A WELFARE COMPARISON OF THE GERMAN AND U.S. FINANCIAL SYSTEMS

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Abstract

There is wide variation in the structures of financial systems in different countries. We compare two idealized polar extremes. In one, which we refer to as the "German model," banks and other intermediaries predominate. In the other, which we refer to as the "U.S. model," financial markets play the major role. On the household side, we consider issues such as intergenerational and cross-sectional risk sharing, noise suppression and the provision of services. On the firm side, we consider the allocation of investment, the market for corporate control, the market for internal funds, incentives, monitoring and long term relationships and diversity of opinion.

1. Introduction

One of the most striking differences between developed countries is the wide variation in the form of their financial systems. At one extreme we have a country like Germany, where a few large banks play a dominant role and financial markets are not very important. At the other extreme is the U.S., where financial markets play an important role and the banking industry is much less concentrated. In between are countries such as Japan and France. Traditionally, these countries had bank-dominated systems, like Germany's, but financial markets are rapidly developing and starting to play an important role, as they do in the U.S. Canada and the U.K. also combine elements of the German and U.S. models. Financial markets are more highly developed than in Germany, but the banking sector is more highly concentrated than in the U.S.

It is not clear what circumstances explain the adoption of such different financial systems in different countries. Perhaps this is a case where history matters. It raises the question of whether each country has adopted the optimal system for its own circumstances, or whether one system is generally better than another. Financial theorists often suggest that systems with highly developed financial markets are in some sense more advanced than bank-based systems. According to this view, the tremendous variety of financial products available in the U.S. and the recent pace of financial innovation provide an unambiguous economic advantage. On the other hand, the relative success of Germany, Japan and France, with their bank-based systems, compared to the U.S., Canada and the U.K., with their sophisticated financial markets, may be taken as counter-evidence. As a recent editorial in *International Financing Review* put it: "...The German financial system is in fetters: it is perceived to be underdeveloped and anachronistic. This view, held by many, is truly a paradox, given the significant contribution of

Germany to the global economy."[1]

Cross-country differences in financial systems and economic performance raise a host of interesting questions. What are the advantages of bank-based systems and what are the advantages of having sophisticated financial markets? Did Germany, Japan and France succeed because of their bank-based systems or in spite of them? Would the relative decline of the U.S., Canada and the U.K. have been worse without their reliance on financial markets or would they have done better with bank-based systems? Given the pace of financial innovation in recent years and the decision of countries such as Japan and France to move away from bank-based systems and toward more market-based systems, these issues are of great interest.

In this paper, we focus on a narrower set of issues, which we nonetheless hope will contribute to the broader debate about the optimal organization of financial systems. We compare two idealized polar extremes. In one, which we refer to as the "German model," banks and other intermediaries predominate. In the other, which we refer to as the "U.S. model", financial markets play the predominant role.

Our approach to this topic is shaped by a number of factors. First, we are primarily interested in analyzing the welfare properties of different financial systems from a theoretical perspective. Second, we want to focus on issues of risk sharing and information, since these strike us as critical in the comparison of the German model and the U.S. model. Third, we think it is important to adopt "systemic" perspective. Since different countries have different financial systems, they share risk, provide information, and allocate resources in different ways. In order to compare the efficiency with which these functions are performed, one really has to look at the financial system as a whole. For this reason, we are interested in functional

categories rather than institutional categories. But this is *not* to say that institutions don't matter — they do. Finally, in order to discover the limits of the welfare properties of the different systems, we focus on ideal cases. In practice, we recognize that these may be unrealistic models of actual bank behavior, because of X-inefficiency, regulation, bounded rationality and so on.

Because of the breadth of the topic, some selectivity has been inevitable. We have ignored some issues for reasons of taste or lack of space.[2] Others we ignored because they did not concern cross-country differences between financial systems. For example, we do not consider the issue of liquidity transformation and bank runs studied by Bryant (1980), Diamond and Dybvig (1983) and others or the issue of prudential regulation of banks studied by Dewatripont and Tirole (1994). Our systemic perspective leads us not to consider specific institutional issues such as the desirability of allowing universal banking in the U.S. (see Saunders (1993) and Saunders and Walter (1994). To our knowledge, some of the points we raise have not been considered in this particular context before. Our purpose in such cases is not to develop the ideas in detail but to leave them to future work.

Rather than focus on the characteristics of a wide range of countries, we concentrate on what we have described as the German and the U.S. models. Section 2 contains a description of the financial systems in these two countries. We divide our theoretical analysis into two parts. In Section 3, we analyze the the household side of the market. Issues such as risk sharing, noise suppression and the provision of services are considered. Section 4 focuses on the firm side of the market. The allocation of investment, the market for corporate control, the market for internal funds, incentives,

monitoring and long term relationships and diversity of opinion are discussed. Finally, Section 5 contains concluding remarks.

2. The German and U.S. Financial Systems

The characterization of Germany as having a bank-based financial system and the U.S. as having a market-based system is, of course, an oversimplification. The financial systems of the two countries have many important differences in addition to these. This section gives a fuller account of the characteristics of each and summarizes the main differences between the two.[3]

Germany

The most significant characteristic of the German financial system is the dominant role of banks. Most banks are universal in the sense that they are legally able to engage in a full range of financial activities including taking deposits, granting loans and mortgages, underwriting security issues and investing directly in securities, including equities. There are three types of universal banks: (i) privately-owned commercial banks; (ii) government-owned banks and (iii) cooperative banks.

The number of privately owned commercial banks is over 300. Together these account for 15 percent of the total offices and over 22 percent of total banking assets. This group is dominated by the three big branch banks, Deutsche Bank, Dresdner Bank and Commerzbank which account for 38 percent of commercial banks' assets.

Many banks in Germany are operated in the public interest as opposed to being privately owned and maximizing profits. These are known as "public law banks". There are around 600 public institutions which operate about 40

percent of all branches and are responsible for about 36 percent of total banking assets. They are less concentrated than the private commercial banks with the top three firms accounting for 17 percent of assets. Management committees which report to a board of administrators consisting of prominent businessmen and government officials run these banks. Originally, they were set up to allow simple deposit opportunities and real estate loans. They now provide a much wider range of banking services but mortgages still constitute an important part of their activities.

