Trends in Organizational Form and their Relationship to Performance: The Case of Foreign Securities Subsidiaries of U.S. Banking Organizations

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Abstract

Debate about the effects of permitting U.S. commercial banks to expand their range of activities has intensified in recent years. Some observers worry that banks with access to a federal safety net have strong incentives to use new opportunities to take greater risks and increase their likelihood of failure at possible cost to the FDIC and taxpayers. Others fear that the safety net might give banks a competitive advantage relative to nonbank rivals. A key element of this debate is whether a holding company structure does a significantly better job of mitigating against these potential problems than a bank subsidiary alternative and should be made mandatory for banking organizations that want to engage in nontraditional activities. Unfortunately, hard, current empirical evidence on the benefits and costs of alternative structures generally is lacking.

The purpose of this paper is to provide this sort of evidence. In the study, annual financial data for the 1987–1997 period for an unbalanced panel of foreign securities subsidiaries of U.S. banking organizations are used to investigate two questions: What factors influence how bank holding companies organize securities activities when they have a choice? And are the observed differences in organizational form related to significant differences in key measures of subsidiary performance? This sort of study is possible because U.S. banking organizations can and do engage in securities activities through subsidiaries of the bank as well as holding company affiliates. These subsidiaries also file financial reports with bank regulators.

A probit model is used to empirically identify important factors influencing structural choice. Univariate and multivariate statistical techniques are used to determine whether or not differences in subsidiary structure are related to differences in subsidiary risk, funding costs, and efficiency. Simultaneity is investigated to a limited extent. In brief, the empirical results do not support the position of the holding company proponents. Safety net subsidy incentives don't appear to be a primary determinant of structural choice. The evidence does not indicate that bank-owned securities subsidiaries tend to be more risky than holding company securities subsidiaries. Bank securities subsidiaries also do not appear to enjoy any funding advantage relative to holding company subsidiaries. These two results are particularly noteworthy because section 23A and 23B restrictions on intracompany funding currently do not apply to transactions between banks and their direct and indirect bank subsidiaries. Finally, some evidence indicates that bank subsidiaries tend to be more efficient.

Key words: bank subsidiaries, holding company affiliates, securities activities

1. Introduction

Debate about the effects of permitting U.S. commercial banks to expand their range of domestic activities—particularly in securities underwriting and insurance—has intensified in recent years. A major component of this debate has focused on how best to mitigate against possible problems associated with greater bank involvement in these less

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traditional activities. The first of the two most oft-cited potential problems is the possibility that management might use expanded powers to increase risk to the bank. The other concern is that safety net access might give banks an exploitable competitive advantage over rival nonbank financial firms offering similar products and services.

Most participants in the debate on the expansion of bank powers domestically agree that constraints on bank organizational form and firewalls are necessary to mitigate against these potential problems. Two competing positions have emerged, both favoring a requirement that banking organizations conduct nontraditional activities in separate corporate entities. The defining difference in the two positions is whether nontraditional activities should be conducted in a subsidiary of the insured bank or in an affiliate of the parent holding company.[1] Proponents of both types of structure envision a need for similar sets of accompanying firewalls to reduce the odds that risk is transmitted from nonbank affiliates to the bank or any safety-net-related subsidy flows in the opposite direction.[2]

Despite the apparent similarities of these two positions, opinions about each structure's ability to inhibit risk or subsidy transmission, as well as the size of any associated effects on efficiency, diverge.[3] Holding company proponents assert that the insured bank will likely be exposed to greater risks from nonbanking activities conducted in a direct subsidiary.[4] This stems either from the more direct exposure of the parent bank to subsidiary losses or from greater secondary effects due to a market perception that troubled direct bank subsidiaries are less separate from the bank than nonbank holding company affiliates. They also allege that the bank subsidiary structure is less likely to prevent the transmission of a significant safety-net subsidy from insured banks to uninsured affiliates engaged in nontraditional activities, creating an overpowering incentive for unconstrained banking organizations to choose this option.

Others dispute these contentions, noting that parent bank liability to subsidiary losses is limited; and since similar firewalls are envisioned in both types of subsidiary model, there is no a priori reason why the market should view banks as less separate from direct subsidiaries than from related holding company affiliates or that the bank subsidiary model should be more "leaky."

Holding company proponents minimize the potential importance of nonsubsidy influences on the structural choices of banking organizations. For example, they discount the likelihood that unconstrained banking organizations might choose to locate riskier activities outside the bank, to insulate the bank from the effects of expected higher risks, or to reduce the perception of potential conflicts of interest.[5] They also don't recognize that banking organizations might be motivated to place activities inside the bank or bank subsidiary to more fully realize potential synergies and efficiencies rather than exploit any safety-net subsidy. Current observed differences in the organizational structure of banking organizations, both domestically and overseas, are consistent with the notion that multiple factors influence organizational choices. Available evidence indicates that, when banks have a structural option domestically they do not uniformly choose a single structural form.[6] The observed structural diversity suggests either a minor role for any safety-net subsidy or that both types of subsidiary structure impede the flow of any safety-net subsidy equally well.

The failure to consider nonsubsidy influences on structural choice may result in the overstatement of the benefits and understatement of the costs of a holding company

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requirement. For example, if banking organizations consider risk to the bank in making structural decisions, risk-reducing benefits from a holding company requirement are likely to be smaller. And to the extent that unconstrained structural decisions reflect attempts to realize efficiencies, rather than exploit a safety-net subsidy, the greater are the costs of forcing activities into holding company affiliates.

But definitive theoretical and empirical evidence on the determinants and performance implications of structure is lacking.[7] A major reason for the dearth of evidence is that banking companies in the United States do not have both structural options for the full range of permissible nonbank activities. Another is that they do not report unconsolidated financial data for their direct domestic subsidiaries.

This study, using a largely unexploited source of data, examines trends in the organizational structure of the foreign securities subsidiaries of U.S. banking organizations and whether or not differences in the structure are related to differences in measures of subsidiary efficiency, risk, and funding costs. The sample used in this study is an unbalanced panel data set consisting of the larger foreign subsidiaries of U.S. banking organizations that engaged in securities activities in each year from 1987 to 1997.

U.S. banking organizations long have been able to engage in a broad array of nontraditional activities overseas through foreign subsidiaries, including securities underwriting.[8] Each foreign subsidiary also is required to file a separate financial report. Further, U.S. banking organizations can structure these as either direct or indirect bank subsidiaries (basically subsidiaries of Edge Act companies, which are invariably direct subsidiaries of a U.S. bank) or holding company subsidiaries. More important, they have exercised this structural freedom and have engaged in securities activities through all three types of subsidiaries, so differences in the performance of holding company subsidiaries and direct and indirect bank subsidiaries can be examined.

The focus is on securities subsidiaries for a number of reasons. One is that securities activities increasingly are an important foreign and domestic activity for banks, and this raises concerns for bank supervisors and the Congress. Another is that, compared to other types of foreign subsidiary activities, there is relatively more observed structural variation for securities subsidiaries facilitating empirical testing for performance differences related to organizational form.

In brief, a simple analysis of structural trends reveals persistent structural variation across holding companies and bidirectional changes in subsidiary structure, suggesting that structural choice depends on more than a single factor. Trends in the aggregate asset shares for the different classes of subsidiaries reveal a preference for the use of the indirect bank subsidiary form, but the continued voluntary choice of the holding company subsidiary implies that this form is preferred in certain circumstances. An abrupt, persistent shift away from the holding company form is apparent after 1992 and does not appear to be driven by safety-net subsidy considerations. A probit model is used to empirically identify key factors influencing the likelihood that a securities subsidiary is organized as a bank subsidiary rather than a holding company affiliate. Most notably, this likelihood appears to be significantly and negatively related to a proxy for the risk of the affiliated lead bank, casting further doubt on the safety-net subsidy effects feared by holding company proponents.

Much of the remainder of the analysis in the paper examines the relationship between

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subsidiary organizational form and subsidiary-level measure of efficiency, risk, and funding costs. The empirical evidence, produced using both univariate and multivariate statistical techniques, does not support the position of the holding company proponents. Taking limited account of possible simultaneity does not alter this conclusion. Specifically, the evidence does not indicate that bank-owned securities subsidiaries tend to be more risky than those organized as holding company affiliates. Bank securities subsidiaries also do not appear to enjoy any funding advantage relative to holding company subsidiaries. These two results are particularly noteworthy, because section 23A and 23B restrictions on intracompany funding currently do not apply to transactions between banks and their direct and indirect subsidiaries. Finally, some evidence shows bank subsidiaries tend to be more efficient.

The remainder of the paper is organized as follows. In the next section, possible determinants of structural choice are discussed. In addition, expectations about the relationship between the performance measures and subsidiary organizational form are detailed. In the third section, some summary information on the sample of securities subsidiaries and structural trends over time is presented and discussed. This is followed by a more detailed empirical analysis of the factors influencing structural choice. In the next section of the paper, the empirical evidence on the performance effects of differences in structure is presented. A summary of the findings and conclusions follows.

2. Possible determinants and the expected performance effects of differences in organizational form

2.1. Possible determinants of trends in structure

The structural variety evident for foreign securities subsidiaries strongly suggests that the organizational decisions of each holding company reflect more than a single factor when regulatory constraints permit. Structural determinants merit exploration, because the subject remains largely unexplored and also because failure to consider the effects of the broader set of potential structural determinants could affect the analysis and interpretation of any observed relationship between organizational form and subsidiary performance in the analysis that follows. In particular, identifying any factors unique to overseas subsidiaries provides insight on the generality of any findings to the domestic debate about the structure and its effects.

Both home and host country regulations are critical potential determinants of the structure of overseas securities activities.[9] Perhaps the most important home country rule influencing structure is the exemption of direct and indirect bank subsidiaries from section 23A restrictions on intracorporate lending.[10] The absence of this constraint facilitates the transfer of any safety-net subsidy enjoyed by an affiliated bank and so could increase the likelihood that holding companies choose the bank subsidiary over the holding company affiliate, ceteris paribus. The magnitude of any subsidy, however, and so its effect on structural decisions, is likely to vary across holding companies and over time.[11] While measuring the subsidy at the individual holding company level is difficult, it should be crudely reflected in simple indicators of the asset risk and capitalization of the holding

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company's banking component. In general, safety-net subsidies are likely to be larger for companies with riskier banks and so one should observe greater reliance on the bank subsidiary at these companies if this structural determinant is important. This motive also could be reflected in aggregate structural data if greater reliance on the bank subsidiary form is evident during recessionary periods, when risk tends to increase for most banks.

Regulation K is a collection of other home country rules that could influence overseas structural choice. Through Regulation K, the Federal Reserve Board exercises its statutory authority to specify the activities and otherwise regulate the overseas operations of foreign branches, direct bank subsidiaries, Edge Act corporations and their subsidiaries, and bank holding company affiliates.[12] The board is required by the International Banking Act of 1978 to review and revise Regulation K at least once every five years to ensure that U.S. banks remain competitive abroad. The last completed revision occurred in 1991.[13]

Some provisions of Regulation K, both before and after the 1991 revisions, clearly limit the abilities of different units of U.S. banking companies to underwrite and deal in securities overseas in a variety of ways. For example, through foreign branches, U.S. banks generally can underwrite and deal only in government securities of the host country in which the branch is located. Direct bank subsidiaries face similar restrictions but can engage in impermissible securities activities to some extent.[14] But, neither the pre- nor post-1991 versions of Regulation K appear to force or induce banking organizations to conduct overseas securities activities in either the indirect bank (i.e., Edge) subsidiary or the holding company affiliate. The revisions did not alter the long-standing broad authority for either type of foreign subsidiary to underwrite and deal in debt securities.[15] Similarly, both types of foreign subsidiaries have been and continue to be subject to similar quantitative restrictions on the amount of equity securities that can be underwritten or held as dealing positions.[16] The other provisions of revised Regulation K related to securities activities also appear to be basically neutral with respect to the alternative subsidiary forms.[17] Examining the timing of any significant changes in the aggregate asset shares of the alternative subsidiary types should provide insight on the accuracy of this assessment. Since the revised provisions took effect in May 1991, any directly related changes in organization should be apparent by the end of that year.

