. [88]

5.3.3. Explanatory variables and control variables

The above discussed two models have utilized three risk dependent variables: banks' total risk, $\sigma_{j,t}^2$, which is the variation of banks' ROA; banks' market risk $\beta_{1j,t}$; and banks' interest risk $\beta_{2j,t}$. To examine the relationship between the three bank risks and the various securities activities, we employ the proportions of the following securities activities in the total spectrum of bank operations as explanatory variables. Several control variables are also included, to increase the explanatory power of the regression. These explanatory variables and control variables are:

TRAratio: To estimate the impact of securities trading activity we include as a regressor the assets ratio of a bank's securities trading, defined as the ratio of a bank's trading securities over total assets (*TRAratio*). Trading securities refer to securities that are acquired for the purpose of selling in the near term or otherwise with the intent to resell in order to profit from short-term price movements[89]. This includes trading securities held by the banks themselves and their consolidated subsidiaries.

[88] Betas would be either positive or negative. A positive market risk beta states that a bank's stock moves in the same direction as the whole stock market; while a negative market risk beta means that when the stock market index goes up as a whole, the individual bank stock declines, due to various bank characteristics. Similarly, a negative interest rate beta denotes that when interest rates rise up, bank stocks suffer from a lower return. The value of the betas, however, does not necessarily correspond to the riskiness of bank stocks. A small beta value could indicate a very high risk sensitivity, if the beta goes way down into the negative domain. Based on this argument, Hirtle (1996) suggests using the absolute value of beta instead of beta itself. However, most literature still utilizes beta itself as the risk measurement, because it provides clear information on the direction and extent of the co-movements of an individual bank stock and its indices. See, among others, Flannery and James (1984a, 1984b), Choi and Elyasiani (1996); Gallo et al. (1996, 1997).

[89] Banks report their trading securities each year in their financial statements. According to the regulations of Federal Reserve banks, a bank should determine whether it intends to hold an asset for trading when a security or other asset is acquired. Nevertheless, there might be some speculation as to defining trading securities. Banks may

FEEratio: On the effects of underwriting, the explanatory variable *FEEratio* is included, measured by the ratio of a bank's fee and commission income to the total operating income. This includes fees and commissions from underwritings (or participating in the underwritings of) securities, private placements of securities, merger and acquisition services, investment advisory and management services, and other related fees from the banks themselves and their consolidated subsidiaries. The dataset reports a zero or "missing" underwriting activity income if the bank has no income from these services and no consolidated subsidiaries that render these services.

FIDratio: The banks' fiduciary activity is measured by *FIDratio*, the ratio of fiduciary activity income to total operating income. The fiduciary activity income is the gross income from services rendered by the banks' trust department or by any of its consolidated subsidiaries acting in any fiduciary capacity. Included are commissions and fees on sales of annuities that are executed in a fiduciary capacity by the banks' trust department (or by any of its consolidated subsidiaries). The dataset reports a zero or "missing" fiduciary activity income if the bank has no trust department and no consolidated subsidiaries that render services in any fiduciary capacity.

We also include in the model a group of control variables, which we think have non-negligible effects on banks' risk exposures. Not all control variables are included in the three risk regressions. We assign different groups of control variables to the regressions of different risks, according to the specific risk characteristics of the control variables.

Lnta: the natural logarithm of a bank's total assets, adjusting for size differences in bank risk. On the one hand side, large banks have a better potential to diversify, which makes them stable. But on the other side, large banks sometimes invest too riskily, as they believe in the "too big to fail"

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define some assets as trading securities with the intent to resell them soon. But in certain cases, unexpected price movements might force a bank to keep these securities longer than expected. However, for simplicity, we do not question a bank's reported trading securities assets, supposing that banks generally have rational expectations when defining their assets.

rule. Therefore, the coefficients of Lnta to bank risk can be either positive or negative, depending on which side dominates.

Loan ratio: To measure the impact of loan activities on a bank's market risk and interest rate risk, we use the ratio of a bank's net loans to total assets (e.g., see Brewer, 1989; Espahbodi, 1991). Bank loans are relatively illiquid and subject to higher credit risks than other assets, implying a positive relationship between Loanratio and the risk measures. The sign of the loan ratio, however, is of big complexity.

Bank loans are highly interest sensitive assets. Yet the relationship between Loanratio and interest risk is not clear-cut. When the interest rate increases, the long term, fixed interest loans suffer from depreciation. However, the banks' liability-deposit also depreciates. The way in which a bank reacts to the interest risk depends on the time-structure and the relative amount of bank interest bearing asset and liability.

In light of the market risk, loans can also increase the stock market exposure of banks in that some parts of loan collaterals are marketable securities or securities-like instruments. But these collaterals are typically provided with considerable discounts, which helps to isolate banks from the stock market fluctuation. This way, the coefficients of Loanratio in the market risk regression can be indefinite ex ante.

Loan Loss ratio: The deducted loan loss reserves over a bank's total assets. The loan loss ratio is exclusively utilized in the regression of total risk: it is a proxy for credit risk and operational risk in credit lending activities. Credit risk and operational risk compose important parts of the total risk, but cannot be classified into either market risk or interest rate risk.

We understand that the loan ratio has very complex impacts on both market risk and interest rate risk. Therefore, it can display very ambiguous coefficients in the total risk regression, failing to reveal the real risk of lending activities. For this reason, the loan loss ratio is chosen as a proxy for the credit risk and operational risk in lending activities, while the loan ratio itself is a proxy

for the market risk and interest rate risk. We expect the loan loss ratio to have a significant sign in the total risk regression.

The demand deposit ratio (*DDratio*): the demand deposit over a bank's total liabilities terms. Demand deposit is typically free of interest expenses, which differs from other liabilities. Therefore, an increment of the demand deposit ratio reduces a bank's interest risk. However, the demand deposit could increase the liquidity risk, hence promoting a bank's total risk.

The money market fund liabilities ratio (*MMFratio*): the money market fund liabilities over a bank's total liabilities. This is the liabilities that a bank borrows from money market funds[90] by issuing short-term certificates.

The money market fund liabilities are borrowed by a bank on its own initiative. In this way, the money market fund liabilities are different from bank deposits, which the bank receives from the depositors in a rather passive way. Thus, money market fund liabilities provide useful instruments for a bank to actively manage its liabilities, and help to achieve a more balanced credit position in its liabilities and loan assets, which hence will lead to a lower interest rate risk.

As to market risk, we expect that money market fund liabilities increase a bank's market risk. Money market funds are institutional investors, which are essentially very similar to the institutional investors in the stock market[91]. When a bank borrows from money market funds, the funds will evaluate the bank through a professional inspection into the bank's financial statements and into all possible events affecting the bank's operation. This evaluation differs from how the individual depositors evaluate the bank, but is rather similar to the evaluation of the bank made by the stock market. This way, borrowing from the money market funds exposes the bank to a group of institutional investors which are essentially similar to the stock market investors, and therefore the bank's market risk is increased. Concerning the total risk, the

[90] Money market funds are mutual funds that primarily invest in the money market. A bank's money market liabilities are typically large CDs or negotiable large CDs, with maturities ranging from 14 days to 1 year.
[91] Mishikin (1998, p. 107) cites data from the Federal Reserve Board and points out that institutional investors dominate the US stock market.

coefficient of the MMFratio in the total risk regression would be unclear ex ante, since it consists of the effect of a negative coefficient in the interest rate risk regression and the effect of a positive coefficient in the market risk regression. However, we tend to believe that money market fund liabilities will have a positive coefficient in the total risk regression, since they also increase the liquidity risk.

P/E ratio: the price to earning ratio affects the risk of stock. A relatively high P/E ratio means that the bank's stock is evaluated on a very high level, compared with its earning ability. This high evaluation is built on optimistic expectations as to a bank's future earnings, or is due to possible speculation factors. The impacts of the P/E ratio on bank risks are two-fold: on the one hand side, stocks with lower earnings and high evaluations are relatively vulnerable to information shocks, so that the P/E ratio is expected to be positively linked to the risk measures. On the other side, highly evaluated stocks are in many cases well qualified stocks, behaving relatively stable in the market volatility. The coefficients of the P/E ratio therefore depend on an aggregate impact from both sides.

Liquid ratio: liquid assets over a bank's total assets. This includes cash, interbank lendings, dues to central banks, bills and CDs. A high liquid asset ratio could help reduce a bank's market risk, but may enhance its total risk, since liquid assets are highly exposed to inflation risks.

5.4. Estimation results and discussion

In the current subsection we present the results from the empirical analysis of the impact of various securities activities on bank risks. We first report the estimation results without time dummies, followed by the results with time dummies. We find the inclusion of time dummies substantially increases the R-square of the total risk regression, implying that the total risk is largely influenced by macro environments in various years.

Among the three risk measures we utilize, the total risk is the most comprehensive measure for catching the risk impacts of securities activities. However, the total risk is more than a simple

aggregation of market risk and interest rate risk. It also covers other risks like operational risk or default risk, which cannot be independently identified. We find that securities activities have different effects on a bank's total risk, market risk and interest rate risk. This probably implies the possibility that certain securities activities would help banks to adjust their risk structure. Banks could better manage their market risk or interest rate risk exposure by flexibly increasing or decreasing their exposure in certain securities activities.

5.4.1. Estimation results

The empirical results show securities activities to have a significant impact on all three risks banks face, although the directions and extents of these impacts vary with different sub-types of the securities activities. We find fiduciary activities significantly increase a bank's total risk, while underwriting activities effectively reduce the total risk. Securities trading activities exhibit no apparent influence on the total risk, whereas they significantly increase a bank's market risk but reduce the interest rate risk banks face. In section 5.4.2 we will provide a detailed discussion of the economic intuitions behind these impacts.

In most cases, coefficients in the regression of total risk are much larger than the coefficients in the regression of the other two risk measures, except for the TRAratio, which is very insignificant (t-ratio=0.17). This is probably due to the fact that the total risk $\sigma_{j,t}^2$ has a much larger absolute value than the two betas. From the definition of the three risk measures we know that the standard deviation $\sigma_{j,t}$ is an *absolute value*, whereas the two betas represent *relative* covariances between a bank's stocks movement and the stock market movement and interest rate movement as the two risk factors.[92] In most cases, this makes them much smaller. In our data set, the average $\sigma_{j,t}$ is 7.28, while the average market risk beta is 0.44 and the average interest rate risk beta is 0.10.

[92] Denoted by formulas, $\beta_{1=}$ Cov ($r_{jbank,}$ r_{market})/ Var(r_{market}) and $\beta_{2=}$ Cov ($r_{jbank,}$ $r_{interest}$)/ Var($r_{interest}$). In section 3.2 we provide a detailed explanation of the two betas, based on the two-factor asset pricing model.

A noticeable issue is the low R-square of the total risk regression without time effects, advocating rerunning the regression by including time effects. Certainly, researchers keep arguing that a panel regression typically provides a much lower R-square than time series regressions, since the aggregation process washes out a lot of the noise in the panel data (Gould and Diesel 2003; Kruse 2000). But the low R-square of 0.07 still lets us doubt whether we have omitted some important macro factors or not.

Our regression examines how banks' securities activities affect their risks on a micro level, in that the risk of each sample bank is individually linked to its respective securities activities. However, there are lots of macro factors which might strongly influence our regression. The stock market cycle effect, for example, is an omitted macro factor that affects both sides of the regression. Various researchers have found that the stock market has significant cycle effects. These might substantially affect a bank's stock risk as well as its securities activities. Bank risks, especially when they are measured by bank stock volatilities, are significantly influenced by the volatility of the whole stock market, as suggested by Officier (1973) and Schiller (1981). A bank's securities activities are also affected by the stock market volatility, in that a bank may choose to contract or to expand its securities activities in volatile periods of the market, depending on the different risk strategies of that bank. Canals (1997, p. 280), for example, claims that a bank's income from securities activities is very sensitive to business cycles.[93] This justifies that omitted macro factors affect both sides of the regression, which might introduce a significant bias to our empirical results.

We therefore rerun the regression by adding year dummies as control variables to capture the influences of these macro factors. Hereinafter we report the empirical results of our regression on a bank's three risk measures, both with time effects and without. The results of these two groups of regressions are then compared and their generality and differences discussed below.

Table 5- 2: The panel regressions of the three types of securities activities on bank risks,

[93] Canals, Jordi, 1997, Universal Banking International Comparison and Theoretical Perspectives, Clarendon Press.

without and with time dummies.