The final category of universal banks is the cooperative banks. These are "shareholder-owned" enterprises where the depositors are the shareholders. There are around 3500 of them and they have about 35 percent of total offices and 16 percent of total banking assets.

In addition to the universal banks, there are also specialist banks that concentrate on providing a narrower range of services. There are about 200 of these and together they constitute about 25 percent of total banking assets. This category includes mortgage banks, housing loan societies, the Postal Giro and Savings Banks and various other special purpose banks which provide trade finance, agricultural credit, small business credit and so forth. Similarly to universal banks, there are both privately- and government-owned specialist banks.

One important aspect of the banking system is the large number of branches maintained by German banks. As of 1988 there were over 45,000 banking offices. During the previous 30 years the number of banks fell by about two thirds but the number of banking offices doubled. The number of people employed by the banking sector has also significantly increased over time.

Financial markets in Germany are relatively undeveloped compared to most

other industrial countries. There are seven regional exchanges in Frankfurt, Duesseldorf, Munich, Stuttgart, Berlin, Hanover and Bremen with those in Frankfurt and Duesseldorf being much the largest. In 1991 only 665 companies were listed on the exchange.[4] Few households participate directly in the markets. The lack of prohibitions on insider trading makes participation by unsophisticated investors unattractive. In addition, the availability of mutual funds and other indirect means of holding stocks are limited. Overall, German investors have a limited range of instruments that they can invest in directly.

The bond markets are more important than stock markets. Much of the debt traded is either the direct debt of government entities or "communal bonds", which is debt issued by the banks but backed by public sector loans. Together these two categories constitute about two thirds of outstanding bonds. Most of the remaining third consists of mortgage and nonmortgage bonds issued by banks and special purpose banks. The amount of debt issued by German industrial firms in German markets is very small and constitutes less than 0.5 percent of bonds outstanding. Some large firms borrow in the Euro-DM markets but the total amount is less than 2 percent of total domestic debt.

The other important debt market in Germany is the Schuldscheine market where "certificates of indebtedness" are traded. These are negotiable promissory notes or loan certificates. They are issued by government entities, banks and other intermediaries. Overall the total size of the Schuldscheine market is about two thirds of the domestic German bond market.

Futures and options markets in Germany are also underdeveloped. The Deutsche Termin Bourse which was Germany's first futures and options exchange only opened in January 1990. The volume of trade has been of little practical importance. One reason for this is that options and futures contracts are

treated as "gambling" contracts under German law, which limits their enforceability. In addition to the lack of practical importance of these markets, short selling and the ability to borrow to finance security purchases is severely limited.

An important characteristic of the German financial system is the role of banks in the control of industrial firms. The direct holding of equity by banks in 1990-91 was about 8.9 percent of the total (see Table 1). Much of this is concentrated in the larger firms. For example, German banks own more than 25% of at least 33 major industrial corporations.[5] More important than this is the fact that many bank customers keep their shares "on deposit" at banks and allow the banks to exercise proxies on their behalf. As a result, banks control a higher proportion of voting equity and have more representation on the boards of large industrial enterprises than their direct holdings suggest. A 1979 Monopoly Commission report found that, of the top 100 corporations, banks controlled the votes of nearly 40 percent of the equity and were represented on two thirds of the boards. German banks thus tend to have very close ties with industry and form long run relationships with firms.

In addition to the close links between banks and industrial firms, another important aspect of the German system is the absence of a market for corporate control. Accounting information supplied by German firms is sparse. Takeovers are rare and are almost always friendly; the first hostile takeover did not occur until 1989. Management buyouts are also rare.

The main focus of government regulation of banks in Germany is on the adequacy of capital; the ratio of loans and investments to capital is not allowed to exceed 18 to 1. Apart from this there is a tendency to rely on market forces. An illustration of this is provided by the fact that creditors

of the Herstatt Bank which failed in 1974 were not compensated by German banking authorities. Deposit insurance is provided by the Federal Association of German Commercial Banks which is a privately controlled but publicly regulated organization.

In summary, the German financial system is dominated by banks. The banking industry is relatively concentrated. Banks that are operated in the public interest as well as profit maximizing banks play an important role. The country is heavily banked in the sense that there are a large number of banking offices. Banks have little competition from financial markets, which are relatively unimportant. Households have access to a narrow range of investment vehicles. Banks are heavily involved in the control of industry and form long term relationships with firms. There is little publicly available information about firms and there is no active market for corporate control.

U.S.

The banking industry in the U.S. is unique among large industrial countries because it is not dominated by a few large banks. One of the important reasons for this difference is historical. During Colonial times, the British did not allow the colonies to have a domestic banking system. During the decades following the founding of the Republic, there was an extensive debate on the structure of the banking system. Alexander Hamilton was influenced by British experience with the Bank of England and advocated a large federally-chartered bank with branches all over the country. This led to the foundation of the First Bank of the United States [1791-1811] and the Second Bank of the United States [1816-1836]. However, there was considerable distrust of the concentration of power these institutions involved. In a

report on the Second Bank, John Quincy Adams wrote "Power for good, is power for evil, even in the hands of Omnipotence."[6] The controversy came to a head in the debate on the rechartering of the Second Bank in 1832. Although the bill was passed by Congress it was vetoed by President Jackson and the veto was not overturned.[7] This was a watershed event as far as the development of banking in the U.S. was concerned. There has been a strong bias toward decentralization of the banking system and an aversion to powerful financial institutions of any kind since then.[8]

Another distinguishing characteristic of the U.S. banking system is the Glass-Steagall Act of 1933. Among other things this led to the separation of commercial and investment banking and commercial banks were forbidden from holding equity. Sensational hearings by the Congressional Committee on Currency and Banking, which found evidence that commercial banks' security affiliates were cheating their customers, were an important factor in the development of the new regulations and reinforced suspicion of and hostility toward large banks.