Differences in host country rules could also influence management's decision to locate securities activities in a particular type of corporate entity. However, to the extent that host country rules constrain the structural choices of U.S. banking organizations, the available evidence suggests that they preclude or discourage the use of foreign branches rather than any particular type of subsidiary.[18] The information that does exist generally shows that, in most of the developed countries from which the sample subsidiaries are drawn, structural constraints tend to be looser than they are in the United States, reducing the chance that they are responsible for observed structural differences.[19] In this study, moreover, the sample is intentionally drawn to further reduce this likelihood. The sample is restricted to subsidiaries headquartered in countries where both types of organizational form existed simultaneously in at least one year over this period. This criterion is intended to eliminate subsidiaries located in countries where host country rules basically dictate structural choice.

A number of other nonregulatory factors also could influence the likelihood a holding company chooses a bank subsidiary structure for securities activities. Assuming securities activities tend to be riskier than traditional activities, management might choose to place

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such activities outside the bank to insulate the bank from risk, absent structural constraints and a significant safety-net subsidy. Given equivalent firewalls, it is not clear a priori whether more insulation is provided by the holding company affiliate, as has been alleged, and how the risk of an activity would influence the choice between these two forms. But, since funds flows between banks and their direct foreign subsidiaries are not restricted, the real or perceived insulation provided by this form is likely to be less and so could increase the likelihood that higher-risk activities are placed in holding company affiliates, ceteris paribus. Since insulation is likely to be a greater concern the higher the risk of the bank, one might observe an inverse relationship between the likelihood that securities activities are done in a direct subsidiary and bank risk.

It is possible that holding companies consider actual or expected subsidiary performance when deciding where a set of activities should be located within the corporation. For example, the inherent risk of a particular set of securities activities could vary considerably, both absolutely and relative to the risk of the more traditional activities of a particular holding company. The insulation motive just described may become relevant only when the risk of some set of securities activities is high. If this is the case, it suggests an inverse relationship between subsidiary-level risk and the likelihood that the subsidiary is structured as a bank subsidiary. The decision to house riskier activities in a subsidiary to achieve some level of insulation also could hinge on the relative scale of a particular set of activities, since this largely determines the impact of the activities on the overall risk of the organization.[20] In general, the larger the relative size of the some set of securities activities, the greater is the impact on overall risk.

If subsidiary risk, or one of the other key measures of subsidiary performance that are the focus of analysis in this study, influences organizational choice, it implies a two-way relationship between such measures of performance and structure. Simultaneity results in a variety of statistical problems, complicating the analysis and the interpretation of any estimated effects of structure on performance. The existence of such a possibility suggests that simultaneity and its potential effects at least should be acknowledged and explored to some extent in the analysis.

Another possibly important influence on how securities activities are organized is the existence of possible synergies or efficiencies. Such benefits could take the form of lower operating costs (from economies of scale or scope) or lower funding costs (stemming either from "real" economies in funding by larger, more diversified parents or from a safety-net subsidy). Largely anecdotal evidence suggests that it is more costly to conduct activities in holding company affiliates than in alternative structures. But the potential economies associated with a particular structural arrangement could depend on the characteristics of the lead bank and the securities subsidiary. For example, locating activities in a bank subsidiary might be more likely to yield greater economies when the parent bank is relatively large or relatively efficient and when the activities of the subsidiary are more "banklike."[21]

If significant efficiency advantages are associated with the bank subsidiary form, feedback from measures of subsidiary efficiency to structure is a possibility, although perhaps with an appreciable lag. Any structurally related inefficiencies are likely to be revealed and become burdensome over time only as the result of sustained competitive pressures on firms. Eventually, high-cost holding companies can be expected to examine

and rationalize their structure, ultimately adopting the most efficient subsidiary structure if a subsidiary structure is required.[22] Since there are likely to be lags in recognizing and eliminating sources of inefficiencies, the precise form of the expected relationship between subsidiary structure and measures of bank or subsidiary efficiency is unclear. For example, one possibility is that poor management results in inefficiency at the lead bank and the contemporaneous choice of a less-efficient holding company affiliate structure for overseas securities operations. In this case, the likelihood that a holding company chose the bank subsidiary form for securities activities would appear to be inversely related to lead bank costs. Alternatively, companies with less efficient banks would appear to be more likely to choose the presumably costlier holding company affiliate form for securities operations. This sort of relationship might be the opposite of what one observed if subsidiary structure at some given point in time was related to lead bank costs in some prior period.

Similarly, the observed subsidiary structure also could appear to depend on subsidiary level costs or efficiency. If bank subsidiaries tend to be more efficient than holding company affiliates, an inverse relationship should be observed between the likelihood of a bank subsidiary structure and contemporaneous indicators of subsidiary costs. That is, higher costs or lower efficiency should be negatively related to the probability that a subsidiary is organized as a bank subsidiary. As argued previously, the relationship between subsidiary structure and lagged subsidiary efficiency might be different.

The existence of a potential funding advantage for the parent suggests that activity funding needs may influence how they are structured. Since banks generally can raise funds more cheaply than parent holding companies, activities that require substantial funding are likely to be organized to facilitate the flow of funds from affiliated banks to the securities subsidiary. The exemption of transactions between banks and their direct and indirect subsidiaries from sections 23A and 23B reinforces this incentive.

In sum, the likelihood that a holding company chooses a particular subsidiary structure for its overseas securities operations could depend on a number of factors. The list of the most likely candidates includes measures of the relative size and risk of the lead bank, the relative size and risk of the securities activities in the overseas subsidiary, other subsidiary characteristics such as potential funding needs and the degree to which its activities are banklike, and possibly the efficiency of the parent or the subsidiary. However, a number of factors make the analysis of structural determinants difficult in practice. In some cases, it is difficult to clearly specify the expected effect of a particular variable on structure a priori. Other omitted factors might be important determinants of observed structure. The issue of possible lags between potential determinants and structure has been mentioned in the preceding discussion. Possible lags and simultaneity complicate any empirical analysis. All these issues could affect the relationship between structure and the set of determinants. Only some of these issues can be and are explicitly addressed in the later empirical section.

2.2. The expected effects of structure on performance

Holding company proponents assert that bank affiliates are likely to be exposed to greater risks from securities and other sorts of nontraditional activities conducted in bank

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subsidiaries than would be the case if the holding company structure were mandatory. This position presumes that the bank subsidiary provides less insulation to the bank from subsidiary risks and increases the likelihood that the bank subsidiary benefits from any safety-net subsidy enjoyed by the bank. It also discounts significant diversification benefits and any voluntary attempt by holding company management to use structure to shield the bank from increases in risk from expanded activities.

In this study, the "typical" effects of differences in structure on the risks of affiliated banks are inferred from observed differences in subsidiary-level stand-alone risk. This approach is consistent with the view that any potential diversification benefits associated with securities activities are likely to be small regardless of structure. In this case, the likelihood that an affiliated bank is exposed to greater risk from a particular type of subsidiary should be directly related to the risk of individual subsidiaries with that structure. This approach also is more convenient, given differences in structure within and across holding companies over the sample period.

Given this approach, a finding that the riskiness of direct and indirect bank subsidiaries is significantly greater than the riskiness of holding company subsidiaries constitutes the clearest empirical support for the position of holding company proponents. The odds in favor of such a result should be increased for this sample because firewalls are more substantial for holding company affiliates than for bank subsidiaries.

Also note that the clear difference in firewalls in this case might provide insight on the validity of another key assumption of holding company proponents; namely, that holding companies are unlikely to take differences in insulation into account when making structural decisions. Finding significantly higher risk at holding company subsidiaries suggests that companies may adjust their structure to provide the desired insulation.

Assuming the validity of the arguments of the holding company proponents just outlined, differences in securities subsidiary structure also may have effects on subsidiary-level borrowing costs. In their view, funding costs are likely to be lower at bank subsidiaries than at holding company subsidiaries because more of the affiliated bank's typical safety-net subsidy tends to be passed through to direct subsidiaries. Again, the absence of fundflow impediments for banks and their direct and indirect foreign subsidiaries should increase the odds of finding this sort of effect, if in fact it does exist.

Some debate also focuses on whether or not a significant efficiency penalty is associated with the holding company structure. There at least is some anecdotal evidence to support this view. For example, in the United States in time periods prior to the creation of a federal safety net and in other countries more recently, when the holding company structure is not required, firms typically do not choose to organize in this fashion. Some observers concede the existence of a cost penalty associated with the holding company form but view it as a necessary price associated with the presence of required firewalls.[23] Given equivalent firewalls, the source of any efficiency advantage inherent in the bank subsidiary form is unclear. But, again for this sample, firewalls are less extensive for bank subsidiaries so it is likely that costs at holding company subsidiaries will be no less than those of bank subsidiaries and could possibly be greater.

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3. Background on the data and sample

The data set is composed of foreign subsidiaries deemed to be engaged in securities activities in each year over the 1987–1997 period. For the purposes of this paper, subsidiaries were considered to be engaged in securities activities if they reported a primary activity of investment or merchant banking, securities underwriting or securities broker/dealer, or reported some amount of underwriting income in two or more years over the 1987–1995 interval.[24] Only securities subsidiaries that filed more comprehensive financial reports were included.[25] Subsidiaries also were included only if they were headquartered in countries where both types of organizational form existed simultaneously in at least one year over this period. This criterion is intended to eliminate subsidiaries located in countries that may have restricted structural choice. The included subsidiaries account for most of the activity of all securities-related foreign subsidiaries. The potential sample consists of 551 annual observations for 108 different foreign subsidiaries over this period, headquartered in 12 different countries.[26]

All the analysis in this paper is based on annual year-end accounting numbers reported by the foreign subsidiaries on their financial reports. This implies a number of well-recognized potential problems.[27] Attempts are made to mitigate or control for such data-related shortcomings.[28]

Selected data that provide insight on the nature of the sample companies are presented in table 1. The first two columns in the table show the aggregate number and total assets of the foreign securities subsidiaries in the sample over time. The total asset series indicates considerable growth in this line of business, particularly since 1992. The third column shows the proportion of aggregate total assets reported by all types of foreign subsidiaries accounted for by the securities subsidiaries in the sample. This proportion more than doubled over the 1987–1997 period. In 1997, the 39 securities subsidiaries in the sample accounted for roughly 45% of the total assets of all types of foreign subsidiaries.[29]

In any given year, the securities subsidiaries in the sample are owned by a relatively small number of bank holding companies (BHCs), but the importance of this line of business varies considerably across these companies. In 1987, 17 different BHCs owned the 59 subsidiaries in the sample. The mean and median value of the ratio of total foreign subsidiary securities assets to total consolidated holding company assets were 2.47% and 2.0% at this time. In 1997, the 39 subsidiaries in the sample were owned by just 10 different BHCs, and the mean and median values of this same ratio were 13.89 and 3.65%.[30] In all, 23 different holding companies owned the securities subs that make up the sample.[31]