$\sigma_{j,t}^2$ (total risk)	*Without time effects*		*With time effects*		β1 (market risk)	*Without time effects*		*With time effects*		β2 (interest Rate risk)	*Without time effects*		*With time effects*	
	R-square=0.07		R-square=0.18			R-square=0.40		R-square=0.42			R-square=0.42		R-square=0.44	
	coef	***Stdv.***	coef	*Stdv.*		coef	*Stdv.*	coef	*Stdv.*		coef	*Stdv.*	coef	*Stdv.*
FIDratio	**13.70****	**6.35**	**12.91****	***6.12***	**FIDratio**	**0.99**	**0.65**	**1.13***	***0.64***	**FIDratio**	**-1.10**	**1.52**	**-1.20**	***1.51***
TRAratio	**-2.42**	**14.13**	**-3.32**	***13.43***	**TRAratio**	**2.88****	**1.34**	**2.67****	***1.32***	**TRAratio**	**-5.74****	**2.59**	**-6.54*****	***2.59***
FEEratio	**-13.27*****	**4.22**	**-10.72*****	***3.97***	**FEEratio**	**0.31**	**0.60**	**0.51**	***0.60***	**FEEratio**	**-0.04**	**0.75**	**-0.31**	***0.76***
lnta	-0.59**	0.25	-0.09	*0.61*	lnta	-0.10**	0.04	0.04	*0.06*	lnta	0.31**	0.08	0.14	*0.13*
mmfratio	2.67	3.06	-1.67	*3.06*	mmfratio	0.55	0.41	0.38	*0.43*	mmfratio	-0.35	0.57	-0.49	*0.62*
ddratio	5.72	4.77	4.45	*4.59*						ddratio	-0.35	0.92	-0.51	*0.56*
loanratio	0.98	2.64	-0.64	*3.03*	loanratio	0.16	0.34	0.18	*0.34*	loanratio	-0.41	0.55	-0.23	*0.86*
liquidratio	9.63**	4.29	8.45**	*4.09*	liquidratio	-2.99***	0.58	-2.61***	*0.58*	liquidratio	-0.28	0.86	-0.12	*0.92*
peratio	0.01	0.01	0.01	*0.01*						peratio	0.00	0.00	0.00	*0.00*
loanlossratio	86.91*	49.26	103.00**	*48.30*										
_cons	10.70***	1.05	3.04	*5.86*	_cons	1.42***	0.36	1.30	*1.82*	_cons	-1.68**	0.82	-0.05	*1.22*
_cons	10.70***	1.05	3.04	*5.86*	_cons	1.42***	0.36	1.30	*1.82*	_cons	-1.68**	0.82	-0.05	*1.22*

For the regressions with time effects, we report the coefficients of year dummies in the appendix. Although the year dummies do not prove to be significant for all of the individual dummy coefficients, they do show a strong joint significance judged by F-test (see Appendix), justifying the inclusion of dummies as a proxy for omitted macro factors.

After rerunning the regression with time effects, most coefficients of the three securities activities explanatory variables still keep the same signs and significances as they had in regressions without time effects, reiterating the impacts of the securities activities on banks' risks. There are, however, a few changes in the results, as discussed below.

The most noticeable change is the R-square of total risk regression. The inclusion of time effects substantially increases the R-square from 0.07 to 0.18, confirming our presupposition that bank stock volatility is strongly influenced by the macro level market situation during different

periods. Former literature also justifies that stock volatility is highly time-variant. Some empirical evidence reports that stock volatility is higher at some times than at others, and lists various reasons for that phenomenon. Officer (1973) argues that stock volatility is closely related to the volatility of macroeconomic variables, whereas Schiller (1981a, 1981b) suggests that ex post variability of dividends and discount rates cause the volatility of stock return. Schwert (1989) links the volatility of stock return to the stock trading volume and the number of trading days per month. All this literature justifies the time series property of the bank stock volatility, a proxy for bank total risk.

The R-squares of the market risk beta regression and the interest rate risk beta regression increase only very slightly from 0.40 to 0.42 and from 0.42 to 0.44, respectively. The two betas are essentially the covariance between bank stock movement and market index movement or interest rate index movement, divided by the deviation of these two index changes. Therefore, betas measure the *relative* responses of bank stock to the market risk factors and interest rate factors, which are independent of the *absolute level* of the stock market volatility. It is for this reason that regressions of the two risk betas have much smaller time effects than the regression of total risk.

Despite the changed R-square, the coefficients of the three securities activities' explanatory variables are generally very similar to the coefficients we get in Regression 4.1 above. The only slight difference is that in the regression of the market risk beta, fiduciary activities have a more significant (t-ratio=1.78) coefficient compared with the coefficient (t-ratio= 1.53) we get when leaving time effects out of the calculations. This is attributed to the strong stock market cycle that influences fiduciary activities, banks' average fiduciary income reached its peak in the years 1999 and 2000, and then significantly slid down until 2003 when it finally picked up once again, exhibiting an evident time cycle. Hence, with the inclusion of time effects, the FIDratio is cleansed from the influence of the stock market cycle, making its impact on the bank risk clearer to observe.

As to the control variables, all of them except for Lnta (logarithm of banks' total assets) leave the signs and significances of their coefficients untouched. Interestingly, descriptive statistics find Lnta is the only control variable that displays a very strong time trend, rising continuously and steadily from 7.05 to 7.96 during the 12 year period. This probably explains the reason why the significance of Lnta has changed after we have included the time effects in the regressions.

5.4.2. Discussions of the empirical results

Fiduciary activities:

We find that the fiduciary activities have a significant impact on all three risk measures. Since fiduciary contracts usually prescribe that risks of fiduciary investments are to be born by trust clients, there could exist some naive intuition that banks as fiduciaries are risk-free. This intuition, however, fails to see the complexity of fiduciary risks. Our empirical results indicate that fiduciary activities significantly increase a bank's total risk while also raising its market risk, but they do not affect a bank's interest risk.

The exposure of fiduciary activities to market risk could be attributed to two sources: a high possibility of benchmark tracking errors due to the securities market's fat tail risk distribution; and a biased investor perception on fiduciary performance.

In fiduciary activities, mandates (or contracts) of fiduciary assets usually set out a benchmark that fiduciary managers are expected to match or out-perform. This pre-set benchmark defines return and risk parameters, which guideline the fiduciary assets portfolio. Deviations from the benchmark would be regarded as "tracking errors" of bank fiduciary managers, and could probably put the bank at risk by way of a large scale fiduciary redemption from clients. Nevertheless, unexpected market turbulences limit the usefulness of the return and risk parameters, rendering the pre-set portfolio model ineffective while driving the managers of fiduciary assets to deviate from their benchmarks. Various studies report that the securities market exhibits leptokurtosis (or a "fat tail" distribution).[94] Essentially, fat tails imply that

[94] See, among others, Rachev, Menn, and Fabozzi 2005, Fat tailed and skewed assets return distribution, Published by John Wiley & Sons, Hoboken, New Jersey.

extreme events in the securities market occur much more frequently than implied by normal distributions. Therefore, risk pegging could be very difficult ex ante and fairly imprecise ex post. For that reason, unexpected market turbulences induce fiduciary "tracking errors", thus exposing banks to a larger market risk.

In addition, banks also face market risks because fiduciary clients may have a biased judgment on a fiduciary's performance, depending on different market situations. Usually, the objective of fiduciary assets management is to choose asset allocations to beat specified return-risk performance benchmarks. However, the clients' satisfaction often depends on the absolute profits or losses of the fiduciary assets, which deviate from the fiduciary investments' relative performance compared to the predetermined benchmark. If the market index as a whole rises up, trust clients could still have irrationally good sentiments when seeing that their fiduciary assets earn some profits, and be they ever so small, which under-perform the benchmark. However, when the whole market goes down, trust clients might still feel frustrated about their fiduciary assets suffering from even relatively small losses, if they out-perform the benchmark. In extreme cases, some trust clients could possibly withdraw from the fiduciary contract, as punishment to the fiduciaries, which leads to declined profits or even losses for the fiduciaries themselves. It is typically argued that as far as investment decisions are concerned, individual investors are more likely to behave irrationally than institutional investors. Since banks' fiduciary activities are largely based on retail investors, banks are more prone to market risk than other kinds of fiduciary institutions. (Also see Morony 1999 for a fiduciary clients psychology diagram.)

Empirical evidence fails to find a significant interest rate risk for fiduciary activities. Theoretically, fiduciary managers could also face risks from interest rate movements, as they face risks from stock market turbulences. Compared with stock market volatility, however , the interest rate movement is much easier to capture. This makes the tracking error of the interest rate benchmark much smaller than that of the stock market benchmark. Besides, interest rate sensitive assets account for only a small proportion of the total fiduciary industry. Research points out that the interest rate environment impacts on the fiduciary industry, mainly through its impacts on the fiduciary bond funds or money market funds. Investors compare the yield

between bank deposits and fiduciary bond funds or money market funds, resulting in ebbs and flows in purchasing and redemption of these funds. Since bond funds and money market funds only account for around 20% of the total fiduciary funds assets in the US[95], it is understandable that the interest rate does not compose a major risk factor for fiduciary activities.

Empirical results also report a significant positive relationship between fiduciary activities and total risk. Certainly this is partly due to the enhancing market risk of fiduciary activities, which composes the total risk. Other factors like operational risk and regulatory risk, however, may also contribute to the increment of total risk. Operational risk refers to the risk that fiduciary portfolio managers fail to comply with the investment guidelines stipulated by certain client mandates. With the growing of the fiduciary industry, the number and diversity of client restrictions also increases dramatically. Studies find that big banks' fiduciary affiliates could face up to 5000 different client restrictions, making it stringently hard for fiduciary portfolio managers to fulfill all the restrictions relevant to each specific mandate. Regulatory compliance risk alludes to the possibility that a bank's fiduciary department or affiliates do not properly adhere to the regulations and requirements of governmental and regulatory bodies and industry standards of practice. In the light of the historical experience that banks improperly profited from interest conflicts through fiduciary activities, fiduciary assets management is now one of the most strictly regulated financial services. Banks have to abide by both federal and state trust laws, aimed at preventing a bank from exploiting the fiduciary customer's interest to serve the bank's interest. For the same purpose banks are also subject to the dual regulation of both banking regulators and the Securities Exchange Commission. The complexity of operating in a manifold jurisdictional and regulatory framework greatly increases the compliance risk of banks.

Securities trading activities:

We do not find securities trading activities to significantly influence the total risk of banks. However, securities trading significantly increase a bank's market risk and decrease its interest rate risk, indicating that securities trading activities could effectively change a bank's risk structure.

[95] See US mutual fund industry statistics: Mutual fund fact book, 1996—2005.

The market risk of trading activities is based on the fact that banks buy securities in anticipation of reselling them at a higher price. This makes the success of the trading activities critically dependent on the bank's assessment of the value of the securities and on that of the market. A big price swing, when unexpectantly happening, might be driving the bank out of its balanced position in a very short time. The market fluctuation therefore impacts on the value of bank held securities as well as on the value of a bank's net long or short position in these securities, thus exposing banks to the risk of market volatility.

Furthermore, securities trading will significantly decrease the interest rate risk beta. Trading securities are highly liquid assets, providing good instruments for banks to better manage their net position in lending and deposits. In the securities market, banks could easily adjust their net long /short position through buying or selling securities. Various literature states that the securities market responds positively to interest rate cuts, at least for a short period. In this way, a bank's securities trading profits respond aversely to the interest rate movement, therefore decreasing the interest rate risk beta of banks.

Underwriting activities:

Empirical results also suggest that securities underwriting significantly reduces a bank's total risk. However, underwriting does not change the market risk and interest rate risk significantly. Both of the two coefficients of the FEEratio to market risk and interest rate risk are small in their absolute values and insignificant in t-statistics.

Concerning the market risk coefficients, our empirical results find no significant evidence suggesting that underwriting increases a bank's market risk. This result stands in contrast to the common idea that underwriting activities are always linked to market volatility. Certainly, as we illustrated in Chapter 3, the spread and volume of the underwritten securities heavily depend on the market situation. When the stock market reaches a low point, banks may find it difficult to solicit the underwritten securities with a sufficient spread, leading a bank's underwriting activities closer to the market risk. This risk, however, can be minimized by using put options of

the underlying securities. Walter (1994), for example, suggests that the underwriting risk can be hedged, given proper financial instruments. He finds that the underwriting risk has a lopsided character, which is akin to that of writing a put option. Therefore, the underwriter can buy options on the underlying stock for an amount equal to the amount underwritten and with a strike price equal to the offer price. Empirically Kwan (1997) also comes to a similar conclusion as the current study. As concerns his 23 sample bank holding companies, he reports that underwriting is not riskier than commercial banking,.

We find no evidence showing that underwriting affects a bank's interest rate risk. Although it is frequently argued that banks could "tie-in" underwriting and lending, thus increasing banks' interest rate risk and credit risk, the current study finds no evidence supporting that argument. Drucker and Puri (2002), and Laux and Walz (2004) all argue that "tie-ins" are a practice widely used with bank products. To facilitate the underwriting activities of a bank (especially, when the bank is a new entrant into the underwriting business), bank loans are made at relatively favorable rates to securities investors, on the understanding that part or all of these funds will be used to purchase certain new issues underwritten by the affiliate and his syndicate. In such a case, imprudent bank loans can be used to support or subsidize the prices of those securities, exposing banks to a larger interest risk and credit risk. However, the regulatory framework has put various firewalls against tying in underwriting and lending. The Board of Federal Reserve, for example, prohibits lending to retail customers for securities purchases during the underwriting period[96]. The newly amended Bank Holding Company Act (section 106)[97] also stipulates that a bank should not have a pre-arrangement or understanding with an affiliate to fund a syndicated loan for which the affiliate acts as syndicate manager. This applies when the affiliate has conditioned the availability (or price) of its syndication services on a requirement that the customer obtain securities underwriting services from the affiliate. Here, our empirical results lend some support to the efficacy of these regulatory firewalls, by reporting that a bank's underwriting activities do not significantly increase the interest rate risk.