The most important sector of the banking industry is commercial banks. These were originally concerned with short-term lending to commercial enterprises but have steadily extended the range of their activities over the years. They now also undertake consumer loans, residential real estate loans, agricultural loans and loans to other financial institutions. In 1950 commercial banks accounted for over a half of the assets held by financial intermediaries but by 1990 this had fallen to under forty percent. They nevertheless remain by far the most important type of financial intermediary.

The commercial banks' original focus on lending to firms created a need for institutions that could provide loans for people to buy their houses. Savings and loans and other thrift institutions filled this need. They

typically obtained funds from investors with small amounts of savings. Many of these institutions originally had a mutual structure, so that claims on them were considered shares rather than deposits and payments were in the form of dividends rather than interest. In recent years many have converted to stock ownership or require that depositors grant their proxies to existing management. The fact that the main business of thrifts involves using short term deposits to finance long term loans exposes them to considerable interest rate risk. Whenever interest rates have risen sharply, thrift institutions have had considerable problems. They were forced to pay high rates to retain deposits while their long term loans had rates which were fixed at low levels. This occurred most dramatically in the early 1980's when two thirds of the industry was rendered insolvent. Taxpayers suffered a substantial loss as a result because these institutions were insured by the federal government.

Traditionally, banks have been defined by the characteristic that they take deposits and lend them out to firms or consumers. In contrast, in stock markets investors lend directly to firms. The development of financial markets over time has increasingly blurred this sharp distinction between banks and financial markets. Many institutions have developed which use financial markets as a source of funds, but are otherwise like banks. One example is consumer and sales finance companies, which finance the purchase of consumer durables such as automobiles. Rather than take deposits from consumers, their main source of funds is the issuance of bonds and commercial paper.

Another important example of this type of intermediary is mortgage banks. These originate loans and then securitize them, while remaining responsible for servicing them. During the last twenty years or so various government agencies such as the Government National Mortgage Association, the

Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation have guaranteed many of these securitized loans and this has significantly increased the importance of the market. In 1989 they were responsible for about a quarter of all new mortgages.

Consumer finance companies and mortgage banks are examples of intermediaries that use financial markets as a source of funds. Another set of intermediaries gathers deposits and uses the financial markets to invest them. The prime example of this type of intermediary is mutual funds. These have steadily grown in importance over the previous twenty years in terms of the value of their assets. There has also been a proliferation in the number of different types of funds available.

In addition to a banking structure that is significantly different from those in other countries, the other defining characteristic of the U.S. financial system is the importance of direct finance. Over the last few decades around 50 percent of external funds raised by nonfinancial firms has been obtained through the sale of securities in stock and bond markets whereas in other countries a figure of 10 percent is more typical.

The Glass-Steagall Act means that U.S. banks are prohibited from undertaking many market related activities such as underwriting new issues of securities, serving as retail or institutional brokers, serving as a dealer or market maker and other market related activities. Instead, investment banks, brokers and dealers undertake these activities. The markets for these services are fairly concentrated. For example, the top eight participating firms account for about 80 percent of the underwriting market.

Stock exchanges where stocks and bonds are issued and traded are not the only liquid financial markets that are available to investors. In addition there are very active options and futures exchanges. These have grown from

nothing twenty years ago to being similar in magnitude to the stock and bond markets in terms of volume.

One important aspect of U.S. financial markets is the availability of information. Among other things this makes possible an active market for corporate control. If one company wishes to acquire control of another because it thinks the other company is undervalued or that it can better utilize the other company's resources, it is able to bid for the other company. Even if the incumbent management disagrees with the raiders, it is possible for the company to be taken over; the shareholders will use all the information available to them in deciding whether to sell.

All sectors of the U.S financial system are regulated. The banking sector is regulated at the state and Federal levels. Broadly speaking, state-chartered banks are regulated by state agencies while federally chartered banks are regulated by the Office of the Comptroller of the currency. The Federal Deposit Insurance Corporation and the Federal Reserve System are also involved in various aspects of regulation. The financial markets are regulated by the Securities and Exchange Commission and the Commodities and Futures Trading Commission.

Overall, financial markets in the U.S. play an important role in providing opportunities for direct financing. They are also important in allowing many different types of intermediaries, such as mutual funds and consumer finance companies, to operate. Banks' activities are also substantially affected by the existence of financial markets because they can use them to manage their risk.

Comparison

The difference in the importance of banks and stock markets in the two

countries is illustrated by Table 1. The size of the extended banking system as measured by assets relative to GDP is 189 percent in Germany but only 87 percent in the U.S. The market value of publicly listed shares of domestic companies is 20.3 percent of GDP in Germany but in the U.S. is more than three times that level at 77.3 percent. It can also be seen that the parties who own these listed shares differ significantly. In Germany households own only 16.8 percent of shares directly whereas in the U.S. they own 53.5 percent. These figures suggest that the financial assets acquired by German households are mostly debt instruments and in fact this turns out to be the case. In 1990-91, German households acquired a total of 211.9 billion DM of which 63.8 billion DM was placed with banks, 55.5 billion DM with insurance enterprises and 78.5 billion DM was invested in bonds.[9]

Table 2 gives a comparison of the different features of the financial systems in Germany and the U.S. This illustrates that the basic difference between the two countries is the structure of the banking industry and the role of financial markets. Germany has a system where the range of instruments available to investors is controlled by a few banks and is limited. In contrast, in the U.S. competitive financial markets ensure investors have a wide range of instruments available. The way in which corporations are controlled also differs substantially between the two countries. In Germany, banks have extensive representation on boards of directors, but there is no market for corporate control, while in the U.S. the reverse is true.

3. The Household Side

In analyzing the welfare properties of the German and U.S. financial systems it is helpful to consider the household side separately from the firm

side. In this section we are interested in things from the perspective of the ultimate providers of funds, that is, households. We focus on the provision of risk sharing and information, and the variety of financial products and banking services.

Intergenerational risk sharing

As stressed in the previous section, one of the salient characteristics of the U.S. financial system is the enormous variety of financial products available to the average investor. The German system, by contrast, offers investors relatively little variety. On the asset side, U.S. banks are much more constrained than their German counterparts. Regulations such as the Glass-Steagall Act prevent commercial banks in the U.S. from participating in the equity market or the corporate bond market. German banks, on the other hand, can and do hold equity and corporate debt. They are universal banks.