4. Structural trends and determinants

The remaining three sets of columns of table 1 contain data on the number, aggregate total assets, and the percent of sample assets accounted for by the sample subsidiaries separated into three organizational categories: holding company subsidiaries, direct bank subsidiaries, and indirect bank subsidiaries (subsidiaries of Edge Act corporations that, in turn, are direct subsidiaries of a bank). The aggregate total asset figures and sample

Table 1. Selected aggregate data on the sample subsidiaries

	All Sample Subsidiaries			HC Subsidiaries			Direct Bank Subsidiaries			Indirect Bank Subsidiaries		
Year	Number	Total Assets ($ mill)	% of All for Subs	Number	Total Assets ($ mill)	% of Sample	Number	Total Assets ($ mill)	% of Sample	Number	Total Assets ($ mill)	% of Sample
1987	59	32428.3	20.4	12	10367.9	32.0	10	4496.1	13.9	37	17564.3	54.2
1988	54	28984.3	18.6	13	10220.5	35.3	8	3217.5	11.1	33	15546.2	53.6
1989	60	38220.3	19.2	14	8778.9	23.0	10	4594.4	12.0	36	24846.9	65.0
1990	58	41077.8	21.2	12	5334.0	13.0	8	3517.5	8.6	38	32226.2	78.5
1991	49	46709.8	23.5	10	11995.7	25.7	8	2836.2	6.1	31	31677.6	68.2
1992	43	53272.0	26.0	9	17038.7	32.0	6	1147.0	2.2	28	35088.3	65.9
1993	44	88787.0	34.2	6	2577.6	2.9	7	4727.5	5.3	31	81481.9	91.7
1994	49	123369.3	36.9	8	2568.3	2.1	5	2872.4	2.3	36	117928.6	95.6
1995	47	165190.3	40.7	7	4430.9	2.7	4	1388.0	0.8	36	159371.3	96.5
1996	49	216691.0	44.1	8	4404.2	2.0	2	1726.6	0.8	39	210560.2	97.2
1997	39	245194.0	44.5	8	3628.9	1.5	2	2338.6	1.0	29	239226.5	97.6

shares show a movement away from both the holding company and direct bank subsidiary organizational form to the indirect bank subsidiary alternative over the first 4 years of the period. The asset share accounted for by holding company subsidiaries rebounded somewhat in the middle of the period, while the share of direct bank subsidiaries did not. Beginning in 1993, the asset share numbers show a rather abrupt, persistent shift in the direction of the indirect bank alternative. Since 1993, basically all the assets of foreign securities subsidiaries are held by indirect and, to a much lesser extent, direct subsidiaries of banks.

The 1993 decline in the holding company subsidiary asset share reflects both robust internal growth by non-holding company subsidiaries as well as internal reorganizations by several holding companies.[32] In fact, a number of shifts in the corporate location of sample subsidiaries took place over the period in both directions (holding company subsidiary to direct or indirect bank subsidiary and vice versa).[33]

A closer look at company-specific structural data provides additional insight on structural preferences over this period. Table 2 presents information on the different structural configurations of the parent bank holding companies owning the sample subsidiaries over time. In general, the data in the table reveal persistent diversity in structural preferences by holding companies over this interval. The preferred structure varies, even for holding companies that operate a single organizational form in a particular year. That is, not all these companies choose the same organizational form. The data in the table also show that a number of holding companies utilize more than one organizational form for their foreign securities subsidiaries at any given moment in time.

A number of preliminary, tentative conclusions are suggested by the data in these two tables. The persistent structural variation across holding companies and bidirectional changes in structure lend credence to the view that the expected net benefits of particular structures, and so structural choice, depends on more than a single factor. The asset share evidence indicates that the economics of the alternatives favor the use of the indirect bank

Table 2. Structural configurations of foreign securities subsidiaries by parent holding company (HC)

Year	All HCs (No.)	HCs with One Organizational Form				HCs with More Than One Organizational Form			
		Number	HC	DB	IB	Number	DB + IB	HC + DB or IB	HC + DB + IB
1987	17	11	2	2	7	6	4	0	2
1988	17	12	2	1	9	5	3	0	2
1989	17	13	1	3	8	5	3	0	2
1990	16	12	0	3	9	4	2	0	2
1991	14	9	0	2	7	5	1	1	3
1992	11	7	0	1	6	4	1	1	2
1993	10	6	0	1	5	4	2	0	2
1994	10	6	0	1	5	4	2	0	2
1995	10	5	0	1	4	5	2	2	1
1996	9	7	1	1	5	2	0	1	1
1997	10	8	2	1	5	2	0	1	1

Note: HC: holding company subsidiary. DB: direct bank subsidiary. IB: indirect bank subsidiary.

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subsidiary form, but the continued voluntary choice of the holding company subsidiary implies that this form is preferred in certain circumstances.

The decline in the asset share of holding company affiliates occurred rather abruptly after 1992. The timing of this shift does not appear to be explained primarily by a desire to exploit any safety-net subsidy flowing from the parent bank to its direct and indirect bank subsidiaries. The parent holding companies could have altered their structure at any time over the interval examined, and most observers would agree that the likelihood that any bank enjoyed a meaningful safety-net subsidy was higher in the period before 1993. So, if exploitation of the safety-net subsidy were a major motivation for the structural shift away from the holding company model, this shift should have been observed prior to 1993. It also does not appear to be the direct result of changes in home country rules, since it occurred after the effective date of the Regulation K revisions in 1991. In addition, the 1991 revisions do not appear to create significant regulation-related advantages for direct or indirect bank subsidiaries relative to holding company affiliates. It may simply be that other factors explain the holding company affiliate-to-indirect bank subsidiary switches during 1993 and the contemporaneous asset growth of the Edge Act subsidiaries could be due primarily to the fortuitous confluence of market and regulatory developments. In particular, the pattern of the pace of underwriting activity was exceptionally brisk during 1993 and came in the wake of the relaxation in Regulation K constraints on underwriting and dealing for both indirect bank subsidiaries and holding company affiliates in 1991.[34]

Further more definitive insights on the importance of potential determinants of structural choice can be obtained from a multivariate statistical model. The dependent variable in the model used in this study is a binary variable that takes on a value of 1 if a subsidiary is a direct or indirect bank subsidiary and 0 if it is a holding company affiliate. That is, all bank subsidiaries (both direct and indirect) are viewed as a single group to be compared to holding company affiliates. Considering these two sorts of subsidiaries as a single class appears to be justified because the two types of bank subsidiaries are similar in most important respects (e.g., regulatory treatment like the exemption from sections 23A and 23B restrictions).[35] A practical reason for this approach is that it simplifies the analysis. The specific type of model used here is a random effects probit model.

In the preceding discussion, a number of variables that might influence the likelihood that a particular subsidiary was organized as a bank subsidiary were discussed. One measure was the relative size of the lead bank. Since larger lead banks should offer greater potential for economies for bank subsidiaries, the expected effect of this variable is positive. The measure used is estimated bank assets divided by consolidated holding company assets (BTAR).[36] Another key variable that is expected to influence the dependent variable is some measure of bank risk, although the direction of the effect is not clear. If the safety-net subsidy is the most powerful influence on structural choice and flows more readily to bank subsidiaries, as alleged by holding company proponents, increases in bank risk should increase the likelihood that a subsidiary is organized as a bank subsidiary since any subsidy tends to increase with bank risk. Alternatively, if bank subsidiaries clearly offer less insulation, and safety-net subsidy exploitation is not a holding company's preeminent concern, it might choose to conduct securities activities in holding company affiliates to prevent these activities from increasing further the risk of the

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lead bank. Here, bank risk is not measured directly but simply inferred from consolidated holding company data.[37] A single composite risk indicator—the bank's net equity ratio (BNEAR)—is used. This ratio is the combination of three bank risk ratios: the capital/assets ratio, the ratio of nonperforming loans to assets ratio, and loan loss reserves divided by total assets.[38] A final lead bank variable that might influence the likelihood of observing a bank subsidiary is a measure of lead bank efficiency. The efficiency variable used here, more accurately an inverse indicator of efficiency, is consolidated holding company operating expenses divided by consolidated net revenue (BEFFR). Again the direction of the effect is unclear. One possibility is that potential economies for bank subsidiaries might be higher when the lead bank is more efficient, and so there could be a positive relationship between bank efficiency and the likelihood that a subsidiary is a subsidiary of the bank. Or this same sort of relationship might be observed if the bank subsidiary option is the most efficient option and tends to be chosen by the superior managers of efficient banks. Alternatively, holding companies with inefficient banks might choose the bank subsidiary option to lower consolidated costs. This implies an inverse relationship between bank efficiency and the likelihood that a subsidiary is a bank subsidiary.

The likelihood that a particular subsidiary is organized as a bank subsidiary might also vary with its own characteristics. One possible factor might be its relative size, although the direction of an independent size effect is unclear. Since the bank subsidiary form probably provides less insulation in the absence of funds flow restrictions and securities subsidiaries tend to have higher risk than affiliated banks, larger subsidiaries may tend to be organized as bank subsidiaries if the safety-net subsidy motive is particularly important. If this motive is not important, holding companies might choose to organize large subsidiaries as holding company affiliates to limit any increase in risk to the lead bank. In addition, larger securities subs may be able to realize efficiencies on their own and not need to be more closely integrated with the lead bank. Subsidiary total assets as a percent of consolidated holding company assets (TAR) is used as the measure of relative size.

Another factor that might influence the likelihood that a subsidiary is organized as a bank subsidiary is some measure of its funding needs. Since section 23A and 23B restrictions do not apply to bank subsidiaries, securities subsidiaries with a revealed need for funding are more likely to be organized in this way. Funding requirements are measured as the ratio of a subsidiary's liabilities issued to related entities divided by subsidiary total assets (RLBLR).

Subsidiaries that are more "banklike" might obtain more benefits from being closely related to the lead bank, so there could be a positive relationship between an indicator of "bankness" and the likelihood of being organized as a bank subsidiary. One possible available measure of this attribute is the extent to which a securities subsidiary is involved in lending to nonrelated entities. The actual measure used is net loans to nonrelated entities divided by subsidiary total assets (NRNLR).

Subsidiary risk also may influence the structural decision although the direction is not clear. One possibility is that holding companies might conduct riskier activities in less insulated bank subsidiaries, given powerful safety-net subsidy incentives. The other is that holding companies might choose to insulate banks from securities risks by placing riskier securities activities in holding company affiliates. Two different alternative subsidiary risk

measures are employed: the subsidiary's equity/assets ratio (EAR) and the ratio of equity investments in nonrelated entities divided by total assets (NRESR).[39]

Finally, a subsidiary efficiency ratio (EFFR), defined in the same way as the bank efficiency measure described previously (subsidiary operating expenses divided by net operating income), is used to determine if there is feedback from structure to this measure of performance.

The results of estimating various versions of a structure equation appear in table 3. All these equations ignore complications related to possible simultaneity or the existence of lags. That is, structure is related to contemporaneous values of the hypothesized determinants. The first equation includes only explanatory variables that represent characteristics of the lead bank of each foreign subsidiary's parent holding company. In eq. (1), the coefficient on each of the lead bank characteristic variables is significant. The results show that the likelihood that a foreign subsidiary is organized as a bank subsidiary is higher, the greater is the relative size of the lead bank.[40] The positive sign on the bank net capital ratio is particularly noteworthy, since it implies an inverse relationship between lead bank risk and the likelihood that a securities subsidiary is organized as a bank subsidiary. This is the opposite of what one would expect if structural decisions were driven primarily by safety-net subsidy considerations, as alleged by holding company proponents. This result suggests that holding companies may choose structure to insulate the bank from risk. Finally, the negative coefficient on the bank cost ratio indicates that the likelihood that a foreign subsidiary is organized as a bank subsidiary is higher, the more efficient is the lead bank.