[96] Testimony of Governor Susan M. Phillips, Restrictions on securities underwriting and dealing, March 20, 1997.
[97] FEDERAL RESERVE SYSTEM, 2003, [Docket No. OP-1158], Anti-Tying Restrictions of Section 106 of the Bank Holding Company Act Amendments of 1970.

We find that a bank's underwriting activities have a significant negative coefficient in the total risk regression. This result does not lead us to neglect the riskiness of underwriting activities. On the contrary, we admit that underwriting could be risky if not properly managed, and we would rather interpret our empirical results by suggesting that underwriting risk has been effectively hurdled by US banks. This successful risk management can be attributed to various financial instruments and policy regulations, including the put option of the underlying securities to reduce market risk, as well as the anti-tying regulation to block the interest rate risk from imprudent tied lending. Last but not least, prudent capital requirement also helps to reduce a bank's risk by forcing the banks to keep sufficient capital for underwriting activities. The Basel Capital Adequacy Accord II, for example, explicitly requires banks to measure the risks of their underwriting activities as well as their credit loans, and to assess their minimum required capital.

Control variables:

Coefficients of the control variables generally fit our expectations ex ante. We find that liquid assets significantly lower a bank's market risk. Liquid assets mainly consist of cash, dues from central banks, treasury bills and Federal Reserve funds, whose values are generally independent of the stock market volatility. However, liquid assets suffer from inflation risk, especially in an environment where the economy growth is relatively strong and the nominal interest rate is at a relatively high level. This contributes to the significant positive sign of the liquid assets ratio in the regression of bank total risk. Deducted loan loss reserves have a significant positive coefficient with banks' total risk. Loan losses are included in the total risk regression in order to capture the credit risk and operational risk in a bank's commercial lending. A high loan losses ratio indicates that the bank suffers a lot from problem loans, which increase a bank's total risk. The coefficients of the loan ratio, on the contrary, are insignificant in the risk regressions, demonstrating the complexity of the lending business.

5.5. Conclusion:

The risk effects of a bank's expansion into the securities activities sector are examined in this paper. The securities activities are categorized into securities trading, underwriting and fiduciary activities, and their respective risk characteristics are discussed. The empirical part consists of

two models. Model 1 examines the effects of securities activities on a bank's total risk. Model 2 employs a two stage regression to check the effects on two risk measures, by firstly decomposing the total risk into market risk and interest rate risk, then secondly regressing the securities activities on these two risks.

436 public listed banks in the US are examined through the regressions over the time span between 1993 and 2004. Empirical results find that banks' fiduciary activities significantly increase the banks' total risk, largely due to the increment of the banks' market risk. Securities trading activities do not touch the banks' total risk, but have significant effects on the two specific risks. Trading increases a bank's exposure to market risk, but lowers its interest rate risk, due to the adverse movement of the interest rate and securities market index. Finally, underwriting lowers the total risk of banks and leaves the two specific risks untouched, indicating that the underwriting risk could be properly hedged.

The policy implication of the study is that the risk effects of commercial banks' expanding into securities activities are case-specific and therefore should not be feared too much. Furthermore, since these securities activities affect various kinds of bank risks in different ways, an appropriate combination of these activities could serve as a useful tool in bank operations, helping bank managers to adjust the bank's risk exposure. The conclusion therefore supports the current deregulation of commercial banks' expansion into the securities market.

Appendix:

Panel regressions of three types of investment banking activities on bank risks, with time dummies

$\sigma_{j,t}^2$ (total risk)	coef	*Stdv.*	β1 (market risk beta)	coef	*Stdv.*	β2 (interest rate risk beta)	coef	*Stdv.*
lnta	-0.09	*0.61*	lnta	0.04	*0.06*	lnta	0.14	*0.13*
TRAratio	3.32	*13.43*	**TRAratio**	2.67**	*1.32*	**TRAratio**	-6.54***	*2.59*
FIDratio	12.91**	*6.12*	**FIDratio**	1.13*	*0.64*	**FIDratio**	-1.20	*1.51*
FEEratio	-10.72***	*3.97*	**FEEratio**	0.51	*0.60*	**FEEratio**	-0.31	*0.76*
mmfratio	-1.67	*3.06*	mmfratio	0.38	*0.43*	mmfratio	-0.49	*0.62*
ddratio	4.45	*4.59*				ddratio	-0.51	*0.56*
loanratio	-0.64	*3.03*	loanratio	0.18	*0.34*	loanratio	-0.23	*0.86*
liquidratio	8.45**	*4.09*	liquidratio	-2.61***	*0.58*	liquidratio	-0.12	*0.92*
peratio	0.01	*0.01*				peratio	0.00	*0.00*
loanlossratio	103.00**	*48.30*						
_cons	3.04	*5.86*	_cons	1.30	*1.82*	_cons	-0.05	*1.22*
y1993	Dropped		y1993	Dropped		y1993	Dropped	
Y1994	Dropped		Y1994	-0.59	*1.89*	Y1994	Dropped	
Y1995	Dropped		Y1995	-0.77	*2.05*	Y1995	Dropped	
Y1996	Dropped		Y1996	-1.10	*2.06*	Y1996	Dropped	
Y1997	Dropped		Y1997	-0.95	*2.06*	Y1997	Dropped	
Y1998	3.52	*7.16*	Y1998	-1.01	*2.07*	Y1998	-0.57	*0.30*
Y1999	5.96	*9.18*	Y1999	-0.84	*2.07*	Y1999	-0.19	*0.30*
Y2000	4.37	*9.76*	Y2000	-1.10	*2.07*	Y2000	-0.29	*0.29*
Y2001	5.67	*9.93*	Y2001	-1.15	*2.07*	Y2001	-0.33	*0.29*
Y2002	4.33	*9.98*	Y2002	-1.13	*2.07*	Y2002	-0.21	*0.29*
Y2003	4.71	*9.20*	Y2003	-1.12	*2.07*	Y2003		
Y2004	3.25	*8.96*	Y2004	-1.00	*2.07*	Y2004	-0.20	*0.28*
F-test on the joint significance of year dummies	8.97	*0.00*	F-test on the joint significance of year dummies	4.75	*0.00*	F-test on the joint significance of year dummies	3.23	*0.00*
	R-square=0.18			*R-square=0.42*			*R-square=0.44*	

Chapter 6

The Efficiency Promoting Role of Securities Activities in US Bank Holding Companies

6.1. Introduction

A perpetual topic in economics is the art of producing more output with possibly less economic resources. This was defined as firm efficiency by Farrel (1957) and for decades roused an enormous interest among economists. Based on this concept, Leibenstein (1966) coined the term X-efficiency and noted that, for a variety of reasons, people and organizations normally work neither as hard nor as effectively as they could. This constitutes a wastage of economic resources: we often observe firms using systematically more inputs than others to produce the same output, which is regarded as inefficient.

The efficiency that we measure in this paper is the cost X-efficiency which refers to a bank's ability to control costs for any given set of production outputs. Measuring the inputs in terms of costs, and setting the cost frontier to a minimum level of costs at which it is possible to produce a certain level of output, we can define the X-inefficiency as the excess of actual cost over the minimum cost (Button and Weyman-Jones 1992, Kwan 2001). The topicality of cost X-efficiency is justified by Berger and Mester (1997) who assert that the most important reason for cost problems in the banking industry is the X-inefficiency. Most of the time, inefficiencies are caused by inappropriate operations, like excessive use of labor in branch offices, or financial inefficiency, such as excessive interest paid for funds. Many researchers have used X-efficiency to study the performance of individual banks and of the whole banking industry. X-efficiency has been linked to organizational structure (Cebenoyan, Cooperman, Register, and Hudgins 1993; Mester 1993), executive compensation (Pi and Timme 1993), market concentration (Berger and Hannan 1996), risk-taking (Kwan and Eisenbeis 1996), mergers and acquisitions (Peristiani 1997

and Berger 1997), and common stock performance (Kwan and Eisenbeis 1996), suggesting that X-efficiencies have potentially important implications for public policies and bank management.

Our current study aims at examining the efficiency change caused by a bank's securities activities. Empirically, this paper stems from the newly reviving strand of research exploring the OBS (Off Balance Sheet activities) and bank efficiencies. This new strand highlights that traditional bank efficiency measures omitting OBS in the estimation of bank efficiency may result in a misspecification of bank output and lead to incorrect conclusions. Siems and Clark (1997) estimate bank efficiencies and find that failing to account for OBS activities seriously understates bank output. Rogers (1998), and Clark and Siems (2002) test US commercial banks and argue that excluding OBS items will result in less accurate indicators of the true bank efficiency. Stiroh (2000) researches US bank holding companies (BHCs) and comes to a similar conclusion.

Nevertheless, as these papers aim at researching the OBS activities, the bank's newly expanded securities activities have not yet been explicitly accounted for. Securities activities and OBS activities are two different - although closely related - concepts. OBS activities refer to all activities that are not related to a bank's assets or liabilities. Important items of OBS include various derivatives, commitments, letters of credit, and participation in bank acceptance and bills of exchange. Securities activities, however, cover both in- and off-balance sheet items. Securities underwriting activities are defined by the FFIEC (Federal Financial Institutions Examination Council) as commitments[98], whereas securities trading activities relate to in-balance sheet items. Partly due to the complexity of the securities activities, and also attributed to the fact that securities activities have only be permissible in the US for the past few years, we find no study addressing the topic of securities activities and bank efficiency for US banks. To the best of our knowledge, the only few papers examining banks' securities business and efficiency cover European universal banks, e.g. Swiss banks (Rime and Stiroh 2003) and a panel of German, Italian, Spanish, French and British banks (Casu and Giradone 2002). Thus, our study aims at

[98] See FFIEC 031 and 041, SCHEDULE RC-L – DERIVATIVES AND OFF-BALANCE SHEET ITEMS (3-02).

supplementing the new strand of literature on bank OBS activities, and takes it a step further into the field of various specific securities activities for US banks.

This chapter examines how the efficiencies of US bank holding companies' (BHCs') reacted to the banks' expansion into the sector of securities activities. The BHCs' securities activities are divided into three types (securities trading, underwriting, and fiduciary activities), and their respective impact on bank efficiency is analyzed through the stochastic frontier approach.

Our empirical conclusion indicates that traditional measurements of bank efficiency which neglect the bank's involvement in securities activities, seriously bias the bank efficiency scores. We found that all three types of securities activities increase bank efficiency scores significantly, and that fiduciary activity brings about the biggest efficiency improvement. The efficiency improvement can be explained through increased managerial compensation and organizational effectiveness. Our results of the securities activities' efficiency improvement effects for US bank holding companies are consistent with former literature on European banks, which argues that universal banks are more cost efficient than specialized banks.

The rest of this chapter is organized as follows: Section 6.2 lays out the concept of X-efficiency, describing the stochastic frontier methodology and translog cost function to measure efficiency scores. Section 6.3 reviews the data sources. Section 6.4 displays our empirical methodology and the main results. Finally, Section 6.5 concludes.

6.2. The concept of bank efficiency and econometric methodology

In this part we introduce the concept of bank efficiency explored in the current study, and discuss our econometric methodology to estimate the efficiency scores.

6.2.1 The concept of bank efficiency

Generally speaking, the cost efficiency refers to a bank's ability to minimize its cost given an output set. The bank using the minimum cost to produce the given output is regarded as the most efficient, or "best-performing" bank. The cost of this best-performing bank (i.e.,the minimum cost to produce the given output) will be used as a benchmark to measure cost efficiency. The cost of every studied bank will be compared with this benchmark. The more its costs exceed the benchmark, the more inefficient a bank is.

Coined by Leibenstein (1966), the term X-efficiency describes the effectiveness with which a firm uses its resources to produce a given output. In the framework of neoclassical microeconomics, the production possibility curve provides various input combinations to produce a certain output set. However, irms will automatically aim at operating at the minimum feasible cost since any firm having higher costs than others can not stay in business in the long run. This way, neoclassical microeconomics formulates a deterministic relationship between output and input during the production process. In contrast to that, the X-efficiency theory assumes that the input-output relationship is non-deterministic. The input to produce a certain output may vary according to several non-material factors, such as insufficient employee effort and a complex organizational process. This way, the firms exhibit X-inefficiency. X-inefficiency is explicitly displayed in wasteful expenditures such as maintenance of excess capacity, luxurious executive benefits, political lobbying and litigation[99], so that the cost to produce a certain output in most cases is higher than the minimal feasible cost defined by the deterministic production function.

Empirical studies have linked X-(in)efficiency to various reasons. A widely explored source of the inefficiency is insufficient competition. In a market with perfect competition, there will be no X-inefficiency because any firm less efficient than the others will in time be forced out of business . With other market forms such as market segmentation and products differentiation, however, it may be possible for x-inefficiency to persist, because the lack of competition makes

[99] OCED glossary of statistical terms, see http://stats.oecd.org/glossary/detail.asp?ID=3332

it possible to use inefficient production techniques and still stay in business. Berger and Hannan (1996) find bank inefficiency is positively linked to market concentration.