These contrasts between the U.S. and German systems could be summarized by saying that German banks take short-term deposits and convert them into holdings of corporate securities, whereas U.S. banks leave the investment in corporate securities to other institutions and convert short-term deposits into mortgages, loans for consumer durables and business loans. Of course, German banks make loans for the purchase of real estate and consumer durables as well, but we are focusing here on the differences. The assets held by German banks thus appear to be fundamentally more risky than those held by U.S. commercial banks.

An interesting question is how the German system manages the risk of the assets it holds. In the U.S., investors hold securities directly or in mutual or pension funds and bear the risk of fluctuations in asset prices, default on corporate obligations and so forth. In Germany, investors deposit their funds

in a bank and are apparently shielded from this risk. "Risky" assets are somehow converted into "safe" deposits. How is this achieved? Who bears the risk?

One possibility is that the banks' depositors bear the risk, but that banks are in a position to "smooth" fluctuations in returns over time, so that volatility appears to be reduced. In other words, it provides intertemporal risk sharing. To see how this might work in an ideal system, consider a situation in which there has been an unexpected negative shock to the economy. Suppose that discount rates remain the same, but expected corporate profits fall. In the U.S. model, capital values would fall, but yields would remain the same. Current investors would suffer a significant loss, but future investors would be shielded because they had not yet taken a position. In contrast, in the German model, the value of bank deposits would be unchanged, so current investors would be shielded from the immediate effects of the shock. Banks would absorb the shock by lowering the interest rate they would pay on deposits in the future, so future depositors would share the loss with continuing depositors. What prevents this kind of smoothing in the U.S. model is the threat of disintermediation. Because German banks face limited competition from financial markets they can lower the interest rate without a consequent flight of funds.

Next consider what happens when there is an increase in expected profits (and discount rates remain the same). In the U.S. model, current investors experience an increase in the capital value of their stocks while future investors' prospects are again unchanged. In the German model, current investors are no better off in the short run; but current and future investors are because the bank will increase the interest rate paid in future periods.[10]

These scenarios illustrate how risk can be shared between current and

future generations in the German model, but not in the U.S. model. Whether this represents genuine risk sharing or only a difference in accounting for the effects of the risk depends on the nature of the shocks and the reaction of markets and banks respectively. In particular, if banks and regulators do not recognize the nature of the risks, they may be engaging in illusory and hence sub-optimal "risk sharing".

Although the U.S. financial system provides a tremendous variety of financial instruments, it cannot provide intergenerational risk sharing of the type described because markets are incomplete. Current investors cannot trade with future generations of investors before uncertainty is resolved. In the extreme case, we have to recognize that such generations may not yet be born. Even if they have been born, they may be liquidity constrained or there may be significant problems in writing individualized contracts. People do not know how successful they are likely to be and what commitments they can undertake. In contrast, the German model, because it is characterized by a lack of competition between banks and is not constrained by competition from financial markets, may be able to overcome this incompleteness.

The Savings & Loan (S&L) crisis of the 1980's illustrates some of the limitations of the U.S. financial system in terms of its intergenerational risk sharing capabilities. The S&L's had made long term loans at low interest rates which were funded with short term deposits. When market rates rose, depositors withdrew their funds and put them in instruments such as money market mutual funds. As a result many S&L's became insolvent and had to be rescued by the government. The transfers from taxpayers that were required are a form of intergenerational transfer since they were funded by government debt which will have to be borne by future generations. Thus government insurance of bank deposits can be regarded as a form of intergenerational risk

sharing.[11]

One important issue is the quantitative importance of the intertemporal risk sharing effect. Casual empiricism suggests the fluctuations in U.S. asset values may cause a large direct loss in utility. Moreover there can also be a large distortion in the allocation of resources to investment, since investors may respond to this risk by substituting away from risky assets. This is an important area for future research.

Cross-sectional Risk Sharing

Although the U.S. financial system may be deficient in terms of intergenerational risk sharing opportunities, it does provide many cross-sectional risk sharing opportunities. When individuals within a generation are heterogeneous, the possibility exists for those who are less averse to risk to bear more of it. This is the classic notion of risk sharing that is captured in traditional financial models. In the U.S., the diversity of instruments and markets means that there is extensive opportunity to share risks within the current generation.

In Germany, the possibilities for cross-sectional risk sharing are more limited. Relatively few stocks are quoted on the stock exchanges and there are few mutual funds or other intermediaries that reduce transaction costs. Trading futures and options is not a practical possibility. In essence, investors have very restricted opportunities to share risk cross-sectionally. Most invest in bank accounts and although this allows intertemporal risk sharing, cross-sectional risk sharing is precluded.

An interesting issue is whether it is possible to have a financial system which simultaneously obtains the benefits of intergenerational and cross-sectional risk sharing. One problem is that there is a fundamental

tension between intergenerational risk sharing and the existence of financial markets. The reason German banks can adjust interest rates to achieve intergenerational risk sharing is precisely because they are not faced with competition from markets. To see this consider the example discussed above where expected profits fall but intertemporal discount rates remain the same. If banks were faced with competition from markets they would not be able to lower interest rates in response to a fall in expected profits; if they did, investors would withdraw their funds and invest them in securities which paid a relatively high yield reflecting the unchanged intertemporal discount rates.

If intertemporal and cross-sectional risk sharing are to be achieved it does not seem likely it can be achieved with a combination of traditional bank accounts and financial markets. One possibility is for a bank to offer a menu of bank accounts which have different risk characteristics. The barrier to implementing this type of arrangement is the difficulty of finding a variable to which the return could be indexed, while at the same time maintaining liquidity. For example, one of the rationales for having a variety of products is that customers can use their private information (about preferences and so forth) to construct tailor-made portfolios. If this information were fixed once-for-all, it might be possible for a bank to set up an optimal mechanism, in the form of a menu of accounts from which the customer would choose at the beginning of his (economic) life. But information continues to arrive and the customer will want to rearrange his affairs as time goes on. The only practicable means of allowing customers to make use of this information is to offer them the opportunity of reallocating their wealth among the different funds. But this threatens to wreck whatever risk-sharing schemes the bank has managed to set up. The intergenerational risk sharing that banks can implement in the German model because they are

non-competitive requires some constraints on disintermediation. Otherwise, problems will arise whenever new information arrives that changes expectations concerning relative rates of return.