The second equation adds a variety of securities subsidiary characteristic variables to the basic specification used in eq. (1). Notably, the signs, magnitudes, and statistical significance of the three lead bank characteristic variables basically are unchanged. The coefficient of the relative subsidiary size variable is positive and marginally significant in

Table 3. Random-effects probit estimates of the effects of factors influencing the likelihood of a bank subsidiary structure

Explanatory Variable	Equation (1) ($N = 455$)		Equation (2) ($N = 404$)		Equation (3) ($N = 406$)	
	Coeff.	Z Stat.	Coeff.	Z Stat.	Coeff.	Z Stat.
BTAR	3.38405	3.82***	3.61330	3.52***	3.61626	3.52***
BNEAR	8.38153	2.65***	9.24828	2.33**	9.58296	2.45***
BEFFR	− 1.62532	− 2.29**	− 1.85496	− 2.11**	− 1.72773	− 2.04**
TAR		4.96655	1.73*	4.49164	1.73*	
RLBLR			0.05383	0.19		
NRNLR			1.00750	2.24**	1.01036	2.26**
EAR			0.19893	0.43		
NRESR			− 7.38113	− 2.83***	− 7.21447	− 2.82***
EFFR			− 0.24747	− 1.83*	− 0.26125	− 1.98**
CONSTANT	− 1.29411	− 1.33	− 1.37400	− 1.21	− 1.40190	− 1.23
Chi square	42.86		51.94		52.03	
DOF	4		9		7	

Notes: *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

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eq. (2), indicating larger subsidiaries tend to be bank subsidiaries. The explanation for this result is not clear. Only one of the two subsidiary risk variables in eq. (2), the ratio of equity investments in nonrelated entities to total assets, is significant, with a negative sign. This result indicates that, the higher is this ratio and presumably the higher the risk of a securities subsidiary, the lower is the likelihood it is organized as a bank subsidiary. Again, this does not appear to be consistent with the notion that the safety-net subsidy is the primary determinant of structure. The other risk indicator, the subsidiary equity/asset ratio, is not significant in this equation.

The coefficient on the measure of subsidiary funding requirements is positive but not even close to significant in eq. (2). This result suggests that the extent to which a subsidiary relies on affiliated companies, including the lead bank, for funding is not related to organizational form. The coefficient on the ratio of loans to nonaffiliates to total assets is positive and significant, indicating higher values of this ratio are associated with an increased likelihood that a subsidiary is organized as a bank subsidiary. This is consistent with greater potential synergies for such subsidiaries when they are more closely integrated with the lead bank.

Finally, the subsidiary cost ratio has a negative, marginally significant coefficient in eq. (2), suggesting some feedback from this measure of subsidiary performance to structure. This result implies a positive relationship between subsidiary efficiency and the likelihood that it is organized as a bank subsidiary.

Equation (3) is simply eq. (2) re-estimated with the insignificant variables dropped. This specification is included only to show that the estimation results are not highly sensitive to changes in specification. Accordingly, the results are not discussed.[41]

The estimation results provide hard evidence about at least some of the important determinants of securities subsidiary structure. Additional evidence about the power of this set of explanatory variables can be gained by examining how well one of the more comprehensive equations predicts structure. Here, in-sample predictions of organizational form are generated using eq. (3). Using the standard 0.5 probability threshold for classification, the model correctly classifies 96.1% of the bank subsidiary observations but only 28% of the holding company subsidiary observations correctly. Overall, 84.2% of the observation are classified correctly. Using a 0.82 probability threshold (the proportion of observations accounted for by bank subsidiaries), the model correctly classifies 68.7% of the bank subsidiary observations and 84.5% of the holding company affiliate observations. Overall classification accuracy is 71.4%.

Another interesting exercise is to see how well the model predicts the structure of subsidiaries that changed organizational form over the sample period. In particular, does the model correctly predict the 1993 switch of several relatively large holding company affiliates to the bank subsidiary form?

Seven subsidiaries with no missing data switched from the holding company affiliate form to a bank subsidiary form over the sample period. Three of these, including two large ones, switched during 1993. All seven are correctly classified as bank subsidiaries in the year in which they switched using eq. (3) and the 0.5 classification threshold. Five of the seven, including all three of those that switched structure in 1993, are correctly classified using the 0.82 threshold.

Six subsidiaries with no missing data switched to a holding company affiliate form from

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the bank subsidiary form over the sample period. Three of the seven are correctly classified as holding company bank subsidiaries in the year in which they switched using eq. (3) and the 0.5 classification threshold. All six are correctly classified using the 0.82 threshold.

So the classification results show that this relatively simple model predicts organizational form reasonably well, particularly for subsidiaries with the bank subsidiary form, although its accuracy may be biased upward since the predictions are in-sample. The key conclusion that can be drawn from the estimated structure models and the associated classification results is that they are not consistent with the hypothesis that structural choice is driven primarily by a desire to exploit the safety-net subsidy.

5. Empirical evidence on the influence of structure on performance

The effects of structure on key measures of subsidiary performance are analyzed using both univariate and multivariate statistical tests in two different ways. First, both sorts of tests are conducted using pooled data for the entire sample of securities subsidiaries. This approach maximizes the number of observations available for analysis at the cost of possible bias if the distributions of the performance measures vary across subsidiaries. Both univariate and multivariate tests of differences in performance across the different organizational groups also are conducted using performance variables defined as multiyear averages, standard deviations, or transformations of these two magnitudes for a number of rolling, multiyear time periods. Several benefits accrue from using this second approach. One is that it avoids any biases associated with pooling the data across subsidiaries and over time. Another is that it allows two additional measures of risk to be constructed for each of the subsidiaries in the sample. The problem with switching to this sort of approach is that it results in a sharp reduction in the number of observations in the samples in each time period, and so reduces the power of the statistical tests, even if a relatively modest time horizon, like four years, is used.[42]

However, even pooling does not provide large subsamples of all types of subsidiaries. This lack of degrees of freedom is another rationale for generally treating all bank subsidiaries (both direct and indirect) as a single group to be compared to holding company subsidiaries.

5.1. Pooled sample: univariate tests

The first set of statistical results presented includes univariate tests of differences in the means, medians, and in some cases the variances of selected subsidiary-level measures of risk, liability costs, and efficiency.[43] In the univariate analysis of the pooled sample, holding company subsidiaries are compared to the combined bank subsidiary group and also to direct bank subsidiaries alone, since pooling yields sufficient observations to make conducting such a test worthwhile.[44] These results appear in table 4.[45] The univariate nature of these tests should be kept in mind. Controlling for other variables that might influence observed differences in the mean and standard deviations of performance ratios in the table could alter the findings.

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Structurally related differences in efficiency are assumed to be reflected in differences between the mean and median values of the efficiency ratio (EFFR).[46] Differences in mean and median profitability also could reflect differences in efficiency, and this is one of the motivations for examining differences in means and medians of two standard profitability measures—pretax return on average assets (PROA) and pretax return on average equity (PROE)—in the table.[47] An imperfect positive correlation between efficiency and profitability is likely to be found. Standard definitions of the two profitability measures are used.

The mean value of the efficiency ratio is higher at holding company subsidiaries (0.847) than for the all bank subsidiary group (0.671) and the difference is statistically significant,

Table 4. Differences in the performance of foreign securities subsidiaries, 1988–1997 (pooled sample)

Performance Measures	HC Subs ($N = 33$)	All Bank Subs ($N = 376$)	Test Statistic (HC vs. all bank)	Direct Bank Subs ($N = 59$)	Test Statistic (HC vs. Direct Bank)
Efficiency ratio (EFFR)					
Mean	0.847	0.671	2.35**	0.608	3.42***
Median	0.734	0.622	2.1***	0.676	1.80*
SD	0.601	0.435		0.288	
Pre tax ROA (PROA)					
Mean	0.021	0.018	0.18	0.006	0.83
Median	0.019	0.014	0.60	0.015	0.43
SD	0.138	0.054	6.49***	0.078	3.14***
Pre tax ROE (PROE)					
Mean	0.137	0.158	− 0.44	0.224	− 1.56
Median	0.148	0.123	0.35	0.146	1.37
SD	0.395	0.318	1.54***	0.248	2.52***
Equity/assets					
Mean	0.228	0.148	3.73***	0.120	4.52***
Median	0.171	0.091	4.76***	0.079	4.07***
SD	0.173	0.158		0.101	
Liability cost ratio (LCR)					
Mean	0.056	0.066	− 1.39	0.084	− 1.90*
Median	0.40	0.054	2.53**	0.068	2.85***
SD	0.053	0.061		0.100	
LCR for related cos. (RLCR)					
Mean	0.061	0.074	− 1.91**	0.100	− 2.23**
Median	0.059	0.057	0.89	0.076	2.05**
SD	0.044	0.086		0.120	
LCR for Nonrelated cos. (NRLCR)					
Mean	0.071	0.060	0.76	0.069	0.11
Median	0.035	0.048	0.95	0.073	2.01**
SD	0.108	0.059		0.052	

Notes: The test statistics are either t statistics (reflecting the null hypothesis that two mean values do not differ), Z statistics (reflecting the null hypothesis that two medians do not differ using a Wilcoxon rank sums test), or F statistics (reflecting the null hypothesis that two variances do not differ). *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

indicating higher costs and lower efficiency for holding company securities subsidiaries. The difference between the means is even more pronounced when holding company subsidiaries are compared to direct bank subsidiaries (mean EFFR = 0.608), and this difference also is highly significant. Differences in median values of EFFR confirm that costs tend to be higher and efficiency lower at holding company affiliates than at either type of bank subsidiary (0.734 vs. 0.622 and 0.676). The differences in the means and medians of the profitability measures are never significant, however.

Two pieces of information in the table provide insight on differences in the risk of the various classes of securities subsidiary. One indicator is differences in the means and medians of the average-equity-to-average-assets ratio (EAR). Ceteris paribus, higher equity ratios imply lower risk. Using this metric, the results in the table suggest that holding company subsidiaries are less risky than bank subsidiaries. The mean equity ratio for holding company subsidiaries (0.228) is well above the comparable ratios for the all bank subsidiaries (0.148) and the direct bank subsidiary (0.120) groups and the differences are statistically significant. This same pattern is evident for median values of this ratio (0.171 vs. 0.091 and 0.079).

However, comparisons of simple equity ratios can lead to erroneous conclusions about overall risk differences because they do not reflect possibly offsetting differences in asset risk for each class of firm. Markets (and supervisors) permit firms with lower risk to hold less capital. So lower capital ratios at bank subsidiaries could reflect lower asset risk, implying equal or possibly lower overall risk relative to holding company subsidiaries.

In table 4 insight on this likelihood is revealed by a comparison of the standard deviations of the pretax profitability measures for the different classes of subsidiaries. Higher variability of the profitability measures, especially return on assets, is likely to reflect differences in asset risk. The standard deviations of pretax ROA and pretax ROE are both higher at holding company subsidiaries (0.138 and 0.395, respectively) than for all bank subsidiaries (0.054, 0.318) and direct banks subsidiaries (0.078, 0.248). These differences are statistically significant in every case. Thus, the lower capital ratios of bank subsidiaries are basically offset by correspondingly lower return volatility.