Another source of inefficiency lies in the discretionary effort of the employees. The employees of a bank might not always try their best to run the bank. Employees are economic persons and try to maximize their utility. Since no contract can exactly stipulate every single action of the employee, there is a grey area where the employees can discretionally decide on an effort level by trading off the employment income, pressure and leisure. Pi and Timme (1993) find higher executive compensation leads to lower inefficiency, in that high-income employees or executives are more motivated to work hard in order to keep their position.

Cebenoyan, Cooperman, Register, and Hudgins (1993) and Mester (1993) link bank inefficiency to organizational structure. Firms or organizations never work as hard and as efficiently as they could. Bureaucracy, misunderstandings, reciprocal mistrust and buck-passing behavior between various internal divisions all increase the organizational inertia and decrease organizational effectiveness. In principle, organizational effectiveness is negatively related to the size of the organization. When an organization grows bigger and contains a more complicated internal structure, the bureaucratic behavior inside and the inertia become more serious.

Imperfect information is viewed as another source of inefficiency (Wheelock and Wilson 1995[100]; Vander Vennet 2002; Matthews and Ismail 2006[101]). Information is an essential factor in a bank's production process. Banks serve as as financing intermediaries and investment agents in economies, based on the fact that they deal better with informational asymmetry than individual investors in the financial market. Lack of information or poor qualified information sends wrong signals to a bank about the market demand and about how to organize the bank's production according to the demand. On the contrary, rich sources of information help a bank to better

[100] David C. Wheelock and Paul W. Wilson, *Evaluating the Efficiency of Commercial Banks: Does Our View of What Banks Do Matter?* JULY/AUGUST 1995, Review, FEDERAL RESERVE BANK OF ST. LOUIS.
[101] Kent Matthews and Mahadzir Ismail, *Efficiency and Productivity Growth of Domestic and Foreign Commercial Banks in Malaysia,* Cardiff Economics Working Papers, No. 2006/2, January 2006.

organize its production by more accurately allocating resources among various banking branches, thus promoting bank efficiency.

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To measure bank efficiency, accounting information on inputs and outputs is used to formulate the cost frontier of a bank. This frontier is defined as the cost of the best-performing bank under observation with the lowest costs to produce the same outputs as other banks. Given the observed efficient frontier, each bank can be compared to the best-practice bank and assigned an efficiency score over (0,1] .

More concretely, taking into consideration a bank *i*, whose cost C_i is higher than the feasible minimal cost C^* of the best-performing bank, given the same output set Y , variable input price set W and fixed input set Z:

$C^* = C\ (Y,W,Z)$
$C_i = C_i(Y,W,Z)$
$C^* < C_i$

where C^* is the minimum cost defined by the cost function, C_i is the actual output of the studied bank, $Y=(y_1,y_2,\ldots\ldots y_n)$ is the bank's output set, $W=(w_1,w_2,\ \ldots\ldots w_m)$ is the bank's price set for variable inputs, and $Z=(z_1,z_2,\ \ldots\ldots z_j)$ is the bank's fixed input set. Variable inputs of a bank may consist of labor and borrowed funds, while the fixed inputs are composed of fixed assets and capital. Variable inputs and fixed inputs are both necessary factors for producing outputs. They both constitute important parts of a bank's costs, and are sometimes partially substitutive of each other. Therefore, both of them must be included in the cost function, although they have to be treated differently. Variable inputs enter into the cost function in terms of prices. Fixed inputs enter into the cost function in terms of their book values, because they are slow to adjust and it is

difficult to measure a price for these durable inputs (Berger and Mester 1999, Adongo, Stork and Hasheela 2005).[102]

The cost efficiency of the bank *i* is measured by the ratio of its cost compared to the feasible minimal cost under the given output set:

$$EFF_i = C^* / C_{i.} \in (0,1] \quad (1)$$

The efficiency score is automatically located in the range from 0 to 1 in that C^* is no larger than C_i by definition. The efficiency score equals 1 for the most efficient bank, and is smaller than 1 for all the other inefficient banks. The higher the efficiency score, the more efficiently a bank operates. An efficiency score of 0.8 means that the studied bank achieves 80 percent of the performance of the most efficient bank. In other words, the studied bank wastes 20 percent of its resources during its operation, due to organizational inertia or insufficient managerial effort. Based on this understanding, economic studies generally prefer a higher efficiency score, in that it is linked to less resource wasting and sound management in the banking industry.

6.2.2. Using the stochastic frontier approach to measure bank efficiency

We adopt the stochastic frontier approach (SFA) to estimate bank efficiencies. This approach was initially introduced by Aigner, Lovell and Schmidt (1977), and has been widely adopted by various studies in recent years. The approach has the virtue of allowing for "noise" in the measurement of efficiency, and has been shown to be more robust than the alternative method of data envelopment (Eisenbeis, Ferrier and Kwan 1998, Kwan 2001)

[102] The classification of variable inputs and fixed inputs widely exists in modern bank efficiency studies. In this literature, variable inputs enter the cost translog functions as a price term, while the fixed inputs enter the function in terms of their book value. Their interaction terms are also included in the function, allowing for partial substitutions between fixed and variable inputs. For detailed descriptions of the cost functional form of the variable inputs and fixed inputs, see among others Battese and Coelli (1988, 1993), Kumbhakar and Lovell (2000), and Van Vennet (2002).

The SFA uses a parametric technique to estimate the characteristics of the "best-practice" bank from the bank cost function. The best-practice bank represents the institution which uses minimal input resources to obtain the given outputs, by most efficiently utilizing the productive factors. The cost function of the best-practice bank is defined as the efficient cost frontier of the banking industry under the present technical condition. Any banks that systematically deviate from the frontier, are regarded as inefficient.

This efficient cost frontier is named stochastic frontier in that it incorporates the stochastic fluctuation. The difference between the best performing bank and other banks is composed of two items: an inefficiency score and a random disturbance. This stochastic characteristic allows for errors in the estimation and so prevents the benchmark from being driven by outliers. The SFA assumes that inefficiency follows an asymmetric half-normal distribution, while random fluctuations follow a symmetric normal distribution.

The stochastic cost frontier is estimated by measuring the cost of the most efficient bank in the data set, that is, it is an extant frontier estimated from all sample banks.[103] For the purpose of the estimation, $C_{i,t}$ (the cost of bank i in period t) can be related to the cost frontier in the following form:

$$C_{i,t}=C(Y_{i,t},W_{i,t},Z_{i,t})*V_{i,t} \quad (2)$$

$$ln\ C_{i,t}=lnC(Y_{i,t},\ W_{i,t},\ Z_{i,t})+v_{i,t} \quad i=1,2,...n,\ t=1,2,...T \quad (3)$$

where $C_{i,t}$ denotes the total operating cost of the studied bank, Y is a vector of output quantities, W is a vector of input prices; n is the number of banks, T is the number of periods. $C(Y,W,Z)$ is the cost frontier calculated on the basis of the cost function of the best-performing bank in the data sample. The term $v_{i,t}$ can be viewed as an error term, which measures the distance between the cost of the studied bank i and the efficient cost frontier.

[103] Habib and Ljungqvist, 2003, *Firm Value and Managerial Incentive: A Stochastic Frontier Approach,* Wharton Financial Institution Center Working Paper,

In the line of the stochastic frontier approach, the term $v_{i,t}$ consists of two components: a inefficiency score and a random error. This way, $v_{i,t}$ can be decomposed in the following form:

$$v_{i,t}=u_{i,t}+\varepsilon_{i,t} \qquad \varepsilon_{i,t}\sim N(0,,\sigma_{\varepsilon}^{2}),\ u_{i,t}\sim N\,|\mu_{i,t},\sigma_{u}^{2}|,\ cov\,(u_{i,t},\ \varepsilon_{i,t})=0. \qquad (4)$$

where $u_{i,t}$ denotes an inefficiency factor that pushes the bank's cost above those of the most efficient bank, and $\varepsilon_{i,t}$ is the traditional random error. In the light of Aigner, Lovell and Schmidt (1977), $\varepsilon_{i,t}$ may take a positive as well as a negative value, and is supposed to follow a symmetric normal distribution. $u_{i,t}$ is zero for the most efficient bank, whose cost will be used as the cost frontier, and $u_{i,t}$ takes a positive value for the other banks, whose costs are systematically higher than the cost frontier. Thus, $u_{i,t}$ could take only non-negative values, i.e. $u_{i,t}$ is a truncated normal distribution. Therefore, the distribution of the composite error term $v_{i,t}$ is positively skewed.

In order to actually estimate $u_{i,t}$ and $\varepsilon_{i,t}$, we must make certain assumptions about their distributional forms. We assume $u_{i,t}$ is obtained by truncation of $N(\mu_{i,t},\sigma_{u}^{2})$ at zero, where truncation at zero captures the non-negativity of $u_{i,t}$. $\varepsilon_{i,t}$ is independently and identically distributed with a zero mean and a σ_{ε} standard deviation, that is, $N(0,,\sigma_{\varepsilon}^{2})$. We further assume the stochastic error to be independent of the bank inefficiencies, that is, $cov\,(u_{i,t},\ \varepsilon_{i,t})=0$. In other words, good or bad luck is assumed to be unrelated to systematic shortfalls of managerial ability.

With these restrictions, we can estimate the parameters of the cost function and the inefficiency scores using maximal log-likelihood estimation.[104] In the light of Jondrow et al. (1982) and their successors[105], $u_{i,t}$, can be expressed as the expected value of $u_{i,t}$ conditional on the composite error $v_{i,t}$. Given the certain assumption of the distributional forms of $v_{i,t}$, $u_{i,t}$ and $\varepsilon_{i,t}$, the first and

[104] Ordinary least squares method could also be used to derive the model. However, maximal likelihood is statistically preferred by most studies. See Greene (1993) for a discussion on that.

[105] Among those important successors are Battese and Coelli (1988, 1993), and Kumbhakar and Lovell (2000). They extend the approach of Jondrow et al. (1982) into panel data studies with different assumptions. In the current study we use the Stata Version 8.2, which adopts the methodology of Kumbhakar and Lovell (2000).

second moments of $v_{i,t}$ can be calculated, and the conditional expected value of $u_{i,t}$ can be derived based on the two moments.

The efficiency score of each individual bank is the inverse of $\exp(u_{i,t})$. According to the definition of the bank efficiency illustrated in Section 2.1, the efficiency score is:

$$EFF_{i,t} = C^*/C_{i,t} \quad (5)$$

Suppressing the stochastic error term, which is assumed to be irrelevant with the efficiency, the equation becomes:

$$EFF_{i,t} = C^*/C_{i,t} = \frac{C(Y,W,Z)*\exp(u^*)}{C(Y,W,Z)*\exp(u_{i,t})} = \frac{\exp(u^*)}{\exp(u_{i,t})} = \frac{1}{\exp(u_{i,t})} \quad (6)$$

Since the most efficient bank is located on the cost frontier, u^* is zero by definition. For all the other inefficient banks, $u_{i,t}$ is always positive, so that $\exp(u^*)$ takes the value of 1 and $\exp(u_{i,t})$ is larger than 1. Therefore, the efficiency score EFF falls in the range of (0, 1]. EFF equals 1 for the most efficient bank, and EFF is smaller than 1 for all the other inefficient banks.

6.2.3. Translog cost function

The calculation of the inefficiency starting from Equation (3) requires that one specifies the form of the cost function. In the current study we adopt a multiproduct translog cost function à la Aigner et al. (1977).

The translog function, essentially, describes the BHCs' stochastic cost frontier. The translog function, as proposed by Christensen and Jorgenson (1969) and Diewert(1974), serves as a prevailing functional form in estimating cost function or production related problems. Figlio (1999) provides statistical evidence that shows translog forms provide better statistical fit.

The primary advantage of the translog is its flexibility. The translog is a mathematical generalization of the Cobb-Douglas function, but more flexible in that it does not place apriori restrictions on the substitution possibilities between different factors[106]. The Cobb-Douglas form is restrictive in terms of the implicit substitution assumptions: elasticities of substitution between all inputs are 1 and shares of the inputs are constant. Extending the Cobb-Douglas form to the translog function enables these constraints to be relaxed because cross-effects between inputs are recognized and therefore more complex substitution patterns can then be captured. It allows the elasticity of substitution to vary with the type of inputs, and allows returns to scale and output elasticity to vary with the size of the inputs, thus helping to minimize any biases that might result from using the more restrictive specification. In fact, the translog is such a flexible and general functional form that it can approximate any continuous twice-differentiable production function.[107] Conveniently, the Cobb-Douglas form can be recovered by the translog with various coefficient restrictions, and thus it is possible to test whether the fit is improved by employing a more flexible functional form.[108]

However, the increased flexibility comes at the expense of additional regressors. Therefore, the disadvantage of the translog function is its increased complexity in evaluating marginal effects of the explanatory cost factors, and the statistical concerns with multi-collinearity and over-parameterization due to the presence of many interaction terms.[109]

Firstly, due to the large number of interaction terms, we should be very prudent in interpreting the parameters of translog functions. Generally, the parameters in a translog function should be interpreted as the elasticity of dependent variables with respect to any of the right hand side variables. This is clearly observed when we compute the first derivatives on both sides of the function to get: $\partial \ln C / \partial \ln R_i = (\partial C / \partial R_i)(R_i/C)$, where R_i stands for any right hand side variables. However, the large numbers of interaction terms add considerable difficulties to

[106] Bodmer, Energy Substitution in Swiss Industry: The Role of Prices and Regulation
[107] Dan Segal, A Multi-Product Cost Study of the US Life Insurance Industry
[108] Brynjolfsson and Hitt, 1995, *Information Technology as a Factor of Production: The Role of Differences Among Firms, Published in Economics of Innovation and New Technology*, 3 (Special Issue on Information Technology and Productivity Paradox): pp. 183-200.
[109] Gronberg, Jansen, Taylor and Booker, 2005, *School Outcome and School Input : A Cost Function Approach*

evaluating the effect of the cost determinant factors. On one side, no single coefficient in the translog is very informative about the cost characteristics for any individual independent factor (that is input price or output quantity in the function). Due to these interaction terms, the elasticity of one independent factor on the dependent variable must vary with other input prices or output quantities. As some parameters of these interaction terms with other related independent factors are positive and others are negative, the overall effect of one input price or output quantity change on the total cost depends on which parameters dominate. On the other side, one could test whether combinations of coefficients simultaneously have the appropriate signs, but such tests would almost certainly be rejected by conventional standards of statistical significance, since not all of these parameters are usually significant.