This discussion also raises the issue of how something like an equity account could be set up within the institutional context of a bank. Deposit contracts are easy because they either specify a fixed rate of return or allow the rate of return to be set at the discretion of the bank. In order to enrich the set of contracts offered by the bank, it is necessary to make the returns contingent on something observable and verifiable. One possibility is to have the bank set up a mutual fund, the assets of which are owned by shareholders and held by a trustee, so that the returns to the fund are naturally contingent on the performance of the fund's portfolio. But once this is done, it effectively rules out the possibility of intergenerational risk sharing. The depositors are the legal owners of the fund and the bank cannot infringe their rights of ownership by making transfers into and out of the fund.

On the other hand, if the money deposited in the new equity account is invested in the general assets of the bank, it is not clear how the rate of return will be determined. Because of the nature of the bank assets, there is no well defined notion of rate of return for the bank as a whole. The banks' loans are non-marketable and to the extent that cash flow depends on the terms on which the bank is willing to accept deposits and make loans, any measure that one might choose is manipulable. In fact, to the extent that intergenerational insurance is offered by the bank, we want the return to be manipulable rather than being tied to some index that is beyond the bank's control. In the case of simple deposit accounts, this does not lead to a problem, because either the rate is fixed or if it is variable, depositors can

remove their funds the moment the new rate is announced. But in the case of an equity account the rate will have to be announced ex post and there is a real problem of moral hazard.

These arguments suggest that it is not surprising that German banks do not offer a wider range of products. There is thus a risk sharing trade-off in deciding on the structure of a financial system. If generations are homogeneous there is no possibility for cross-sectional risk sharing and there is no cost to adopting the German model which allows intergenerational risk sharing. On the other hand, if there is enough heterogeneity that the benefits from cross-sectional risk sharing outweigh the benefits from intertemporal risk sharing, the U.S. model may be preferable.

Noise Suppression

There is considerable evidence that U.S. stock prices are very volatile. The traditional explanation for this volatility is the arrival of new information about payoff streams and discount rates (see Fama (1970) and Merton (1987)). One of the differences between the German and U.S. financial systems described in Section 2 was the amount of information provided to the public. The large number of publicly listed firms in the U.S. together with extensive disclosure requirements means that there is a great deal of information released. In Germany, however, relatively few companies are listed and disclosure requirements are limited so very little information is available. In Section 4 the implications of this for the allocation of investment are discussed. The impact of information revelation on price volatility is also important, however. In a well known paper Hirshleifer (1971) pointed out that the release of information could destroy valuable risk sharing opportunities. Allen (1983) and Laffont (1985) investigated this idea

in the context of security markets and showed that more information could make everybody worse off because the added price volatility increases consumption variability. Jacklin and Bhattacharya (1988) showed that bank deposits can be more desirable than equity mutual funds for similar reasons. In comparing the German and U.S. models, the absence of information about firms in the German model may actually be desirable. Because of the reduction in price volatility, investors who have liquidity needs may be better off. In effect, the universal banking system allows noise suppression.

The question of whether information is the only major cause of asset price volatility has been hotly debated. Leroy and Porter (1981) and Shiller (1981) have provided evidence that there is excess volatility: they are more volatile than changes in payoff streams and discount rates would predict. The econometric methods used in these original studies have been extensively criticized but recent work which avoids these problems still finds there is excess volatility (see Campbell and Shiller (1988a,b), West (1988a,b) and Leroy and Parke (1992)). A number of theories have been put forward to explain this excess volatility. These include fads (Shiller (1984) and Summers (1986)), noise traders (DeLong, Shleifer, Summers and Waldmann (1990)), asymmetric information (Gennotte and Leland (1990), Allen and Gorton (1993) and Allen, Morris and Postlewaite (1993)) and limited market participation (Allen and Gale (1994)). To the extent such excess volatility occurs and has negative implications for welfare, the noise suppression associated with the German financial system will be advantageous.

Provision of Services

A striking difference between the two countries is the fact that Germany has many more bank branches per capita than the U.S. Care must be taken in

interpreting this since universal banks in Germany perform more services than commercial banks in the U.S.[12] Nevertheless the difference in bank branches per capita is an impressive statistic. How can it be explained?

Chiappori, Perez-Castrillo and Verdier (1992) have developed a model of spatial competition between banks. Among other things, they are able to show that regulation of deposit rates of the type undertaken in France and Spain can lead to overbranching. Instead of competing by price, banks compete in terms of the level of services provided. They suggest that the oligopolistic nature of the German banking industry means their analysis is applicable there too.

Given the large number of banks that are operated in the public interest in Germany (not to mention the bureaucratic nature of large organizations everywhere) it is not obvious that the standard assumption of profit maximization is appropriate. Rather than think of the bank as a profit- or value-maximizing entity, an alternative is to think of it as a rent-seeking institution. Rents, such as informational rents, efficiency wages and so forth, are to all intents and purposes like other costs. They are part of the organizational structure of the institution; any other institution will be constrained to pay the same rents to its employees and managers. They are thus harder to eliminate than excess profits which can potentially be regulated or competed away. Because the management maximizes the aggregate rents earned by the "team" of managers, it behaves quite differently from a profit-maximizing firm. In particular, it has an incentive to increase services to its customers beyond what a profit-maximizing firm might choose. A large number of branches is one example. At one level, this represents a higher degree of convenience and service. At another level, it represents a stream of rents for the management "team". Every branch needs a manager, who

will be paid an efficiency wage which is higher than his transfer wage (the amount he could earn in his next most attractive occupation). Another bank even if it is privately owned cannot offer the same level of service without incurring the same costs, in the form of rents, as well as the more usual costs of buildings, labor, and so forth. The existence of a government-owned sector which seeks rents may therefore force the rest of the industry which is privately owned to follow suit.