The last three variables in the table are measures of liability costs and differences in the means and medians provide insight on whether or not bank subsidiaries enjoy a funding advantage relative to holding company affiliates. Holding company proponents expect a safety net-related funding advantage for bank subsidiaries. The measures of the liability costs of securities subsidiaries used here are crude but have been used in a number of other studies.[48] The first of the three variables, the liability cost ratio, is defined as the total interest expense at year-end divided by average total liabilities for that year. The second variable represents an attempt to measure the cost of funds supplied by related companies (RLCR), defined in an analogous fashion: interest paid to related companies divided by the average total of such liabilities. Examination of differences in this variable may be the most informative in making judgments about the direct transference of any subsidy to securities subsidiaries. The last variable is a measure of the cost of borrowing from nonrelated parties (NRLCR), defined as the interest paid to such parties divided by the average total of these liabilities.

The differences in the means of all three of these variables across organizational classes do not show significantly lower borrowing costs for bank subsidiaries. In fact, in most

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cases, including all of those where statistically significant differences are observed, the data indicate the opposite. The mean rate for all liabilities is higher for all bank subsidiaries and direct bank subsidiaries than they are for holding company subsidiaries (0.066 and 0.084 vs. 0.056), and the difference is significant when direct bank and holding company subsidiaries are compared. The differences in the median rates paid on all liabilities also show higher borrowing costs for both all bank and direct bank subsidiaries (0.054 and 0.068 vs. 0.04), and both differences are significant. More notably, the mean rates on liabilities issued to related companies again are higher at both bank subsidiary reference groups than they are at holding company subsidiaries (0.074 and 0.100 vs. 0.061) and these differences are significant in both cases. This also is true when the medians of holding company affiliates and direct bank subs are compared (0.059 vs. 0.076). The roughly equal median values at holding company affiliates and the more comprehensive group of banks subsidiaries are the lone exception to this general pattern.

The mean rate on liabilities issued to nonrelated parties is lower at both of the bank subsidiary groups than at holding company subsidiaries, but neither of the differences is even marginally significant. However, the opposite result is evident when differences in median rates are examined. In the case of medians, rates are higher for both groups of bank subsidiaries than for holding company affiliates (0.048 and 0.073 vs. 0.035), and in the case of direct bank subsidiaries, the difference is significant.

Although not reported in table 4, differences in the mean proportions of total liabilities held by related companies also were examined to see if bank subsidiaries borrowed more of their funds from coaffiliates. Examining differences in the proportions of liabilities held by related entities serves as an additional check on the liability rate results. If the safety-net subsidy is as important as holding company proponents suggest, one would expect to observe significantly higher proportions of bank subsidiary funding coming from related entities.[49] But analysis of differences in the proportion of liabilities held by related entities does not conclusively demonstrate that this is the case. The mean proportion of total liabilities held by related companies is 0.513 for the holding company subsidiaries. It is somewhat higher, 0.577, for the combined bank subsidiary group but this difference is not statistically significant. The mean proportion for direct bank subsidiaries is 0.414, below that of holding company subsidiaries and this difference is marginally significant. The same pattern is revealed when median values are compared across groups, but these differences are never significant.

The descriptive statistics in the table and the associated statistical tests also were calculated after dropping observations for subsidiaries in periods where they changed organizational form, to see whether or not performance effects differed during transition periods. Dropping these observations did not change the results reported in table 4 in any material way, and so these results are not presented.

The analysis was repeated using only observations from 1988–1992, a period of economic weakness where the risk exposure of the typical U.S. banking organization tended to be relatively high. Further, this interval largely predates changes in capital requirements and supervisory policies related to FDICIA. During this time period, any safety-net-related subsidy effects on the results might be more pronounced. Basically, the results for the 1988–1992 period do not differ in any material way from those reported in table 4 and so are not presented or discussed.

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5.2. Pooled sample: multivariate tests

Because the observed differences in the means and medians could reflect the effects of nonstructural variables not controlled for in the univariate tests, simple regressions also were estimated using the pooled sample and the same set of performance measures as dependent variables. The estimated equations for the entire 1988–1997 period appear in table 5.

The starting point of the analysis for each performance variable was a simple equation that includes a constant, the log of subsidiary total assets (LSUBTA), a binary bank subsidiary organizational form dummy (BKSUB: equal to 1 if the subsidiary was a direct or indirect bank subsidiary, otherwise equal to 0), and a set of headquarters country dummies as explanatory variables.[50] This is the first version estimated for each performance measure and reported in the table.[51] Since this specification could exclude other determinants of performance and so influence the estimated effect of structure on performance, a more complicated version of each performance equation also was estimated. Since theory provides limited guidance on the correct specification of the performance equations used here, judgment was used to select a relatively small set of additional control variables most likely to influence performance. This entire set of additional control variables then was added to basic set of explanatory variables and the equation was re-estimated. This specification is the second version of each equation reported in the table.

The first additional explanatory variable is an indicator of the importance of a subsidiary's level of fee-based, or off-balance-sheet, activity (noninterest income divided by total assets, NONIIR). Three variables are used to capture potentially important differences in the business mix. The first of these is an indicator of the level of portfolio lending (net loans to nonrelated entities divided by total assets, NRNLR). The second is an indicator of the subsidiary's involvement in trading activities (trading account assets divided by total assets, TAAR). The third measures the extent to which a subsidiary makes direct equity investments in nonaffiliated companies (equity securities of nonaffiliated companies held divided by total assets, NRESR). Two variables are used as indicators of the degree to which subsidiaries rely on related entities for funding or operational support (liabilities issued to related entities divided by total liabilities, RLBLR, and noninterest expenses paid to related entities divided by total noninterest expenses, RNONIER). The first of these is used in the performance equations, where the equity/asset ratio and the liability cost measures are used as the dependent variables. The second is used in the efficiency and profitability equations. A dummy variable is included to see if the performance of subsidiaries that do not report securities as a primary activity differs systematically from those that do (the variable takes on a value of 1 for subsidiaries that have a securities-related primary activity code, otherwise equal to 0, PSECACT). Finally, in some equations where it might be important, the equity/assets ratio is included as an explanatory variable.[52]

The sign and significance of the estimated coefficient on the bank subsidiary dummy in the simple regressions never differed materially from those found in the expanded regressions. As a result, and in the interests of space, the discussion will focus on the sign and statistical significance of the estimated coefficient on the structure variable in each equation.

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Table 5. Performance equations, pooled sample, 1988–1997 (by dependent variable)

Explanatory Variables	EFFR				PROA				PROE			
	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat
CONSTANT	0.9035	5.94***	0.9649	5.16***	0.0768	4.51**	0.0401	1.96**	0.0633	1.00	−0.1368	−1.31
LSUBTA	0.0183	0.97	0.0334	1.64	−0.0074	−3.20***	−0.0042	−1.75*	0.0044	0.39	0.0173	1.43
Bksub	−0.2259	−3.53***	−0.2337	−3.52***	−0.0069	−0.81	0.0032	0.37	0.0373	0.85	0.0650	2.02**
NONIIR			1.3809	4.62***			0.1841	3.95***			1.3456	6.33***
RNONIER			−0.1621	−2.23**			−0.0180	−1.64			−0.0050	−0.09
RBLR												
NRNLR			0.1117	−0.99			0.0210	1.38			0.0655	1.16
TAAR			0.0596	0.68			−0.0002	−0.01			0.0233	0.35
NRESR			−0.7267	−1.96**			0.1229	3.37***			0.3964	2.26**
PSECACT			−0.2277	−2.18**			0.0014	0.17			0.0433	1.11
EAR											−0.2245	−2.09**
Number of observations	404		404		442		442		442		442	
R^2	0.052		0.093		0.061		0.082		0.071		0.124	
Lagrange multiplier statistic	13.63		7.24		1.75		0.87		1.21		0.98	

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Table 5. (*continued*)

Explanatory Variables	LCR				RLCR				NRLCR			
	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat
CONSTANT	0.1043	5.96***	0.1011	4.50***	0.1189	5.21***	0.1511	4.96***	0.0446	2.44**	0.0462	1.84*
LSUBTA	−0.0081	−3.56***	−0.0089	−3.56***	−0.0091	−2.96***	−0.0122	−3.63***	0.0001	0.06	−0.0014	−0.50
BKSUB	0.0007	0.09	−0.0055	−0.70	0.0160	1.39	0.0134	1.13	−0.0024	−0.78	−0.0055	−0.60
NONIIR			−0.0851	−2.10**			−0.0678	−1.06			−0.0307	−0.66
RNONIIER												
RLBLR			0.0090	0.90			−0.0395	−2.51**			0.0091	0.74
NRNLR			0.0596	4.16***			0.0482	2.32**			0.0231	1.30
TAAR			0.0072	0.67			0.0159	0.92			0.0046	0.35
NRESR			−0.0158	−0.43			−0.0038	−0.07			−0.0753	−0.79
PSECACT			0.0006	0.07			0.0087	0.77			0.0060	0.59
EAR			0.0211	1.09			−0.0042	−0.15			−0.0074	−0.26
Number of observations	423		423		405		405		365		365	
R^2	0.199		0.282		0.120		0.161		0.310		0.321	
Lagrange multiplier statistic	82.81		44.99		11.11		4.93		33.40		25.62	

Notes: eleven country dummy variables also were included in each estimated equation but are excluded from the of reported results. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Table 5. (continued)

Explanatory Variables	EAR			
	Coefficient	t stat	Coefficient	t stat
CONSTANT	0.5686	12.28***	0.4873	8.09***
LSUBTA	− 0.0633	− 10.59***	− 0.0555	− 0.13***
BKSUB	− 0.0226	− 1.07	− 0.0195	− 0.95
NONIIR	0.3596	3.77***		
RNONIER				
RBLR	0.0443	1.52*		
NRNLR	0.0168	0.47		
TAAR	− 0.0694	− 3.21***		
NRESR	− 0.0666	− 0.72		
PSECACT	0.0383	1.23		
EAR				
Number of observations	450		450	
R^2	0.144		0.197	
Lagrange multiplier statistic	257.19		207.51	

Since the data set is a panel, an error components specification was employed for the performance equations. Specifically, a one-way random effects model was used.[53] One important reason for the choice of a random effects model over a fixed effects specification is that it permits the computation of estimates of the effects of time-invariant explanatory variables. The key variable of interest in this study, organizational form, is such a variable. As a check to determine whether or not the one-way random effects model was a suitable one, Breusch-Pagan Lagrange multiplier statistics were computed for each estimated equation and are included in the table.[54] These statistics typically support the use of the random effects model. In such cases, the estimates in the table are feasible GLS estimates of a one-way random effects model. When the Lagrange multiplier statistics do not support the use of the random effects model, OLS estimates of the equation appear in the table.

Each equation is estimated independently. That is, in table 5, possible simultaneity is ignored, possibly affecting the reported results. A case could be made that all of the performance variables investigated in this study are simultaneously determined. Again, theory provides little guidance on the correct specification of systems of bank performance equations. For this reason, and for the sake of simplicity, possible simultaneity is routinely ignored in most empirical studies of various aspects of bank performance. The previous analysis of structural determinants generally did not reveal strong evidence of feedback between structure and performance, so the single equation methods used here may not result in severe statistical problems. The exception to this statement is the relationship between subsidiary structure and efficiency. So an attempt was made to explore whether or not the single-equation results change in any important way if simultaneity is considered. These results are summarized briefly at the end of this section.