Besides, the translog cost function is structurally non-homothetic. A cost function is homothetic if and only if it is "separable" in input prices and outputs, that is, it can be written as $C(p, y) = h(p)*\phi(y)$, for any $p>0$ and $y>0$. The translog cost function corresponds to a homothetic production function only in one special case, namely if the coefficient of every interaction term is equal to zero.

6.3 . Data Sources

The sample covers 620 US bank holding companies. For data availability, the analysis is restricted to the period from 1993 to 2004. For some of the banks data is only available for some of the years, which leads to an unbalanced panel dataset.

All the aforementioned variables are calculated from the banks' financial statements. Our data set is taken from Bankscope[110] (Version 2002, 2003, 2004, 2005) and includes data for 620 US bank holding companies that provide consolidated financial statements. The sample period covers 12 years from 1993 to 2004. We use yearly data from the sample banks' financial statements, including bank balance sheets and income statements.

[110] BankScope is a database created by IBCA and Bureau van Dijk.

The average production cost of banks, as measured by the total operating expense, counts for 641 million dollars. A translog function is used to determine the cost frontier, where we have defined four inputs and at least two outputs. The input vector contains both variable inputs and fixed inputs. Labour and borrowed funds are defined to be the two variable inputs. Data suggests that US banks averagely employ 4560 workers, whose mean wage is 60,000 dollars. The banks hold 16.5 billion dollars in borrowed fund on average. The mean interest expense paid for one dollar of borrowed funds is six cents, that is a 6% interest rate. For the two fixed inputs, we gauge the equity capital and fixed assets with the average capital being twice as large as the fixed assets.

The output vector includes two commercial banking outputs, namely bank loans and cash/other earning assets, and the securities activities outputs. The output for the securities trading activities is measured by the value of the banks' trading securities, averagely 2.7 billion dollars. For the underwriting and fiduciary activities, their outputs are measured by either their revenue or their equivalent assets. The equivalent assets are computed by capitalizing the revenues with the rate of return of the commercial banking activities. After capitalization, the equivalent assets of underwriting and fiduciary activities amount to 2.5 billion and 2.8 billion dollars respectively, which are similar in size to the trading securities assets. Since the total loan assets of the banks average 9.4 billion dollars, each of these securities activities output counts for almost one fourth of the total loan. This indicates that securities activities have already become an important part in the banking production, and therefore should not be neglected.

Table 1 supplies an overview of the 11 variables in our empirical model. The data is rounded to two decimals. Any data, which is smaller than 0.005, is shown as 0 in the table.

Table 1: Descriptive statistics of the cost frontier variables:

	Mean	Std. Dev.	Min	Max
Cost: total operating expense (unit: million dollars)	641.96	3053.69	0.00	58299
Labor input: number of employees	4560.63	18024.46	3.80	287000
Price of Labor W1: total personnel expenses over number of employees (unit: million dollars)	0.06	0.55	0.00	37.04
Borrowed fund input: total liabilities(unit: million dollars)	16477.81	71428.08	0.00	1374810

Price of borrowed fund W2: total interest expense over total liabilities	0.06	1.09	0.00	64.04
Fixed input Z1: fixed assets (unit: million dollars)	251.18	1514.33	0.00	46351
Fixed input Z2: total equity (unit: million dollars)	1520.95	6327.17	4.20	109291
Output Y1: total customer loan (unit: million dollars)	9443.82	37596.16	0.00	579857
Output Y2: cash and other earning assets (unit: million dollars)	591.69	2397.98	0.00	35168
Output of securities trading activities: trading securities (unit: million dollars)	2753.89	22130.02	-0.40	484420
Rate of return of commercial banking activities (capitalizing rate for asset equivalent measure)	0.05	0.33	-2.95	17.53
Output of underwriting activities: underwriting equivalent assets (unit: million dollars)	2449.72	33335.66	-1827864	546489.60
Output of fiduciary activities: fiduciary equivalent assets (unit: million dollars)	2803.38	71158.07	-724144.4	4316654
Output of securities underwriting activities: underwriting income (unit: million dollars)	105.75	647.73	-16.1	13591
Output of fiduciary activities: fiduciary income (unit: million dollars)	56.69	264.77	0.00	4835

6.4. The efficiency promotion effects of the securities activities: empirical evidence

In this section we will present the empirical model to examine the impacts of the three types of securities activities on bank efficiency. The model is based on the translog cost function, using the stochastic frontier approach to measure bank efficiency. Following Roger (1998), Clark and Siems (2001) and Stiroh (2003), the efficiency effects of securities activities are examined by comparing the average efficiency score estimated with and without securities activities as output. We first calculate the efficiency score without securities activities as output by restricting the bank products to contain only the two commercial banking outputs. We then calculate the three other groups of efficiency scores with each of the three securities activities by allowing the bank products to include the three securities activities. The latter three groups exhibit significantly higher average efficiency scores than the former one, leading to our argument that securities activities help promote bank efficiency.

Two different measures are utilized to define the output, and their respective results are presented. The Asset-Equivalent-Measure computes the equivalent assets of underwriting and fiduciary activities, whereas the Revenue-Based-Measure directly utilizes the underwriting and

fiduciary revenues as outputs. The two measures come to similar results, confirming the efficiency enhancement effects of securities activities.

6.4.1. Efficiency estimation with Asset-Equivalent-Measure and Revenue-Based-Measure

The translog cost function is used to estimate bank efficiencies. In order to construct the cost function, the inputs and outputs are to be defined. In this study, the outputs are defined by the two different measures, while the inputs are defined in accordance with the *intermediary approach* (Sealey and Lindley, 1977). Banks, as intermediaries, borrow funds from depositors and lend them to loanees. In order to get loanable funds from depositors, banks do not only pay interest expenses. They also provide services like safekeeping, check clearing, bookkeeping, etc. to depositors; and these services implicitly constitute partial payment to the use of these funds. These services are based on capital, labor, and other material resources. These resources, as well as the deposit funding, are viewed as the inputs of the bank production. Accordingly, we set the input vector to contain both variable and fixed inputs: labor and borrowed funds as two variable inputs, and fixed assets and equity capital as two fixed inputs.

To distinguish between the fixed and the variable inputs explicitly acknowledges the different characteristics of these two types of inputs, and thus helps to improve the accuracy of the cost frontier function. Fixed assets are taken as fixed input because they are slow to adjust and it is difficult to measure their prices (Berger and Mester 1998, 2001; Adongo et al. 2005). There could be discussions on the role of bank equity, though. The current regulatory framework of the minimum capital requirement demands a bank to increase its equity in accordance with the expansion of its total risk assets, implying that the bank equity could vary over time. Yet, literature commonly assumes the bank equity to be a fixed input by arguing that legal restrictions make issuing a new equity a complicated business so that a bank would not frequently adjust its equity capital (Eichberger and Summer 2004; Stein 2004).[111] Besides, treating bank equity as a fixed input also has the explicit advantage that it allows us to utilize the quantity of bank equity instead of the price of equity as an explanatory variable of the cost frontier function. The price of

[111] Stein (2004) cites several reasons to explain the economic inconvenience of issuing new bank equity. These reasons include asymmetric information, market inefficiencies and free-cash-flow-type agency problems.

bank equity is difficult to measure accurately and creditably, in spite of various imputation formulas suggested by literature. The widely used Capital Asset Pricing Model to estimate the cost of equity capital, for instance, depends largely on appropriate measures of the risk-free interest rate, the equity market risk premium and the risk beta of bank equity. As a result, the estimated price of equity capital is imprecise with a large standard error, due to the uncertainty of the true equity market premium and imprecise estimates of equity betas (Fama and French 1997, Green et al. 2001). We thus believe that treating bank equity as a variable input with its estimated price may not help to further improve the estimation accuracy for our cost frontier. We therefore prefer to regard it as a fixed input following Berger and Humphrey (1992, 1997), Cebenoyan et al. (2003) and Wang (2003).

Suppressing individual bank superscripts, the models take the following form:

$$\mathrm{LnC} = \acute{a} + \sum_{j=1}^{N} \beta_j \ln y_j + \sum_{k=1}^{2} \gamma_k \ln w_k + \sum_{h=1}^{2} \lambda_h \ln z_h + \sum_{j=1}^{N}\sum_{k=1}^{2} \beta_{jl} \ln y_j \ln y_l + \sum_{i=1}^{2}\sum_{k=1}^{2} \gamma_{jl} \ln w_k \ln w_i + \sum_{i=1}^{2}\sum_{k=1}^{2} \lambda_{jl} \ln z_k \ln z_i$$
$$+ \sum_{j=1}^{N}\sum_{k=1}^{2} \chi_{jl} \ln w_k \ln y_j + \sum_{j=1}^{N}\sum_{h=1}^{2} \vartheta_{jl} \ln z_h \ln y_j + \sum_{h=1}^{2}\sum_{k=1}^{2} \psi_{jl} \ln w_k \ln z_h + \ln u \ + \ln \varepsilon$$

Where

C represents cost, measured by the total operating expense of a bank.

Y denotes the output quantities set, for N types of outputs. N=2 if we restrict banking outputs to result only from commercial banking activities, and N>2 if we also allow outputs of securities activities to be included;

W denotes the input prices set for two variable inputs----labor and borrowed fund;

w_1 is the labor price calculated by a bank's personnel expenses over its employee number;

w_2 is the price of borrowed fund, measured by a bank's total interest expenses divided by its total liabilities;

Z is the fixed input set containing two fixed inputs: z_1 for fixed assets and z_2 for bank equity;

u denotes the cost efficiency of each individual bank, and

ε denotes stochastic errors.

The intermediary approach measures the output of the banking production process by the amounts of earning assets produced by a bank. Following the approach proposed by Roger (1998), Clark and Siems (2001) and Stiroh (2003), we estimate the impacts of securities activities on bank efficiencies by restrictedly specifying bank outputs. In our econometric model with N types of outputs, $N=2$ when we estimate the efficiencies of bank holding companies with only commercial banking activities, as y_1 denotes a bank holding company's total customer loan, and y_2 denotes the bank holding company's other earning assets like interbank dues and deposits and so on. When estimating the efficiencies of bank holding companies with different kinds of securities activities, we define $N=3$, with the third output y_3 specified respectively by: (1) the bank holding company's trading securities assets ;(2) BHC's fee income equivalent assets; (3) BHC's fiduciary income equivalent assets. Finally, we define $N=5$ to measure the overall efficiency effects of all three types of securities activities. The five outputs are two commercial banking outputs plus three securities activities outputs.

6.4.1.1.Asset-Equivalent-Measure

Measuring and estimating y_3 requires specific methods. We estimate the output of securities trading activities by measuring the trading securities assets. The underwriting and fiduciary activities, however, are off-balance activities and intermediary activities, and therefore provide

only income data. In order to make outputs of underwriting and fiduciary activities comparable to y_1 , y_2 and the output of trading activities, their equivalent assets have to be estimated.

Here we adopt the Asset-Equivalent-Measure proposed by Boyd and Gertler (1994). This measure computes the on-balance-sheet assets required to generate a BHC's level of off-balance income by using the rate of return on on-balance-sheet assets to capitalize off-balance income. Assuming that off-balance securities activities incomes INC_{sec} are generated by the equivalent hypothetical assets Y_{sec}, and regarding the equivalent assets Y_{sec} and commercial banking assets Y_b as symmetrically profitable, the estimated value of Y_{sec} can be derived as follows:

Rate of return for commercial bank lending activities: r= $(I-E-LP)/Y_b$

$Y_{sec}= INC_{sec} /r = Y_b * INC_{sec} /(I-E-LP)$

where

INC_{sec} denotes underwriting fee incomes and fiduciary incomes for the underwriting and fiduciary activity of BHC, respectively. Y_b is the commercial bank lending assets, measured by the total customer loans of the banks. I is the total interest income; E is total interest expense; LP is the loan loss provision.