The tendency of management to take its remuneration in the form of these rents has a number of implications. The shareholders' interests are not necessarily served. Likewise, the interests of the customers may not be served. To the extent that rents are generated by services provided to customers, there will be a tendency to expand the range of services provided beyond what customers would choose if they faced the true cost function. Customers are better off to the extent that they receive good service, but welfare is lower because the cost is high. It does not follow that services are always maximized. There may be some services that do not generate large rents or generate insufficient rents relative to the effort required; management will not have an incentive to provide these services.

4. The Firm Side

The previous section has focused on the household side of financial systems. The other important aspect is the allocation of resources to investment. The form of a country's financial system can have an important impact on the types of investment firms undertake and the efficiency with which they are carried through.

The Allocation of Investment

As stressed in Section 2, one of the most important differences between the U.S. and Germany is the amount of information that is publicly available. In the U.S. the large number of firms that are publicly listed and the SEC requirements that they release extensive accounting reports means that there is a great deal of information available. This has implications for the allocation of investment.

The wide availability of information helps firms to make good investment decisions. Firms can also make better decisions about whether to enter an industry or not. This allocational role of the stock market has traditionally been viewed as one of its most important attributes.

By contrast to the U.S., few companies in Germany are publicly listed and those that are do not release much useful accounting information. As suggested in Section 3, this noise suppression can be advantageous in that it may reduce the risk born by investors. On the other hand, it raises the issue of how investment is allocated. Without the price signals and other information available to U.S. firms, German firms would appear to be at a significant disadvantage in making investment and entry decisions. However, it can be argued that a German type of financial system with a small number of large banks permits substitute mechanisms. The banks will have a large amount of information about the profitability of firms. They can use this information either directly by advising firms or indirectly when they decide whether or not to grant loans to finance investments. Although substitute mechanisms allow duplication of many functions there remain some apparent disadvantages. Most importantly, without an active stock market deciding on appropriate risk adjusted discount rates may present a serious problem.

The Market for Corporate Control

Manne (1965) has argued that an important aspect of U.S.-style economies is the ability of different management teams to compete for the control of assets. In principle, the process of takeovers and acquisitions allows the most able teams to gain control of assets and to make investment decisions. In addition, it provides a mechanism for disciplining managements that squander the resources of their companies.

A large number of studies have indicated that takeovers in the 1970's and 1980's increased shareholder wealth substantially. Jensen (1993) gives the total increase in value of target firms from 1976-80 as $750 billion. There has been an extensive debate as to what caused this increase in value. A number of studies using accounting data such as Ravenscraft and Scherer (1987) and Herman and Lowenstein (1988) have found little evidence that operating performance improves after mergers. Other studies such as Healy, Palepu and Ruback (1992) do find some increases in asset productivities after mergers. Kaplan (1989) has found evidence of improved operating performance after management buyouts. An alternative explanation for the value changes suggested by Shleifer and Summers (1988) is that the increase could be due to wealth transfers from employees, suppliers and others but there appears to be little empirical evidence that this is the case.[13]

In Germany an active market for corporate control does not exist. This is perhaps not surprising given the fact that relatively few German firms are publicly listed and the information that is available for those that are is sparse. Based on case studies of the few hostile takeovers that have occurred in Germany, Franks and Mayer (1993) argue that concentration of ownership is the single most important factor that makes it difficult for outsiders to obtain control and prevents a proper market from developing.

Without an active market for corporate control, German firms would at first sight appear to be at a disadvantage because of the absence of a mechanism for removing incompetent management. However, it has been argued by Franks and Mayer (1992), Jenkinson and Mayer (1993), Kester (1993a,b), Schneider-Lenné (1993) and others, that a German type of financial system permits substitute mechanisms. One important factor is concentrated shareholdings since this provides incentives for shareholders to monitor. Franks and Mayer (1992) found that in the largest 200 companies in Germany, 90 percent have at least one shareholder with a share of 25 percent or more of the equity. Another factor is the ability of German banks to appoint directors to a large number of firms. This means they have considerable power over the appointment of management teams. Given the banks' extensive inside knowledge of other firms their views are presumably weighted heavily in board discussions. They will have substantial power to remove or otherwise discipline ineffective managers. Kaplan (1993) has found that poor stock returns and earnings increase the likelihood of top management turnover in Germany by about the same amount as in the U.S.

The Market for Internal Funds

The controversy over the source of value gains in takeovers suggests that the traditional explanation of the benefits derived from mergers and acquisitions may not be the only thing going on. The fact that it appears difficult to identify gains in operating efficiency indicates that the value gains may arise from other factors.

A number of papers have suggested that firms have a strong preference for internal finance. Using aggregate data, Mayer (1988; 1990) has provided evidence which suggests that in Germany and the U.S., as well as in other

countries, most investment is financed with internally generated funds. Table 3 shows that, at least in the U.S., the disaggregated data provides a somewhat different perspective. Large firms do predominantly use internal finance. However, smaller firms use a significant amount of external finance; their internal funds are not sufficient for their needs. The transactions costs of internal funds are significantly lower than the transactions costs of external funds. Table 4 shows the costs of issuing equity, preferred stock and convertibles and bonds.[14] These costs are significant for all firms but are particularly high for small firms. Myers (1984) and Myers and Majluf (1984) have provided theories based on asymmetric information which also suggest internal funds are likely to be preferred to external sources of funds.

These observations suggest an alternative efficiency gain that can arise from mergers and acquisitions. If external markets are very costly, firms will prefer to rely on internally generated funds. If some firms are generating more funds than they can invest while others lack the resources they need there will be an incentive for the firms to merge. In a world of incomplete information this may be the best way to ensure an efficient allocation of resources.

In external markets free-rider problems resulting from the wide diversification undertaken by risk averse investors means the incentives to gather a lot of information about the quality of management and the long-run prospects of the firms in which they invest may be seriously flawed. It is hard to maintain property rights over information especially when some of the information will be revealed by prices or trading activity. For all these reasons, participants in the markets for debt and equity are unlikely to be willing to incur the substantial costs of acquiring information that might justify a large injection of cash into a company that was unable to generate

sufficient internal funds to finance the efficient level of investment. The size and lumpiness of these information costs suggest that it may be easier to get funds from a single source, without the use of the debt or equity markets, and the transaction costs may be further reduced if the transfer of capital takes the form of a merger or an outright takeover.