The efficiency ratio (EFFR) is the dependent variable in the first set of estimated equations in table 5. In both versions of this equation, the coefficient on the bank

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subsidiary dummy is negative and significant, indicating that costs are significantly lower at bank subsidiaries relative to those of holding companies. This confirms the results of the univariate analysis.

In the next four equations in the table, the two pretax profitability ratios serve as dependent variables. In general, the estimated bank subsidiary coefficient is insignificant, although it is positive and significant in the more complicated version of the pretax ROE equation, which also includes leverage as a control variable. This result is consistent with the finding of greater efficiency.

In both versions of the performance equation with the equity/asset ratio on the left-hand side, the coefficient on the bank subsidiary dummy is negative but not even marginally significant. The influence of subsidiary size swamps any effect related to structure.

The results for the remaining six equations in the table basically show that the borrowing costs of bank subsidiaries do not differ significantly from those of holding company subsidiaries, controlling for other important factors. This is true for borrowing costs overall, as well as the cost of borrowing from related entities. The coefficient on the bank subsidiary dummy comes closest to significance only in the latter case. But, contrary to the predictions of holding company proponents, the sign is positive, indicating bank subsidiaries pay more rather than less to borrow from coaffiliates.

To determine if structure influenced the performance of bank subsidiaries differently in the first half of the time period, the performance equations were also re-estimated using data from only the 1988–1992 period. These results are consistent with those presented in table 5 and so are not reported. No evidence was found that bank subsidiaries are more risky or benefit more from greater access to safety-net subsidies than holding company subsidiaries in this earlier subperiod.

Possible simultaneity between measures of performance and structure was explored to a limited extent. The more complicated version of each performance equation appearing in table 5 was re-estimated along with a structure equation (eq. (3) from table 3) with that performance measure included as a right-hand-side variable in the structure equation.[55] A two-stage estimation procedure outlined in Maddala was used.[56]

In general, the two-stage estimation procedure did not produce radically different estimates of the effects of the impact of structure on any measure of performance than found using the single-equation approach and so are simply discussed briefly and not reported. In most cases, the signs and magnitudes of the estimated coefficients on the bank subsidiary dummy are quite similar to the single-equation estimates, and in no case was the estimated structure coefficient found to be significant with a sign that differed from that reported in table 5 in any performance equation.

The statistical significance of the estimated coefficient on structure, however, was substantially lessened in the efficiency equation. The estimated coefficient on the bank subsidiary dummy produced by the two-stage estimation procedure was -0.2655 vs. -0.2337 in the single-equation case, but the associated t statistic was barely significant at -1.65 vs. -3.52.

The two-stage estimates of the coefficients on the variables in the structure equation also generally were the same sign and similar in magnitude to the single-equation estimates reported in table 3, and most continued to be highly significant.

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In sum, the regression results do not show that bank subsidiaries are significantly riskier or enjoy any funding cost advantage relative to holding company affiliates, even when the effects of other variables are controlled for. This also is true when performance and structure are viewed as simultaneously determined. The results provide some evidence that bank subsidiaries are more efficient than holding company affiliates, although the difference is highly significant only when feedback between structure and performance is ignored.

5.3. Rolling multiyear time periods: univariate tests

Univariate tests of differences in performance across the different organizational groups were conducted using performance variables for each of the sample companies defined as multiyear averages, standard deviations, or transformations of these two magnitudes over four-year rolling time intervals.[57] This approach avoids any biases associated with pooling data across subsidiaries and over time and also allows two additional measures of risk to be constructed for each of the subs in the sample. One is a measure of each subsidiary's return variability over time. Here, the standard deviations of the pretax profitability variables are used.

The second is the so-called Z score measure of insolvency risk.[58] The Z score is an estimate of the number of standard deviations below the mean that profits would have to fall before the equity of the firm became negative.[59] This sort of indicator is a more informative measure of risk than any of its components, because it reflects the interplay of the level of equity capital employed, the expected level of returns, and return variability. Higher mean return on assets (ROA), higher capital ratios, or lower ROA standard deviations result in higher Z values. Higher Z values, in turn, reflect a lower estimated risk of insolvency.

The problem with switching to this sort of approach is that it results in a sharp reduction in the number of available observations and so reduces the power of statistical tests of hypotheses about organizational form effects. For example, the largest sample size for any four-year period examined is only 35.[60]

Univariate tests of the differences in the mean and median values of eight performance measures are presented for four-year rolling time periods. The performance measures examined are the average efficiency ratio (MEFFR), average pre-tax ROA (MPROA), average pretax return on equity (MPROE), average equity/assets ratio (MEAR), the standard deviations of the two pretax profitability measures (SDPROA, SDPROE), the Z score, the average liability cost ratio (MLCR), the average cost of liabilities issued to related companies (MRLCR), and the average cost of liabilities issued to nonrelated companies (MNRLCR). In general, no significant differences in either means or medians were ever found for either the mean efficiency or mean profitability ratios, so these results are not presented. The results for the other measures of performance appear in table 6. Note the relatively small sample sizes after 1991.

Turning to the first risk indicator, the average equity/assets ratio, the first consistent set of significant differences in means are apparent. The mean equity/assets ratio for holding company subsidiaries tends to be higher for every time period examined, and the

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differences are significant for the last three time periods examined. The same pattern is evident for differences in medians. But, as noted in the discussion of differences in simple equity ratios based on pooled data, this finding must be evaluated in tandem with the findings for the other risk indicators that follow.

In all seven of the four-year periods examined, the mean of the standard deviation of pretax ROA was higher for holding company subsidiaries than for bank subsidiaries, and for four of the seven intervals, the differences are significant. Medians also are higher for holding company affiliates; and in six cases, the differences in the median values of the standard deviation of pretax ROA were found to be significant. When the means of the standard deviations of pretax ROE are examined, a slightly different pattern emerges. In five of the seven periods, the mean value of the standard deviation of holding company subsidiary pretax ROE is higher than that of bank subsidiaries, although all these differences are statistically insignificant. But, in two periods, the mean standard deviation of bank subsidiary pretax ROE is higher than that of holding company subsidiaries and the differences are statistically significant. However, the differences in medians are never significant in any period.

Comparison of the means of the most comprehensive risk measure, the Z score, provides the most definitive evidence on risk differences across the two organizational groups because it reflects whether or not the typically higher capital of holding company subsidiaries sufficiently offsets their typically higher asset risk. Higher holding company Z scores imply lower risk. But in every one of the seven periods, the mean Z score of the holding company group is below that of the bank subsidiary group, indicating that holding company subsidiaries tend to be more risky; and in two periods, these differences are significant. The results are more mixed when differences in median Z scores are examined. In four of the seven periods, the median Z score for the holding company group is below that of the bank group. But the differences in medians are insignificant for every four-year interval.

Taken together, the analysis of differences in return variability and Z scores do not strongly indicate that bank subsidiaries are significantly more risky than holding company subsidiaries. Bank subsidiaries do tend to hold less capital, but lower capital is largely offset by lower asset risk.

Comparisons of the means of the three measures of the borrowing costs do not show that the liability costs of bank subsidiaries are systematically lower than those of holding company subsidiaries. In the case of the most comprehensive liability cost measure, in six of the seven time periods and in all five cases where the significant differences were found, bank subsidiary borrowing costs are above those of holding company subsidiaries. The results are similar when differences in median overall liability costs are examined, including the two time periods where significant differences are evident. The results generally are the same when the cost of liabilities issued to related and nonrelated parties are examined separately, although the results in the former case are a bit less strong. In two periods, mean borrowing costs from related companies are significantly lower for holding company affiliates than they are for bank subsidiaries, and in one period, a similar result is evident for differences in median rates. In five of the seven periods, mean rates paid on liabilities issued to nonrelated entities are significantly lower for holding company affiliates; in three of the seven periods, the same result is found when medians are

compared. In only the most recent period, do significant differences in mean and median rates paid to nonrelated entities indicate lower borrowing rates for bank subsidiaries. So the weight of the evidence in table 6 is not consistent with a subsidy-related borrowing advantage for bank subsidiaries.

5.4. Rolling multiyear time periods: multivariate tests

As in the case of the pooled data, simple performance equations were estimated for the various multiyear efficiency, risk, and borrowing cost measures analyzed in table 6. The equations are estimated using ordinary least squares (OLS) and the results appear in table 7.[61] The same two specifications used for the pooled regressions are employed here. When the cost of borrowing from affiliates and the cost of borrowing from nonaffiliates are used as dependent variables, the regressions had minimal explanatory power, and so these results are not included in the table.

Results are presented for performance variables defined only over the 1988–1991 time period. This is the only period with even a modest number of sample observations (35) available. It also is the period when the alleged adverse effects associated with operating bank securities subsidiaries are likely to be evident.

The coefficient on the BKSUB variable was not found to be significant in either version of the efficiency equation estimated. In both of the profitability regressions, the sign of the BKSUB dummy is positive and significant in three of the four versions reported in the table.

The estimated coefficient on BKSUB is negative in the performance equation explaining the equity/asset ratio but is insignificant in both cases. The estimated coefficient of the BKSUB variable was found to be negative in the simpler versions of both the standard deviations of pretax ROA and pretax ROE equations. In both cases, the sign of the coefficient was negative and significant, indicating that bank subsiaries tend to be less risky than holding company subsiaries. In the simple versions of the performance equation with the Z score as the dependent variable, the bank subsidiary dummy has a positive, significant coefficient. Higher Z scores are indicative of less risk, so this result is further evidence that bank subsidiaries tend to be less risky than holding company affiliates.

In the last two equations in the table, where overall subsidiary borrowing costs is the dependent variable, the BKSUB dummy variable coefficient is never significant, indicating no significant differences in borrowing costs are associated with differences in organizational form.

In sum, the results of the regression analysis generally are consistent with the evidence obtained using the alternative approaches and data for the whole and pre-1992 periods. Specifically, the evidence does not show that bank subsidiaries tend to be more risky than holding company affiliates. Where significant effects are found, the evidence suggests that bank subsidiaries are less risky. In addition, there is no evidence that borrowing costs of bank subsidiaries are significantly lower than those of holding company affiliates.