6.4.1.2.Revenue-Based-Measure

Although the asset equivalent measure is popularly adopted in measuring the off-balance sheet outputs of banks, it suffers from a possible bias resulting from an improper capitalization rate. In the above section we use the rate of return of the on-balance sheet loan activity to capitalize the off-balance sheet underwriting and fiduciary activities, based on the preposition that the on- and off-balance sheet activities have the same rate of return. This preposition, however, does not necessarily hold.

Various studies point out that on- and off-balance sheet activities could have different rates of return. Thus, the asset equivalent measure could significantly over-estimate or under-estimate underwriting and fiduciary activities assets, depending on whether the real rates of return of these two activities are lower or higher than the on-balance sheet return. If the off-balance sheet activities present a higher rate of return, capitalizing off-balance sheet assets with an on-balance sheet rate of return could exaggerate the real off-balance assets of underwriting and fiduciary activities. This biases the real outputs of those banks that have a higher share of underwriting and fiduciary activities, so as to bias the cost efficiency of those banks. Siems and Clark (2002), Roger (1998) all report that cost efficiency estimation is sensitive to the different measurement of a bank`s off-balance outputs.[112]

In the current section we rerun the efficiency estimation with the income measure in order to overcome the aforementioned estimation bias with the asset equivalent measure. Instead of using the capitalized assets, the income measure directly adopts the incomes of the underwriting and fiduciary activities as the third output. The income measure has the apparent advantage that it completely avoids data distortion caused by any improper capitalization rate, hence increasing the credibility of the estimated efficiency scores. The income measure, however, is also criticized in that it is inconsistent with the output/input definition. In accordance with the intermediation approach proposed by Sealey and Lindley (1977), the two commercial banking outputs, y_1 and y_2, are defined in stock terms of earning assets. The third output y_3, on the contrary, is defined in flow terms of income generated by the underwriting or fiduciary activities. This goes hand in hand with the production approach which argues that banking service flows are bank outputs. In this way, an efficiency estimation with income measure suffers from the inconsistency of banking production definition approaches.

Despite of the above criticism, the revenue-based measure is popularly adopted in various efficiency studies. Lang and Wenzel (1995, 1998), Koetter (2005), and Shen (2005) all use non-interest revenues to measure the off-balance sheet output of banks. Siems and Clark (2002) and

[112] Siems and Clark (2002) compare the cost efficiency results estimated with Boyd-Gertler asset equivalent measure and their revenue-based measure. In their study, the mean efficiency scores resulting from these two estimation measures are significantly different.

Roger (1998) conduct a comprehensive survey on bank cost efficiency with both the assets equivalent measure and the revenue-based measure

Table 2 in Section 6.4.2 presents the estimated cost efficiency scores. Cost efficiency is yearly measured for each BHC, resulting in a group of 7440 (12*620) scores for each efficiency measure. Let *cte* stand for the cost efficiency of BHCs without any securities activities; *ctetra,* ctefee and ctefid for cost efficiencies for BHCs with securities trading, underwriting and fiduciary activities respectively. *cteAll* represents the cost efficiency with all three types of securities activities. The cost efficiencies estimated with the Asset-Equivalent-Measure and the Revenue-Based Measure are jointly presented to provide a better view of the efficiency results.

6.4.2. Testing the significance of efficiency enhancement

Hereinafter we present the efficiency estimation results with RBM in Table 2, and compare the results between the two measures. As typical for most literature using the stochastic frontier approach to estimate efficiencies, we present our empirical results by focusing on the efficiency scores while leaving out the presentation of the detailed translog functional parameters. The parameters of the translog function are presented in the appendix, and the signs of the parameters all fit well with what we economically expect of them.

Table2: Means of estimated efficiencies

Asset Equivalent Measure			Revenue-Based Measure		
Cost efficiency	mean	Stv.dev	Cost efficiency	mean	Stv.dev
cte	0.62	0.24	cte	0.62	0.24
cteTRA	0.68	0.24	cteTRA	0.68	0.24

cteFEE	0.76	0.18	cteFEE	0.82	0.16
cteFID	0.84	0.17	cteFID	0.85	0.15
cteAll	0.87	0.20	cteAll	0.90	0.20

As displayed in the table, the regressions with RBM and AEM result in quite similar efficiency scores. All the groups with securities activities show significantly higher efficiency scores than the comparative groups without securities activities, so as to substantiate the efficiency enhancement of a bank's securities activities. Among the three types of securities activities, fiduciary activities result in the highest efficiency gains (cteFID=0.84 and 0.85) for the banks. These results indicate that the efficiency estimation is unaffected by different measures. Their robustness stands in accordance with the reports of other aforementioned studies using both AEM and RBM (Siems and Clark 2002, Roger 1998).

Despite the high similarity of the estimated efficiencies between AEM and RBM, the efficiency scores estimated by RBM are notably higher than those estimated by AEM for both underwriting and fiduciary activities. This leads us to doubt whether the AEM might have underestimated bank efficiency. The AEM utilizes the return rate of the commercial banking activities to capitalize the underwriting and fiduciary incomes. This capitalization strongly amplifies the variations of the underwriting and fiduciary outputs, since the return rate of the commercial banking also varies. Two banks having exactly the same underwriting or fiduciary revenue could exhibit very different equivalent assets in AEM, for instance. Reexamination of the data also suggests that the variations of underwriting and fiduciary equivalent assets have more than doubled compared to the variation of their original income data. This large variation has exaggerated the gaps between the highest and the lowest outputs of underwriting or fiduciary activities in the sample banks, and may have wrongly attributed the gaps to inefficiency. Imagine two banks with similar costs and similar underwriting or fiduciary revenues, but having

completely different equivalent assets outputs in AEM. The bank with the highest equivalent assets output would be incorrectly regarded as the best-performing bank, and be improperly set as the frontier. The other bank with the lower equivalent assets output is viewed as inefficient, although it reaps the same revenue with the same costs. This way, the measure error in the equivalent assets will be improperly ascribed to cost inefficiency, leading to a lower average efficiency level.

The aforementioned results suggest that securities activities considerably promote bank efficiency. Restricting the banking outputs to contain only commercial banking activities, we get a mean efficiency of only 0.62. In other words, 38 percent of the resources are wasted during the banking production. However, when including the securities activities as banking outputs, the mean efficiency rises to above 0.68, indicating a considerable efficiency enhancement.

T-test on the significance of efficiency enhancement

To test the significance of this efficiency improvement, we run a series of t-tests on the null hypothesis that the estimated efficiency scores derived from the empirical cost functions are the same, regardless of whether securities activities are included in the BHCs or not. Table 3 presents the t-statistics and p-values for both the AEM and RBM. The t-statistics reject the null hypothesis of no differences, suggesting that the efficiency improvement is statistically significant.

Table 3: t-test for differences between mean efficiencies of BHCs with and without securities activities

H0: BHCs have the same mean efficiencies when with and without securities activities	
Asset Equivalent Measure	Revenue-Based Measure

	t-statistics	p-value		t-statistics	p-value
cte vs. cteTRA	-44.31	0.00	cte vs. cteTRA	-44.31	0.00
cte vs. cteFEE	-120	0.00	cte vs. cteFEE	-130	0.00
cte vs. cteFID	-120	0.00	cte vs. ctefid	-120	0.00
cte vs. cteAll	-131	0.00	cte vs. cteAll	-145	0.00

Effects on the most inefficient 25% of all sample banks:

Policy makers and regulators are interested in observing the effects of securities activities on the most inefficient banks. Literature finds that the most inefficient banks with the lowest efficiency scores are prone to potential failure, and therefore deserve more attention. Berger and Humphrey (1992), Cebenyon et al. (1993), and Barr et al. (1994) all report that banks with low efficiency scores fail at a greater rate than those with high efficiencies. For this reason we examine the efficiency enhancement of the most inefficient 25% of all sample banks as follows below.

We first take a look at the minimum efficiency score in each group. The first row indicates that the minimum points of efficiency have risen considerably, from 0.13 to at least 0.15 and above. Using the 1% bound as a benchmark for the less efficient group of BHCs, the securities activities raise the lowest bank efficiencies from 0.18 to a range of 0.25 –0.39. We take the 25% as a threshold to define the most inefficient banks. In the last row, the average efficiency scores for the most inefficient 25% of all sample banks in each group are reported. The average scores display a significant increase when banks are allowed to conduct securities activities. We therefore come to the conclusion that securities activities do not only improve mean efficiency for all banks observed, they also improve mean efficiency for the group of the most inefficient banks.The regulatory authorities therefore have good reason to support securities activities so that the “weakest banks” will have a chance to improve their operations, leading to a better overall financial stability.

Table 4: Efficiency Percentiles for the most inefficient 25% of all banks with and without securities activities

	Asset Equivalent Measure					Revenue-Based Measure				
	cte	cteTRA	cteFEE	ctefid	cteAll	cte	cteTRA	cteFEE	ctefid	cteAll
Minimum	0.13	0.15	0.18	0.20	0.20	0.13	0.15	0.20	0.21	0.22
1%	0.18	0.25	0.32	0.35	0.36	0.18	0.25	0.37	0.38	0.39
5%	0.32	0.33	0.47	0.53	0.49	0.32	0.33	0.54	0.56	0.58
10%	0.35	0.36	0.53	0.59	0.55	0.35	0.36	0.60	0.63	0.65
25%	0.42	0.47	0.62	0.72	0.63	0.42	0.47	0.72	0.75	0.76
Mean efficiency for the most inefficient 25% of all banks	0. 36	0. 38	0. 55	0. 61	0. 56	0. 36	0. 38	0. 61	0.63	0. 64

6.4.3. Discussions about the empirical results

Both the asset equivalent measure and the revenue-based measure consistently lead to the conclusion that securities activities help promote bank efficiency. This efficiency promotion effect could be the result of several factors like enhanced competition, clearer organizational structure and higher managerial compensation, as discussed below. The impact of these factors varies with the different sub-types of securities activities, leading to the various levels of efficiency promotion caused by these activities.

Fiduciary activities

Among the three types of securities activities, fiduciary activities bring about the highest efficiency gains for US banks, as confirmed by both the asset equivalent measure and the revenue-based measure.

Fiduciary services are widely regarded as one of the most competitive playfields of the financial service industry. Walter (1994) points out that bank trust and fiduciary activities have “so many competitors” and “the performance is so easy to measure”. Carlson, Pelz and Sahinoz (2004)

suggest that the fiduciary industry exhibits characteristics of the competitive market[113], where a great number of funds sellers and almost no entry barrier for new fiduciary funds exists. They find that more than 8000 funds compete in the market and new funds are launched almost everyday. Other studies (Ney et al., 2003) cite the fiduciary management fee as a competition indicator. They point out that the average fiduciary fee has declined by 40% since 1980, referring to the enhanced competition in the fiduciary industry.[114] More importantly, the service of fiduciary management is largely homogeneous so that it is easy to measure and to compare the quality of fiduciary services. Thus, the fiduciary market in many ways exhibits the characteristics of a fully competitive market.[115] As illustrated by the general theory of X-efficiency, intensive competition exerts exogenous pressure on banks to move closer to the efficiency frontier. Banks and their employees have to work harder in order to lower the costs and exhaust the output potentiality, so that the bank will not be pushed out of the market.

Another impulse for banks to behave efficiently is the clear organizational structure of fiduciary management. Usually, when a bank operates across various banking products lines, the organizational structure of the bank becomes larger and more complex. Bureaucracy, misunderstandings, ambiguous entrusts and buck-passing behaviors between various internal divisions increase the organizational inertia and decrease organizational effectiveness. This organizational deficiency, however, is unlikely to hold for the fiduciary activities of banks. As stipulated by various regulatory authorities from states and national levels, the divisions conducting fiduciary activities have to be relatively independent of other divisions of the same bank, for the purpose of protecting the fiduciary assets holder from conflicts of interest.[116] This independence makes the fiduciary division a concise but full-fledged financial service provider, largely free of various interferences from other parts of the bank. This effectively reduces the internal resource wastage among the organization, and hence helps increase the efficiency of the whole bank.

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[113] Mutual Funds, Fee Transparency and Competition, by John B. Carlson, Eduard A. Pelz, Erkin Y. Sahinoz, 2004

[114] Statement of Congressman Bob Ney before the Capital Markets Subcommittee hearing on "Mutual Fund Industry Practices and Their Effect on Individual Investors", 2003.

[115] Garczarczyk (2002), on the contrary, finds the quality of commercial banking to be difficult to define and to measure. See Józef Garczarczyk, 2002 (5), *Determinants of Quality of Banking Services*, in Ekonomia journal.

[116] Concerning the conflicts of interests in banks' fiduciary activities, see Chapter 3 for a detailed description.

Besides, empirical studies also find that staff in the fiduciary industry, as staff in most securities activities related industries, receive comparatively higher wages than staffs in the commercial banking industry. The high wage effect helps enhance the working efforts of the employees in two ways: on the one hand side, namely from the perspective of the shareholders and bank managers, it is more intolerant for highly-paid employees to be slug and fraudulent than for lowly-paid ones. It is hard to imagine that managers will accept the sluggishness of employees who are much better paid than others. On the other side, from the perspective of the employees themselves, highly paid staff usually have incentives to work harder, in order to keep their current income level and to come closer to a potential promotion. This way, the high wage levels help to promote the average working efforts of the employees, contributing to enhanced efficiencies of the banks.