Lamont (1993) has provided evidence for the U.S. which is consistent with this view of firms having an internal capital market for funds. He looks at the reaction of firms with a significant oil division but which also had other unrelated divisions, to the dramatic drop in the oil price in the mid 1980's. Investment in the non-oil divisions fell despite the fact that investment by other control firms in the same industries as these divisions increased.

In Germany an equivalent allocation of resources may be achieved by the banking system. The oligopolistic structure of the banking industry means that the incentive problems associated with the size and lumpiness of the information costs may be significantly reduced. In addition, the extensive cross-holdings of shares may also play an important role in reallocating funds.

Incentives, Monitoring and Long Term Relationships

It has long been recognized that when ownership and control are separated managers may not have the correct incentives to allocate resources efficiently. One crucial aspect of a financial system is in constraining managers. It has been argued that there are substantial differences in this respect between bank-based systems such as that of Germany and financial-market-based systems such as that of the U.S.

Diamond (1984) has proposed that one of the most important roles of banks is to act as delegated monitors. He suggests that the shareholders of a firm

need to check what the managers are doing. When there are many shareholders there is a free rider problem, since it is not worthwhile for any individual shareholder to bear the costs of checking. They could combine to hire somebody to do this but that person would effectively be another manager and would also need to be monitored. Diamond argues that this problem can be solved if a bank provides a loan to the firm. If the bank promises a high rate of return to depositors it effectively precommits to monitor the firm's actions because if it did not it would be unable to pay the high rate. Of course, in practice, there is risk associated with individual firms which may prevent the bank from paying the high promised rate but Diamond suggests this problem can be overcome by lending to a number of firms and diversifying away the risk. This argument implies that the German financial system may lead to German firms being more efficiently run than U.S. firms. To the extent U.S. firms use both bank loans and publicly issued debt they may not be at too great a disadvantage.

Mayer (1988) and Shleifer and Summers (1988) have stressed that bank-based systems allow implicit contracts and long term relationships to be formed more easily than when active financial markets exist. When contracting possibilities are incomplete, implicit contracts and long term relationships may allow significant *ex ante* gains to be made. For example, workers and suppliers may be willing to acquire firm specific skills and capital, whereas without an implicit contract or long term relationship they would not be willing to do so. *Ex post* a firm may be required to make payments to fulfill its obligations even though it is not legally required to. Banks are likely to encourage this type of arrangement in order to be able to share in the ex ante gains. Ex post a desire to maintain their reputation will ensure the banks do not pressure firms to break their implicit contracts. In contrast, for a firm

that is listed on a stock exchange, there is an incentive for somebody to take it over and cease making the payments required under the implicit contract.

The important question, of course, is why banks and firms should be different in this respect. It may be that banks are less subject to takeover and hence to sudden changes in management. Also, banks may have a longer time horizon. Banks are less likely than firms to experience sudden shocks that increase their costs or reduce the market for their services.

Dewatripont and Maskin (1990) have argued that a German style financial system can be associated with a "centralized" credit system and that a U.S. style financial system can be associated with a "decentralized" credit system. They argue that each has advantages and disadvantages. Consider a "bad" project which requires investments at two dates and suppose that it is unprofitable when viewed from an ex ante perspective. Once the initial cost has been sunk it may be optimal to continue it because the present value of the final payoff exceeds the interim cost. Next suppose that there are also "good" projects which are ex ante profitable. The proportion of good and bad projects are such that they are all worth doing on average. Entrepreneurs know their own project type but lenders do not. With a centralized credit system all projects will be undertaken and completed because lenders will not identify project quality until the intermediate stage and they are all worth continuing. Decentralized systems have the advantage that they effectively allow lenders to precommit not to refinance bad projects at the interim date. As a result, entrepreneurs will not undertake them and so only good projects are financed. The reason decentralization allows precommitment is that new lenders must be brought in and informational rents shared so refinancing bad projects is no longer worthwhile. It is also shown, however, that decentralization may prevent the continuation of good long term projects which

have high payoffs at the final date. The reason is that they will be pooled with the bad projects which have low payoffs at each date. Dewatripont and Maskin's theory thus provides an interesting contrast between the differing long and short term incentives provided by the German and U.S. financial systems.

Diversity of Opinion

Traditional economic analysis has been concerned with situations where production technologies are well known and managers are aware of the consequences of the actions they take. In this case, the problems facing managers are relatively simple; they choose inputs and outputs to maximize profits. Because production technologies and the consequences of actions are well known there is wide consensus on how the firm should be managed.

In some circumstances, the assumption that the consequences of managerial actions are well known is appropriate. In a competitive industry where there are many producers and the time taken for consequences of actions to be discovered is small, a large amount of experience will soon be accumulated. The industry will approximate the ideal where the consequence of managerial strategies is known and there will be a consensus on how firms should be run. One example is agriculture. Here the available body of evidence is large and there is a fair degree of consensus. A number of other *traditional* industries are a reasonable approximation to this ideal.

In many modern industries, however, the assumption that the consequences of managerial actions are well known is not satisfied. There are only one or a few firms, production lags are such that it takes a great deal of time before the consequences of actions are discovered and, even when they are, technology is constantly changing so the information is of limited use. In

this type of situation there is often very little consensus on how a firm should be run. The extreme case is where an industry is a new one so there is no experience at all on the consequences of managerial strategies. A current example would be the biotechnology industry.

It is often possible for institutional investors and individuals to gather information and undertake research on the likely effects of various managerial actions. However, the complexity of running modern corporations means that there will not be a uniform view of the best actions to undertake. It is important to stress it is not just a difference in data that is important here. Even if people collected the same information about the industry, they might interpret it differently because of differences in education, personal experiences and background. In the absence of a large sample of data points on the effect of various actions, differences in views will persist. This divergence of opinions is an important feature of many dynamic industries where there is constant change.