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Table 6. Key performance measures holding company subsidiaries vs. all bank subsidiaries rolling four year intervals

	1988–1991			1989–1992			1990–1993			1991–1994		
Performance Variables	HC Subs (N = 6)	Bank Subs (N = 29)	Test stat.	HC Subs (N = 3)	Bank Subs (N = 27)	Test stat.	HC Subs (N = 2)	Bank Subs (N = 26)	Test stat.	HC Subs (N = 2)	Bank Subs (N = 26)	Test stat.
Average equity/assets (MEAR)												
Mean	0.225	0.182	0.72	0.277	0.169	0.93	0.244	0.159	0.65	0.207	0.123	1.20
Median	0.185	0.095	1.47	0.263	0.089	1.45	0.244	0.069	1.12	0.207	0.063	1.65
SD	0.120	0.173		0.163	1.090		0.183	0.161		0.093	0.122	
Standard deviation of PROA (SDPROA)												
Mean	0.080	0.026	1.51	0.037	0.023	1.73*	0.024	0.021	0.46	0.045	0.017	2.36**
Median	0.044	0.017	2.08**	0.041	0.016	1.73*	0.024	0.014	1.03	0.046	0.010	1.92*
SD	0.067	0.026		0.012	0.021		0.006	0.018		0.015	0.017	
Standard deviation of PROE (SDPROE)												
Mean	0.331	0.215	1.11	0.140	0.214	−1.98*	0.136	0.215	−1.96*	0.206	0.167	0.53
Median	0.248	0.162	1.29	0.131	0.155	0.35	0.136	0.149	0.40	0.206	0.123	1.12
SD	0.245	0.171		0.024	0.162		0.029	0.176		0.026	0.179	
Z score												
Mean	4.78	11.19	−2.72***	5.30	16.31	−1.43	10.67	15.80	−0.71	5.11	12.82	−3.89***
Median	4.32	5.56	1.47	8.00	7.54	0.35	10.67	9.30	0.22	5.11	10.60	1.03
SD	3.21	10.54		2.93	27.59		5.84	29.72		0.64	9.83	
Average liability cost ratio (MLCR)												
Mean	0.056	0.079	−1.35	0.048	0.077	−2.62**	0.042	0.070	−3.29***	0.035	0.068	−3.89**
Median	0.057	0.075	0.83	0.045	0.072	1.38	0.042	0.059	1.12	0.035	0.051	1.83*
SD	0.034	0.055		0.012	0.047		0.002	0.042		0.007	0.046	
Average RLCR (MRLCR)												
Mean	0.069	0.081	−0.69	0.063	0.093	−1.38	0.064	0.083	−1.47	0.052	0.078	−1.54
Median	0.067	0.077	0.01	0.054	0.073	0.90	0.064	0.065	0.04	0.052	0.059	0.58
SD	0.028	0.046		0.022	0.094		0.006	0.063		0.015	0.063	
Average NRLCR (MNRLCR)												
Mean	0.051	0.067	−0.84	0.035	0.067	−1.71*	0.021	0.059	−1.64*	0.019	0.053	−2.00*
Median	0.056	0.068	0.43	0.045	0.068	1.04	0.021	0.058	0.97	0.019	0.053	1.25
SD	0.037	0.058		0.026	0.060		0.024	0.056		0.020	0.048	

Table 6. (continued)

Performance Variables	1992–1995 HC Subs (N = 3)	1992–1995 Bank Subs (N = 26)	1992–1995 Test Stat.	1993–1996 HC Subs (N = 3)	1993–1996 Bank Subs (N = 26)	1993–1996 Test Stat.	1994–1997 HC Subs (N = 3)	1994–1997 Bank Subs (N = 24)	1994–1997 Test Stat.
Average equity/assets (MEAR)									
Mean	0.239	0.123	3.97**	0.267	0.117	4.99**	0.405	0.127	2.56**
Median	0.222	0.092	2.11**	0.276	0.092	2.35**	0.390	0.065	2.27**
SD	0.041	0.066		0.040	0.094		0.181	0.132	
Standard deviation of PROA (SDPROA)									
Mean	0.052	0.016	1.89*	0.032	0.017	1.61	0.077	0.016	1.76*
Median	0.052	0.011	2.04**	0.034	0.010	1.74*	0.047	0.009	2.44**
SD	0.033	0.018		0.015	0.019		0.060	0.017	
Standard deviation of PROE (SDPROE)									
Mean	0.330	0.181	0.81	0.276	0.190	0.52	0.191	0.177	0.30
Median	0.251	0.098	0.90	0.163	0.158	0.35	0.188	0.117	0.96
SD	0.312	0.180		0.267	0.167		0.050	0.177	
Z score									
Mean	9.58	14.72	−0.84	11.65	13.94	−0.49	7.68	13.89	−1.59
Median	3.91	10.77	0.75	9.03	8.35	0.19	7.18	10.04	0.79
SD	9.85	11.18		6.66	12.62		4.73	12.74	
Average liability cost ratio (MLCR)									
Mean	0.031	0.067	−2.24**	0.031	0.053	−1.97*	0.096	0.049	0.85
Median	0.022	0.052	1.63*	0.021	0.047	1.50	0.052	0.046	0.35
SD	0.015	0.068		0.017	0.024		0.099	0.024	
Average RLCR (MRLCR)									
Mean	0.036	0.073	−2.35**	0.036	0.055	−1.77*	0.056	0.051	0.23
Median	0.033	0.056	1.90*	0.030	0.049	1.20	0.055	0.043	0.35
SD	0.012	0.067		0.016	0.023		0.037	0.023	
Average NRLCR (MNRLCR)									
Mean	0.011	0.050	−3.62**	0.017	0.049	−2.65**	0.195	0.046	2.14**
Median	0.010	0.041	1.74*	0.015	0.041	1.80*	0.195	0.033	2.08**
SD	0.011	0.044		0.015	0.039		0.098	0.041	

Notes: The test statistics are either *t* statistics (reflecting the null hypothesis that two mean values do not differ) or *Z* statistics (reflecting the null hypothesis that two medians do not differ using a Wilcoxon rank sums test). *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

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Table 7. OLS regressions, dependent variables calculated over the 1988–1991 period

Explanatory Variables	MEFFR				MPROA				MPROE			
	Coefficient	t stat.	Coefficient	t stat.	Coefficient	t stat.	Coefficient	t stat.	Coefficient	t stat.	Coefficient	t stat.
CONSTANT	1.2294	1.15	−0.5575	−0.35	0.0353	0.40	−0.0221	−0.18	−0.3028	−0.69	−0.4114	−0.46
LSUBTA	−0.0315	−0.36	0.0644	0.70	−0.0025	−0.37	0.0004	0.05	0.0207	0.59	0.0260	0.41
BKSUB	−0.0533	−0.32	0.1554	0.76	0.0216	1.62	0.0358	2.20**	0.1584	2.35**	0.2411	2.69**
NONIIR			1.9414	1.32			0.1933	1.48			1.1389	1.56
RNONIER			−0.1532	−0.63			0.0009	0.05			0.0004	0.01
RLBLR												
NRNLR			−0.1860	−0.58			0.0490	1.73*			0.0542	0.33
TAAR			0.0292	0.10			0.0297	1.20			0.0658	0.46
NRESR			4.9078	1.80*			0.3606	1.49			1.6835	1.21
PSECACT			0.1363	0.85			−0.0192	−1.41			−0.0626	−1.10
MEARA											−0.1774	−0.64
F	1.78		1.50		1.38		1.39		5.09		2.90	
AdjRSQ	0.198		0.206		0.100		0.160		0.546		0.495	

Table 7. (continued)

Explanatory Variables	MEAR Coefficient	t stat.	MEAR Coefficient	t stat.	SDPROA Coefficient	t stat.	SDPROA Coefficient	t stat.	SDPROE Coefficient	t stat.	SDPROE Coefficient	t stat.
CONSTANT	1.6440	3.50***	1.4976	2.24**	0.4812	4.28***	0.3914	2.54**	1.0057	1.85*	0.8636	1.12
LSUBTA	−0.1070	−3.05***	−0.1117	−2.34**	−0.0321	−3.60***	−0.0263	−2.39**	−0.0479	−1.11	−0.0360	−0.65
BKSUB	−0.0157	−0.23	−0.0356	−0.43	−0.0497	−2.88***	−0.0238	−1.24	−0.1415	−1.71*	−0.0170	−0.18
NONIIR			0.5380	0.81			0.4411	2.88***			1.7292	2.25**
RNONIER												
RLBLR			0.1709	1.31			0.0063	0.21			−0.1385	−0.92
NRNLR			0.1197	0.81			−0.0046	−0.14			−0.0401	−0.23
TAAR			0.0713	0.56			0.0002	0.01			0.0156	0.11
NRESR			−1.0595	−0.83			0.2198	0.75			0.4869	0.33
PSECACT			−0.0330	−0.48			−0.0312	−1.96*			−0.1053	−1.31
MEARA												
F	2.00		1.62		2.90		2.93		1.37		1.54	
AdjRSQ	0.227		0.226		0.358		0.477		0.097		0.204	

Table 7. (continued)

	ZPROA				MLCR		
Coefficient	t stat.	Coefficient	t stat.	Coefficient	t stat.	Coefficient	t stat.
−14.5580	−0.58	0.2292	0.01	−0.0742	−0.59	0.0392	0.20
1.2286	0.62	0.0900	0.03	0.0063	0.84	0.0001	0.01
7.6724	2.00*	4.1215	0.86	0.0241	1.25	−0.0019	−0.08
		−32.9330	−0.87	−0.2013	−1.04		
		0.7455	0.10	0.0501	1.32		
		8.2513	0.98	−0.0225	−0.52		
		−1.45570	−0.20	0.0047	0.13		
		−131.4170	−1.80*	−0.2980	−0.80		
		4.9404	1.25	−0.0109	−0.54		
2.63		1.97		3.15		2.21	
0.324		0.314		0.388		0.363	

Notes: Eight country dummy variables were also included in each estimated equation but are excluded from the table of reported results. The number of observations in each regression is 35. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

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6. Summary and conclusions

This study presents empirical evidence on two key questions in the current debate on financial modernization: First, what are the most important factors influencing how banking organizations structure their activities, in this case securities, when they have a choice? Second, does structural choice result in desirable or undesirable changes in performance? This evidence is obtained from the analysis of data on the organizational structure and performance of a panel of the foreign securities subsidiaries of U.S. banking organizations over the 1987–1997 period.

Both the simple analysis of structural patterns and trends and the estimation of a multivariate statistical model of structural choice suggest that the decision to conduct foreign securities activities in a bank subsidiary vs. a holding company affiliate depends on more than a single factor. More important the evidence does not strongly support the primary importance of a desire to exploit any safety-net subsidy.

The weight of the empirical evidence on the effects of structure on performance does not indicate that bank-owned securities subsidiaries tend to be more risky than those organized as holding company affiliates. Bank securities subsidiaries also do not appear to enjoy any funding advantage relative to holding company subsidiaries. These two results are particularly noteworthy because section 23A and 23B restrictions on intracompany funding currently do not apply to transactions between banks and their direct and indirect bank subsidiaries. Finally, some evidence finds that bank subsidiaries tend to be more efficient. Both univariate and multivariate statistical techniques yield the same basic set of results. Explorations of possible simultaneity, albeit limited, did not produce significantly different findings. While more research is necessary before these findings can be accepted as definitive, taken as a whole, the results raise serious doubts about the validity of the assertions of proponents of a mandatory holding company structure.

Acknowledgments

Notes

1. In general, the United States is the only major industrialized country that requires banking organizations to use a holding company structure to engage in a variety of nontraditional activities domestically. Cumming and Sweet (1987–88) documented this fact in the late 1980s. For a more comprehensive and detailed recent survey, see Barth, Nolle, and Rice (1997), especially tables 4, 5, 6a, and 6b.
2. Firewalls basically are constraints on intracompany payments, lending and asset transfers. Firewalls are not typically employed in foreign countries that have adopted the bank subsidiary model. See Barth, Nolle, and Rice (1997), table 4.
3. Detailed discussions about the advantages and disadvantages of these two structural models are contained in Longstreth and Mattei (1997) and Whalen (1997c).

4. The debate about the need for structural restrictions also reflects the implicit assumption that the risk/return profiles of nontraditional activities are such that the risk of banking organizations is likely to increase as a result of entering these lines of business.

5. Kroszner and Rajan (1997) provide evidence suggesting that banks in the pre-Glass-Steagall period chose to underwrite securities through affiliates rather than directly to address investor concerns about likely conflicts of interest.