Underwriting activities

Underwriting activities also help increase bank efficiency by stimulating the high managerial compensation and the project-guided performance evaluation. The efficiency promotion effect of the underwriting activities, however, is moderate compared to that of the fiduciary activities, probably due to the highly monopolized market structure in the underwriting industry.

Various research reports that the underwriting industry averagely has much higher personnel expenses than the commercial banking industry. Walter (1994) argues that underwriting depends much on the quality of personnel, especially expertise and capability in corporate finance advising. Thus, the sluggishness of personnel in underwriting activities will result in a much worse financial service production than in other activities where the hardware takes more weight in outputs production. The gravity of the personnel expertise in underwriting activities, joint by the high wage level in these activities, makes inefficient employees more intolerable in the underwriting industry. Fry et al. (2002) confirm that the employees in the underwriting industry work harder than in other financial service industries, implying that the enhanced X-efficiency is largely attributed to the improved working efficiency in the underwriting sector.

Bank efficiency also benefits from enhanced informational advantage gained through the underwriting process. In order to bring the newly issued securities smoothly to the public, and to set a reasonable price for the securities, a bank will thoroughly inspect the firms whose securities it underwrites. In other words, the bank has to show "due diligence or intelligence" about the financial conditions and the true prospectus of the firms. This intelligence is built on large quantities of information, including some information unannounced or unavailable to outsiders. This information could be spread to other parts of the bank to generate a more efficient resource utilization (Walter 1994). Vander Vennet (2002) also argues that underwriting activities improve bank efficiency by reducing the cost of monitoring a bank's clients. In general, banks face problems of adverse selection and moral hazard caused by asymmetric information between a bank and its customers. Monitoring the customers helps reduce the moral hazard, thus constituting an important part of the risk management of a bank. Underwriting activities give a bank access to private information which may improve the effectiveness of its monitoring efforts.

Meanwhile, we find the efficiency promotion effect of underwriting activities to be significantly lower than that of the fiduciary activities, probably due to the highly monopolized market structure of the underwriting industry. Pugel and White (1994) suggest that US securities underwriting is dominated by about 20 to 25 large securities firms. Heyal et al. (1983)[117] explore the average concentration in securities underwriting. They find that the first 15 firms make up 89% of the market share in US negotiated securities underwriting, and 85% of the market share in competitive-bid underwriting. The monopoly is largely attributed to the syndicated structure of underwriting, which constitutes higher barriers for new entrants, as argued by Pugel and White (1994). On one side, the entrant faces a marketing-based entry barrier, because the established firms already have a reputation and track record, whereas the entrant's capabilities are relatively untested. On the other side, the structure of syndicates might also enhance barriers that have the syndicate manager control other participators. These factors lead to the monopolized structure of the underwriting industry, and may somewhat lessen bank efficiency.

[117] Samuel L. Hayes, III, A. Michael Spence, and David Van Prang Markes, Competition in the Investment banking Industry: Harvard University Press, 1983, Table 3,4, and 5.

The monopolized banks that lack competition pressure would operate inefficiently but still keep considerable market shares.

Securities trading activities

Securities trading activities, similar to underwriting activities, display a significant efficiency enhancement. But this enhancement comes about to a lower extent when compared with that of the fiduciary activities. We explain this with the securities trading activities benefitting from the stimulation of the high managerial compensation but suffering from the ambiguous trading strategy.

Staff of the securities trading sector, as well as of most of the other securities related sectors, enjoy a relatively high wage level. As illustrated above, high managerial compensation helps reduce sluggish work and thus enhances the X-efficiency of a bank. However, the securities trading activities of commercial banks, unlike the trading activities of most other institutional investors, are not fully profit-oriented. The securities trading strategies of banks are mainly based on the need for position management, instead of being based on the profit-risk analysis of the securities themselves. The banks call in securities when they have a long position in the loan-deposit activities, and put out securities when they have a short position in the loan-deposit. In other words, trading securities are tools for banks to match their assets-liabilities positions. This way, the real contribution of the securities trading division is hard to gauge. It is improper to measure the performance of a securities trading division just by its profits. It is also unjustified to compare the profitability of the securities trading activities in a commercial bank to the trading activities in an investment bank or a mutual fund. Even comparing the trading profitability of one commercial bank to another would lead to an unjustified conclusion, given that the two banks may have different position managements. The above mentioned difficulties in measuring the real performance of trading activities create an “inertia area” for the securities trading managers. Managers may not try all their best when working, since responsibility for a lower trading profitability could be easily shifted off to other divisions. Thus, the efficiency enhancement of the securities trading activities is limited by the ambiguous trading strategy of banks.

With all the three types of securities activities

The empirical results report that banks conducting a full range of all three types of securities activities exhibit the highest mean efficiency. The reason may lie in the fact that a universal bank enjoys better informational advantages from multiple securities activities. A bank's informational advantage comes from its professional operation through various financial products and in various segments of the financial market. In terms of securities activities, each of the three types of securities activities provides certain information on the clients and on the financial market, which can be used to facilitate the bank's production: fiduciary activities bring about a wider network of individual or institutional investors, and provides a better understanding of investors' behaviors. Underwriting activities enable a bank to have more insight into firms whose securities the bank underwrites. Trading activities brings a bank closer to the financial market and help it to better catch the sentiment of the market.

A Bank's informational advantage stems from its professional operation in the various segments of the financial market. The more banking activities are conducted, the more information a bank draws from the financial market. When a bank operates within a full range of all three types of securities activities, the information gained from a certain type of securities activities spills over to the other activities, enhancing the information both qualitatively and quantitatively. The enhanced informational advantage helps a bank to allocate its resources more efficiently and more accurately, thus contributing to a higher efficiency of the bank.

Consistent with our findings, various literature reports that information gained by one part of a bank can spill over to other parts, and that different types of securities activities can collaborate with each other and with the commercial banking activities, in order to better exploit this information (Vander Vennet, 2002; Johnson and Marietta-Westberg, 2004, 2005; Laux and Walz, 2005). Johnson and Marietta-Westberg[118] (2004, 2005) report that a bank serving both as underwriter and fiduciary assets manager performs better than other banks. They claim that

[118] William C. Johnson & Jennifer Marietta-Westberg, *Universal Banking, Asset Management, and Stock Underwriting,* Michigan State University, Department of Finance, First Version: February 20, 2004; Updated Version: April 22, 2005

combining underwriting and assets management activities provides a bank with superior information, while the diligence gained from the underwriting process can be utilized by the asset management branch or the trading branch of the bank. Vander Vennet (2002) suggests that a financial conglomerate with a full range of both securities activities and commercial banking activities enhances its informational advantage through multiple financial-related services. This informational advantage reduces the operating costs of the conglomerate, since the conglomerate otherwise has to incur more expenses to get information from outside sources. Thus, informational advantage helps improve cost efficiency.

6.5. Conclusion

This paper aims at exploring the impact of the US BHCs' expansion into the securities activities on bank efficiency. The stochastic frontier analysis is utilized to examine bank efficiency with and without different types of securities activities. The BHCs' securities activities are divided into three types (securities trading, underwriting and fiduciary activities), and their respective impacts on bank efficiency empirically analyzed.

Empirical results find that all three types of securities activities increase bank efficiency scores significantly, with the fiduciary activity bringing about the greatest efficiency improvement. We adopt both the Asset-Equivalent-Measure and the Revenue-Based-Measure to define the securities activities outputs, whereas the results are unaffected by different measures. The efficiency improvement can be explained by a higher managerial compensation, an increased organizational effectiveness and enhanced competition pressure. The conclusion of this paper indicates that traditional measurements of bank efficiency, which neglect the bank's involvement in securities activities, seriously bias bank efficiency scores.

Appendix

Parameters of the translog cost functions, for asset equivalent measure and revenue-based measure

Following we present the coefficients and their standard errors estimated by the translog functions, for informative purpose. Due to the great number of interaction terms and square terms, the function has 36 coefficients altogether for only four inputs and three outputs. Thus, the total cost effects of a certain input or output must be very prudently interpreted, taking into consideration all relevant interaction and square terms.

Generally our coefficients are in accordance with the economic common sense of cost functions. Among the four inputs and three outputs, most of them display significant positive signs in either their logarithm terms or their square logarithm terms. These significant coefficients are primarily terms of *z*1, z2, p2, y1, y2 and y3. On the input side, the coefficients of lnz1 (fixed assets input), lnz2 (equity capital input) and their squared terms sqlnz1 and sqlnz2 are significantly positive in the cost translog function, which clearly shows that a rising fixed input pushes the BHC's cost up. The sqlnp2, the square term of lnp2 (price of fund input) is also positive in most cases, indicating that increased interest expenses result in higher costs. On the output side, the positive coefficients ofsqlny1 (square of lny1, loan output), lny2 (cashes and interbank output) and sqlny3 (square of lny3, securities activities output) indicate larger costs needed to produce more outputs.

The only exception to the positive relationship between inputs and costs is p1 (price of the labour input). We find significant negative coefficients in lnp1 and sqlnp1, surprisingly suggesting that a rise in labour cost brings down the operating costs of banks. We interpret it by arguing that there is a partial substitution between labour and other inputs like fixed assets. Our studied period runs from 1993 to 2004. During this decade, the modern information processing technology was launched and widely adopted by the banking industry. Technical progress in the

field of computer and internet has greatly improved work efficiency, and has made it possible to lay off more workers. Especially with the price of labour input rising up, banks are motivated to replace the worker with the computer, which results in lower costs. Thus, we find the negative coefficients of p1 in the cost function are understandable from an economic point of view.

Revenue-based measure											
Cte (taking no consideration of securities activities)			CteTRA (with securities trading activities as the 3rd output)			CteFEE (with underwriting activities as the 3rd output)			CteFID (with fiduciary activities as the 3rd output)		
lnc	Coef.	Std.	lnc	Coef.	Std.	lnc	Coef.	Std.	lnc	Coef.	Std.
lnz1	0.02	0.12	lnz1	0.22*	0.13	lnz1	0.07	0.13	lnz1	0.87***	0.15
lnz2	0.55***	0.09	lnz2	0.24**	0.11	lnz2	0.38***	0.10	lnz2	0.45***	0.12
sqlnz1	0.13***	0.02	sqlnz1	0.18***	0.02	sqlnz1	0.13***	0.02	sqlnz1	0.18***	0.03
sqlnz2	0.07***	0.02	sqlnz2	0.09***	0.03	sqlnz2	0.08***	0.02	sqlnz2	0.06**	0.03
lnp1	-0.68***	0.06	lnp1	-0.63***	0.07	lnp1	-0.70***	0.08	lnp1	-0.92***	0.09
lnp2	-0.21**	0.10	lnp2	-0.36***	0.12	lnp2	-0.32**	0.15	lnp2	-0.36***	0.14
sqlnp1	-0.01	0.01	sqlnp1	-0.01*	0.01	sqlnp1	-0.01**	0.01	sqlnp1	-0.07***	0.01
sqlnp2	0.11***	0.03	sqlnp2	0.05	0.04	sqlnp2	0.06*	0.03	sqlnp2	-0.04	0.03
lny1	0.06	0.09	lny1	-0.04	0.11	lny1	0.30***	0.10	lny1	-0.21	0.15
lny2	0.50***	0.10	lny2	0.74***	0.12	lny2	0.59***	0.13	lny2	0.47***	0.15
			lny3	0.01	0.04	lny3	-0.18*	0.09	lny3	-0.17***	0.07
sqlny1	0.05***	0.01	sqlny1	0.07***	0.02	sqlny1	0.03**	0.02	sqlny1	0.08***	0.02
sqlny2	0.05***	0.01	sqlny2	0.05***	0.02	sqlny2	0.08***	0.01	sqlny2	0.00	0.02
			sqlny3	0.00	0.00	sqlny3	0.00	0.01	sqlny3	0.03***	0.01
lnp1p2	-0.34***	0.04	lnp1p2	-0.28***	0.04	lnp1p2	-0.23***	0.05	lnp1p2	-0.06	0.04
lnp1y2	-0.05***	0.02	lnp1y2	0.02	0.02	lnp1y2	-0.01	0.02	lnp1y2	-0.06***	0.03
lnp1z1	-0.03	0.02	lnp1z1	-0.02	0.02	lnp1z1	0.01	0.02	lnp1z1	0.08***	0.03
lnp1z2	0.11***	0.02	lnp1z2	0.08***	0.02	lnp1z2	0.10***	0.02	lnp1z2	0.16***	0.02
lnp2y1	0.00	0.02	lnp2y1	0.01	0.02	lnp2y1	0.02	0.02	lnp2y1	-0.03	0.02
lnp2y2	0.04**	0.02	lnp2y2	0.03	0.02	lnp2y2	0.03	0.02	lnp2y2	0.07***	0.02
lnp2z1	-0.10***	0.02	lnp2z1	-0.10***	0.02	lnp2z1	-0.06***	0.02	lnp2z1	0.00	0.02
lnp2z2	0.07***	0.02	lnp2z2	0.05**	0.02	lnp2z2	0.04**	0.02	lnp2z2	0.02	0.02
lny1y2	-0.21***	0.03	lny1y2	-0.19***	0.04	lny1y2	-0.24***	0.04	lny1y2	-0.22***	0.05
lny1z1	-0.01	0.02	lny1z1	-0.06***	0.02	lny1z1	0.01	0.02	lny1z1	-0.03	0.02
lny1z2	0.04***	0.01	lny1z2	0.07***	0.02	lny1z2	0.03**	0.01	lny1z2	0.05***	0.02
lny2z1	-0.01	0.01	lny2z1	-0.01	0.02	lny2z1	0.03**	0.01	lny2z1	0.00	0.02
lny2z2	0.03***	0.01	lny2z2	0.00	0.02	lny2z2	0.01	0.02	lny2z2	0.08***	0.02
lnz1z2	-0.19***	0.03	lnz1z2	-0.21***	0.04	lnz1z2	-0.21***	0.03	lnz1z2	-0.31***	0.05
			lnp1y3	-0.03***	0.01	lnp1y3	-0.06***	0.01	lnp1y3	-0.07***	0.01
			lnp2y3	0.03***	0.01	lnp2y3	-0.01	0.01	lnp2y3	-0.04***	0.01
			lny1y3	-0.01	0.01	lny1y3	0.02	0.01	lny1y3	-0.01	0.01

			lny2y3	0.01*	0.00	lny2y3	-0.01	0.01	lny2y3	0.01	0.01
			lnz1y3	0.00	0.00	lnz1y3	-0.05***	0.01	lnz1y3	-0.02**	0.01
			lnz2y3	0.00	0.01	lnz2y3	0.03**	0.01	lnz2y3	-0.01	0.01
_cons	-3.92***	0.40	_cons	-3.36***	0.42	_cons	-3.37***	0.43	_cons	-3.75***	0.57