6. This is documented for securities affiliates of banks prior to the establishment of deposit insurance in Kroszner and Rajan (1997). Variation in the structure of bank-permissible activities by banking organizations in the 1990s is contained in Whalen (1997a), table 8, p. 19. Herring and Santomero (1990) present data showing that, even where universal banking is permitted, some banking companies choose to conduct certain activities in subsidiaries of the parent bank rather than in the bank itself.

7. The only existing study of the relationship between performance and organizational form in a domestic context is that of Rose and Rutz (1981). Using panel data for 24 mortgage banking firms (17 holding company affiliates and 7 bank subsidiaries), they find that holding company subsidiaries have significantly lower adjusted equity ratios than the reference group of bank subsidiaries, implying that holding company mortgage banking subsidiaries are more, rather than less, risky.

8. Through Regulation K, the Federal Reserve does impose some limits on the securities activities of these entities. These limits are discussed further later.

9. For a detailed discussion of the home country rules influencing bank overseas securities activities, see Fein (1998), Chapter 12, or Tortoriello (1999), Chapters 1 and 11.

10. See Houpt and Martinson (1982), p. 15, for support for this view. The effects of this exemption are somewhat mitigated against by restrictions on the percent of parent bank equity that can be invested in Edge Act corporations. Prior to September 30, 1996, this limit was 10%; after this date, the limit has been 20%. It also is mitigated against by Edge corporation capital requirements, which were increased above those of banks in 1991.

11. For a discussion of factors influencing the size of the subsidy, see Whalen (1997a).

12. This authority comes from section 25 and the Edge Act provisions in section 25(a) of the Federal Reserve Act and section 4(c)(13) of the Bank Holding Company Act.

13. The key pre-1991 provisions of Regulation K and the proposed 1991 revisions are detailed in *Federal Register* (1990), pp. 32424–32442. The rules adopted in 1991 are detailed in *Federal Register* (1991), pp. 19549–19577. The board put out its most recent set of proposed revisions to Regulation K for comment in December 1997. For details, see *Federal Register* (1997), pp. 68423–68464.

14. U.S. banks are permitted to own foreign commercial banks that engage directly or indirectly in ineligible securities activities to a limited (generally a maximum of 5% of assets or revenues) extent.

15. This is likely to be the most important type of underwriting activity for foreign subsidiaries. The percentage of the value of international securities offerings accounted for by debt instruments averaged roughly 95% of the total over the 1987–1996 period, see Securities Industry Association (1997), p. 64.

16. The 1991 revisions permit an investor (which can be an Edge Act corporation, member bank, or holding company) to underwrite equity securities for any issuer through a foreign subsidiary up to the smaller of $60 million or 25% of Tier 1 capital. The per-issuer dealing limit for equity securities for any investor is the smaller of $30 million or 10% of Tier 1. The dollar maximums typically are the binding constraint. The 1991 revisions also permit all investors to calculate the dealing limit after netting and with some adjustment for hedging. These limits represent a relaxation of the pre-1991 rules. For the old rules, see *Federal Register* (1990), p. 32425.

17. One example of a structure-neutral but potentially important 1991 revision is the authority for both Edge and holding company subsidiaries to deal in the equities securities of U.S. corporations overseas. The general consent authority limits on the size of individual portfolio investments and percentage of shares acquired in nonfinancial firms were similarly relaxed for all types of investors. The constraint on the aggregate amount of such investments was lowered from 100% of capital to 25% of Tier 1 for bank holding company investors. It was not changed for the other types of investors. But this reduced percentage need not sharply constrain the investment authority of holding company affiliates relative to direct bank and Edge corporation subsidiaries because consolidated holding company capital is a multiple of the capital of its individual bank and nonbank affiliates.

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18. This view is reflected in Houpt and Martinson (1982) and Houpt (1988). There also is no support for the notion that host country rules in the countries from which most of the sample is drawn systematically favor one type of subsidiary in either the 1990 or 1994 National Treatment studies done by the Treasury Department (Department of the Treasury, 1990 and 1994). In particular, the 1994 study documents the advantages of separately capitalized banking and securities units of non-EU financial firms in the European Union relative to branches on pp. 522–524, 527–528, and 532–538.

19. *Looser* means that banking organizations are not required to place securities activities in holding company affiliates, see Barth, Nolle, and Rice (1997), tables 5, 6a, and 6b.

20. It also depends on the correlation of overseas securities returns and the returns of the rest of the corporations activities. Some empirical work suggests that the diversification benefits from overseas securities activities are likely to be modest and so the impact of these activities on overall risk depends largely on the risk and relative scale of securities activities; see Whalen (1998).

21. In this study, some of the securities subsidiaries are much more involved in lending than others. These "banklike" subsidiaries are likely to benefit more from a closer relationship with an affiliated bank than other sorts of securities subsidiary.

22. The structural changes by bank holding companies in response to the elimination of geographic restrictions follow this general pattern. In the wake of the elimination of intrastate restrictions, most banking companies ultimately merged their in-state bank affiliates, but the pace of the consolidation varied across companies, see Whalen (1997b). The same pattern of adjustment is evident since banking companies have been permitted to transform out-of-state bank affiliates into interstate branches of their lead bank.

23. See Kwast and Passmore (1997), p. 35.

24. Each foreign subsidiary reports a single primary activity code but may engage in a number of other activities. In general, the extent to which they do so is not readily apparent. An exception is information on underwriting income reported through 1995. This information was used to identify subsidiaries that engaged in underwriting but that reported a nonsecurities primary activity. Such subsidiaries account for roughly 20% of total observations in the sample.

25. Basically, these are securities subsidiaries with total assets of $25 million or more from 1987–1990 and total assets of $50 million or more from 1991 onward.

26. The actual number of sample observations used in the different statistical tests varied from this number due to the averaging of denominator values, missing values, and entry and exit of subsidiaries from the sample.

27. For example, parent companies may shift income and expenses through intracorporate transaction, possibly to obtain tax benefits. They may also try to smooth net income.

28. For example, pretax net income is used to minimize the effects of tax considerations on reported profitability.

29. Although the 39 securities subsidiaries represented only about 4% of the number of all types of foreign subsidiaries with total assets of $1 million or more.

30. If only claims on nonrelated entities are used in the numerator of this ratio, the mean and median values are 1.96 and 1.3% in 1987 and 8.8 and 3.0% in 1997.

31. The three holding companies that account for the three largest shares of the sample observations account for a combined 53% of the sample observations.

32. During 1993, three subsidiaries that began the year as holding company subsidiaries were restructured as Edge subsidiaries. The year-end 1993 assets of these three subsidiaries roughly totaled $24 billion.

33. There were eight instances of direct and indirect bank subsidiaries being switched to holding company affiliates and eight switches in the opposite direction. Two subsidiaries switched twice.

34. For example, the annual percentage change in the value of U.S. corporate debt underwriting was 23.7% over the 1992–1993 period; for high-yield debt, it was 42.1%; for equity, it was 28.6%; and for IPOs, it was 45.7%. Comparable figures for the value of international debt securities and international equity securities were 43.5 and 43.1%, respectively. And for international debt and equity securities of U.S. issuers, the figures were 51.1 and 27%, respectively. The calculations use figures drawn from Securities Industry Association (1997).

35. This similarity also holds when measures of their performance are compared using formal statistical tests later.

36. Estimated bank assets are consolidated holding company assets minus total assets in all nonbank holding company affiliates.
37. This implies the assumption that the values of these sorts of risk measures at the lead bank largely determine the values of these ratios for the consolidated holding company.
38. This ratio is equity plus loss reserves minus nonperforming loans, all divided by assets. Bank failure research has shown that this sort of ratio is a critical determinant of the likelihood of bank failure.
39. A number of other subsidiary risk indicators were used in preliminary structure equations, including trading account assets divided by total assets, total off-balance sheet obligations divided by total assets plus total off-balance sheet obligations, noninterest income divided by total assets, and trading income divided by total assets. None of these was found to be significant.
40. One reviewer suggested that this result could reflect a too-big-to-fail effect. While possible, this explanation appears unlikely, since all the holding company lead banks in the sample are relatively large. So it is unlikely that expected too-big-to-fail benefits increase along with this relative size variable.
41. As a final check on the specification of the structure equation, eq. (3) was re-estimated with country-specific dummies included to formally examine whether host country regulations are responsible for observed differences in structure. Only one country dummy was found to be marginally significant and a formal test that the country dummy coefficients were jointly 0 did not result in a rejection of the null hypothesis.
42. This sharp decline occurs because subsidiaries typically exited the sample for a variety of reasons over the 1987–1997 interval. Other subsidiaries that switched their organizational form were dropped for periods that include the year in which their structure changed.
43. Examination of differences in medians rather than differences in means are more appropriate when the distributions of the variables are not normal.
44. Examination of the differences in performance at direct and indirect bank subsidiaries shows that these two classes are quite similar and supports their treatment as a single class for most of the analysis in the study.
45. The variables are calculated over the 1988–1997 interval because the performance measures use the average of the current and previous year-end values in the denominators to smooth the volatility observed in several of the series.
46. This ratio better reflects fee-based and off-balance-sheet activities than a ratio with average total assets in the denominator. These sorts of activities tend to be more important for securities than for banking subsidiaries.
47. Differences in profitability also might reflect differences in risk or leverage and so are less reliable indicators of efficiency differences.
48. See, for example, Baer and Brewer (1986) and James (1988).
49. It is not possible to determine how much of this funding comes from bank vs. nonbank affiliates.
50. All these performance equations also were estimated using separate dummies for direct and indirect bank subsidiaries. Wald tests of the hypothesis that these two coefficients were equal were never rejected, supporting the use of a single bank subsidiary dummy.
51. The equations also were estimated with organizational change and time dummies included. Neither of these variables had a material effect on the estimation results and so these versions of the performance equations are not reported.
52. Several parent holding company variables also were tried as explanatory variables in the estimated equations. Specifically, measures of holding company size and capitalization were used to determine if parent characteristics had important effects on subsidiary performance, possibly because market participants looked through or discounted the financial characteristics of the individual subsidiaries. These variables never were found to be even marginally significant in any equation.
53. For a discussion of this model, see Greene (1993), Chapter 16, pp. 469–479.
54. For a discussion of this test statistic, see Greene (1993), p. 476. These statistics are distributed as chi-squared with one degree of freedom. Rejection of the null hypothesis implies that the random effects model is appropriate. In this study, the null hypothesis is rejected for equations with Lagrange multiplier values greater than 3.84 (the 5% level).
55. For the performance measures other than the efficiency ratio, that performance measure was substituted for the efficiency ratio, rather than being added to the version of eq. (3) reported in table 3.
56. See Maddala (1983), pp. 244 and 245.

57. Five-year rolling time periods also were examined. The results did not differ and so are not reported.
58. The equation defining the Z score, used in a number of previous studies, is $(E(ROA) + equity/assets)/$ SDROA, where $E(ROA)$ is expected profitability and SDROA is the standard deviation of profitability. For a discussion of its derivation and use, see Boyd and Graham (1986).
59. This interpretation assumed that the distribution of ROA is normal. But Boyd, Graham, and Hewitt (1993) show that Z can be viewed as an upper bound on the probability of insolvency, even if ROA is not normally distributed.
60. This results from entry, exit, and organizational change by subsidiaries.
61. An attempt was made to estimate several of the equations jointly. For example, a 2SLS estimation of a system consisting of the equity ratio equation and the standard deviation of ROA equation was attempted. The estimated coefficients of these two variables were not found to be significant.

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