Asset-equivalent measure											
Cte (taking no consideration of securities activities)			CteTRA (with securities trading activities as the 3rd output)			CteFEE (with underwriting activities as the 3rd output)			CteFID (with fiduciary activities as the 3rd output)		
Asset equivalent measure											
lnc	Coef.	Std.	lnc	Coef.	Std.	lnc	Coef.	Std.	lnc	Coef.	Std.
lnz1	0.02	0.12	lnz1	0.22*	0.13	lnz1	0.33**	0.14	lnz1	1.36***	0.18
lnz2	0.55***	0.09	lnz2	0.24**	0.11	lnz2	0.26***	0.11	lnz2	0.20*	0.12
sqlnz1	0.13***	0.02	sqlnz1	0.18***	0.02	sqlnz1	0.14***	0.02	sqlnz1	0.23***	0.03
sqlnz2	0.07***	0.02	sqlnz2	0.09***	0.03	sqlnz2	0.10***	0.02	sqlnz2	0.08***	0.03
lnp1	-0.68***	0.06	lnp1	-0.63***	0.07	lnp1	-0.62***	0.11	lnp1	-0.70***	0.11
lnp2	-0.21**	0.10	lnp2	-0.36***	0.12	lnp2	-0.67***	0.19	lnp2	-0.39*	0.23
sqlnp1	-0.01	0.01	sqlnp1	-0.01*	0.01	sqlnp1	-0.02***	0.01	sqlnp1	-0.09***	0.01
sqlnp2	0.11***	0.03	sqlnp2	0.05	0.04	sqlnp2	-0.01	0.04	sqlnp2	-0.06	0.04
lny1	0.06	0.09	lny1	-0.04	0.11	lny1	0.22*	0.12	lny1	0.07	0.15
lny2	0.50***	0.10	lny2	0.74***	0.12	lny2	0.28**	0.12	lny2	0.07	0.16
			lny3	0.01	0.04	lny3	0.09	0.08	lny3	-0.21***	0.06
sqlny1	0.05***	0.01	sqlny1	0.07***	0.02	sqlny1	0.04**	0.02	sqlny1	0.01	0.03
sqlny2	0.05***	0.01	sqlny2	0.05***	0.02	sqlny2	0.08***	0.01	sqlny2	-0.03	0.03
			sqlny3	0.00	0.00	sqlny3	0.00	0.00	sqlny3	0.01**	0.00
lnp1p2	-0.34***	0.04	lnp1p2	-0.28***	0.04	lnp1p2	-0.27***	0.07	lnp1p2	-0.10	0.06
lnp1y2	-0.05***	0.02	lnp1y2	0.02	0.02	lnp1y2	-0.05***	0.02	lnp1y2	-0.09***	0.03
lnp1z1	-0.03	0.02	lnp1z1	-0.02	0.02	lnp1z1	0.02	0.03	lnp1z1	0.17***	0.03
lnp1z2	0.11***	0.02	lnp1z2	0.08***	0.02	lnp1z2	0.11***	0.02	lnp1z2	0.11***	0.02
lnp2y1	0.00	0.02	lnp2y1	0.01	0.02	lnp2y1	0.04*	0.02	lnp2y1	-0.02	0.03
lnp2y2	0.04**	0.02	lnp2y2	0.03	0.02	lnp2y2	-0.02	0.02	lnp2y2	0.05**	0.03
lnp2z1	-0.10***	0.02	lnp2z1	-0.10***	0.02	lnp2z1	-0.07***	0.02	lnp2z1	0.01	0.03
lnp2z2	0.07***	0.02	lnp2z2	0.05**	0.02	lnp2z2	0.03	0.02	lnp2z2	0.00	0.03
lny1y2	-0.21***	0.03	lny1y2	-0.19***	0.04	lny1y2	-0.20***	0.04	lny1y2	-0.09*	0.05
lny1z1	-0.01	0.02	lny1z1	-0.06***	0.02	lny1z1	-0.04**	0.02	lny1z1	-0.05***	0.02
lny1z2	0.04***	0.01	lny1z2	0.07***	0.02	lny1z2	0.06***	0.01	lny1z2	0.06***	0.02
lny2z1	-0.01	0.01	lny2z1	-0.01	0.02	lny2z1	0.00	0.01	lny2z1	-0.02	0.02
lny2z2	0.03***	0.01	lny2z2	0.00	0.02	lny2z2	-0.01	0.02	lny2z2	0.08***	0.02

lnz1z2	-0.19***	0.03	lnz1z2	-0.21***	0.04	lnz1z2	-0.16***	0.04	lnz1z2	-0.32***	0.05
			lnp1y3	-0.03***	0.01	lnp1y3	-0.03**	0.01	lnp1y3	-0.07***	0.01
			lnp2y3	0.03***	0.01	lnp2y3	0.03**	0.01	lnp2y3	-0.02**	0.01
			lny1y3	-0.01	0.01	lny1y3	0.01	0.01	lny1y3	0.00	0.01
			lny2y3	0.01*	0.00	lny2y3	0.01	0.01	lny2y3	0.01	0.01
			lnz1y3	0.00	0.00	lnz1y3	0.00	0.01	lnz1y3	-0.01	0.01
			lnz2y3	0.00	0.01	lnz2y3	-0.02*	0.01	lnz2y3	-0.01	0.01
_cons	-3.92***	0.40	_cons	-3.36***	0.42	_cons	-4.22***	0.59	_cons	-3.80***	0.68

Chapter 7 Concluding Remarks

7.1 Main Findings:

This dissertation presents a study of securities activities undertaken by US bank holding companies during the last decade. Securities activities are categorized into three different types, namely securities trading, underwriting and fiduciary activities. We empirically analyze how the three types of securities activities affect profitability, risk and efficiency of bank holding companies.

Chapter 2 provides a close look at the on-going theoretical debates on the advantages and disadvantages of commercial banks' expansion into securities activities. It also reviews empirical literature dealing with historical evidence and contemporary surveys of banks with securities activities. Chapter 3 portrays our classification of the three types of securities activities. This chapter proves fiduciary activities, besides trading and underwriting activities, to be non-negligible securities activities of bank holding companies. It also provides a preliminary description of the characteristics of different types of securities activities, and serves as a basis for our analyses of these activities in later chapters.

Chapter 4 contributes to the discussion about the profitability effects of securities activities on bank holding companies. Employing a quadratic function, we find that the relationship between a bank's profitability and its involvement in securities activities is non-linear. Securities underwriting and fiduciary activities enhance bank profitability only when underwriting and fiduciary incomes lie above certain thresholds, implying a "top-player" rule in the securities activities sector. Securities trading activities, on the contrary, are not affected by an explicit threshold.

Chapter 5 deals with the risk effects of banks' securities activities. A bank's total risk is decomposed into market risk and interest rate risk. We find that these risks respond differently to

the various types of securities activities. A bank's exposure to market risk increases with securities trading activities, whereas its interest rate risk falls with trading, keeping the total risk unchanged. Underwriting activities reduce the total risk of banks and leave the two specific risks untouched, indicating that the underwriting risk is properly hedged. More importantly, against the common expectation that fiduciary risk is borne by the trustors and that banks as assets managing agents are risk free, we find a bank undertaking fiduciary activities significantly increases its total risk, due largely to the increment of the bank's market risk.

Moreover, in chapter 6, we concentrate on the influence of securities activities on bank efficiency. Bank cost efficiency is calibrated by the stochastic frontier analysis based on a transcendental logarithm cost function. We compare the mean efficiency scores of banks with and without securities activities, and find that all three types of securities activities increase bank efficiency scores significantly. Both the Asset-Equivalent-Measure and the Revenue-Based-Measure are adopted to define the securities activities outputs - the results, however, turn out to be unaffected by different measures.

The policy implication of the study is to cautiously support the current deregulation tide to create integrated financial service providers. Economists frequently worry about the potential risk of commercial banks' expanding into securities activities. This study, however, allows us to argue that the risk effects are specifically related to a particular type of securities activities and are specially related to a particular risk, and should therefore not be feared too much. Moreover, since these securities activities affect various kinds of bank risks in different ways, an appropriate combination of these activities could serve as a useful tool in bank operations, helping bank managers to adjust the bank's risk exposure. Besides, we find a "broader" bank combining both commercial banking activities and securities activities is economically more efficient than a specialized commercial bank. Nevertheless, the rule of "top-player" in the profitability analysis suggests that only a few top banks which are strong enough to overcome various operating barriers in the securities industry are able to make profits from this combination. Large numbers of small and middle-sized banks, therefore, have to be very

cautious when stepping into the securities market. Such evidence helps to formulate recommendations for both policy makers and bank managers.

7.2. Directions for Further Research:

The research in this dissertation focuses on the deregulation effects of the US banking industry. This deregulation tide, however, is not exclusively observed in the US. Starting in the 1980s, reforms towards a more integrated financial industry have taken place in numerous developed as well as in developing countries. An interesting extension of this topic might be comparing profitability, risk and efficiency effects of the US banking industry with those of other economies. In detail, such research should be extended into a panel of various countries while controlling for differences in the economic growth rate, the structure of the banking market, and the relative size of bank financing and stock market financing. Particularly, the comparison with China as the world's biggest developing country would be of great research interest.

During the past twenty years the Chinese banking industry has been hovering between the separating banking system and the universal banking system. Banks holding securities subsidiaries have once been common until the first half of the 1990s. In 1993, however, the collapse of certain stock market bubbles and of the real estate market has greatly impaired the banking system by bankrupting some financial institutions and leaving the others with numerous non-performing assets. This turmoil has directly contributed to the legal separation of banking industry and securities industry in 1995. Yet a few big banks still manage to circumvent this restriction by establishing oversea securities branches to participate in the domestic securities market.

Years after the separating banking system has been enacted, policy makers are now endeavouring to develop a more flexible framework for a limited integrated banking system, in order to meet the increasingly diversified financing demand of the growing economy. In addition to the legal underwriting of government bonds, the central bank has for some years now

gradually extended the banks' underwriting power into the corporate bonds market. Also, starting 2005, Chinese bank have been permitted to undertake a wide range of fiduciary activities under the condition that they establish sound internal control procedures and operational risk management.[119] Among the three types of securities activities, the securities trading activity now remains the last and only taboo.

Our current study is of interest in that its categorization of the three types of securities activities fits well with the stepwise deregulation in China. This study justifies the order of deregulating underwriting activities earlier than other types of securities activities, in that we find the underwriting risks to be effectively put under control in the practice of US bank holding companies. Nevertheless, our study does not support tabooing securities trading. In fact, securities trading activities increase banks' market risk but reduce their interest rate risk, thus providing a useful instrument for banks to manage their risk structure. Moreover, this study reminds policy makers and banks to be aware of the risk of fiduciary activities.

For our study to be more applicable to developing countries, we may extend our future research by also taking the particular macroeconomic environments of the studied countries into consideration. In contrast to the rather stable macroeconomic features in developed countries, many developing countries have experienced some kind of economic transition in recent years. Moreover, banks in developing countries typically have much higher rates of non-performing loans, weaker risk management procedures, and inadequate capital adequacy. These differences constitute a distinctive feature of the banking industries in various studied countries, and are to be taken into account in future research.

[119] See "Mandate of Commercial Banks Establishing Fund Management Companies", the People's Bank of China, Feb 20th, 2005.

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