Allen (1993) argues that bank-based systems, such as that of Germany, are much more suited to traditional industries where there is consensus and financial market based systems are more suited to dynamic industries where there is not wide agreement. Stock markets provide an incentive for a wide range of people to undertake research and to check managerial actions. Some investors keep their information and views private. They buy and sell shares on the basis of this information and the profits they make compensate them for the expenses incurred in undertaking the research. Grossman and Stiglitz (1980) have shown this information can become reflected in the firm's stock price. Firms that adopt managerial policies that are widely regarded to be good have a high stock price on average; firms which adopt policies that are thought to be bad have a low stock price on average. In addition to investors

who keep their information to themselves and trade on the basis of it, there are also people who do research that is published in newsletters and distributed to clients in various other ways. This process encourages debate about how firms should be run. In general, the diversity of views and the process of debate can play an important role in checking the actions of managers. Even in industries where there are few firms and little previous experience to go on, this checking process leads to consensus strategies being favored and helps to reduce risk.

In contrast, with banks there is no equivalent to this broad based checking process. The bank officers overseeing the loan will check what the firm managers are doing but they are very limited in number. These bank officers together with the firm's managers are the only ones to go through this process and they are not enough to form a reliable view on how the firm should be run. In the absence of disclosure associated with U.S. style stock markets, the lack of public information means there is no public debate as to the appropriateness of various managerial strategies.

One implication of these theories is that new industries where there is very little if any prior experience on how firms should be run should do better with stock markets than with banks. Allen (1993) argues that this prediction is consistent with the observation that it was the U.K. which first underwent the Industrial Revolution in the nineteenth century with the development of the railways and the other new industries which were to a large extent financed through the London Stock Exchange. Similarly, in the U.S. the New York Stock Exchange played a critical role in the development of the major twentieth century industries such as the automobile, aircraft, electronics and computer industries. Among current emerging industries such as biotechnology, stock markets are again major sources of finance. In contrast, in nineteenth

century Germany, with a few exceptions such as chemicals and electrical goods, most industrial development took place when the technologies were not as new and untried as in the U.K. Similarly, in the twentieth century Germany's most important achievements have been in existing industries rather than entirely new ones.

5. Concluding Remarks

This paper has argued that a welfare comparison of financial systems in Germany and the U.S. is a complex exercise. Which type of system is desirable depends on a wide range of factors both on the investor and the firm side. As a country's circumstances change it may be optimal for it to change its financial system. In discussing the recent financial deregulation in France, Melitz (1990; p.397) remarks as follows.

> As one contemplates the panoply of measures that took effect in France from late 1984 to the end of 1986, there is no doubt that the changes were inspired by a general vision. This was no mere lifting of controls: new instruments were created; new markets were added, including markets in futures; and the importance of permitting every individual agent to hedge his risks was clearly recognized. The whole program smacks of a close acquaintance with the principles of the theory of finance.

In undertaking its reforms France may well gain some of the advantages associated with the U.S. financial system that were discussed above. In particular, the quotation stresses the cross-sectional risk sharing advantages. What is not entirely clear is that these benefits outweigh some of the losses associated with the change. For example, intertemporal risk sharing will no longer be possible once widely-used and liquid markets are established.

The principles of the traditional theory of finance that Melitz refers to apply to a perfect world with complete markets. In an imperfect world it is not immediate that markets are the best institutions available. Markets

impose constraints in the form of equilibrium conditions that must be satisfied. They may prevent arrangements which are ex ante inefficient. The German model, with its lack of financial markets, provides an example of how ex ante efficient arrangements can be provided. In conclusion, much more analysis is required before conclusions concerning the desirability of particular financial systems can be drawn.

Table 1

A Comparison of Equity Holdings

Country	Germany	U.S.
	(percent)	(percent)
Size of the extended banking systems measured by total balance sheet as a percentage of GDP in 1988[a]	189	87
Market value of shares of domestic companies as a percentage of GDP in 1992[b]	20.3	77.3
Ownership of publicly listed corporations 1990-1991[c]		
Banks	8.9	0.3
Insurance Companies	10.6	5.2
Pension Funds	-	24.8
Investment Companies	-	9.5
Non-financial Businesses	39.2	-
Households	16.8	53.5
Government	6.8	0
Foreign	17.7	6.7

Sources: [a] Maccarinelli, Marotta and Prosdocimi (1993), Table 12.1, p. 303.

[b] Report of the German Stock Exchanges 1992, International Financial Statistics.

[c] Kester (1993a), Table 4, p. 33.

Table 2

A Comparison of Financial Systems

Country	Germany	U.S.
Universal banking	Yes	No
Number of important banks	Small	Large
Long term relationships between banks and firms	Extensive	Limited
Competition between banks and financial markets	Little	Considerable
Interaction between intermediaries and financial markets	Limited	Extensive
Number of publicly listed firms	Small	Large
Futures and options markets	Illiquid	Liquid
Information available about publicly listed firms	Limited	Extensive
Market for corporate control	No	Yes

Table 3

Sources of Financing in the U.S. for 1988

Decile	Ret. Earn.	Debt	Equity	Other	Depr.	Avg. Assets
All	.9819	.4364	-.1200	-.2238	.5918	1971
1	-.0596	.3577	.5946	.1056	.3819	11
2	.3834	.6951	.2700	-.3449	.6929	35
3	.3341	.4564	.3219	-.1126	.3379	67
4	.6368	.4296	.1201	-.1864	.4473	116
5	.4727	.5104	.0343	-.0153	.5336	190
6	.5194	.5508	.0415	-.1108	.4230	307
7	.5481	.4516	-.0772	.0806	.4578	547
8	.7353	.2061	-.0715	.1392	.4824	1069
9	.8399	.3117	-.1326	-.0138	.4727	2467
10	1.0076	.4832	-.1407	-.3503	.6489	15758

Sources are written as a proportion of net real investment (net capital expenditures + acquisitions). Retained earnings is operating cash flow - dividends, debt is net cash from debt, equity is net new equity including preferred, other is mainly cash and short-term securities. Firms are sorted into deciles based on 1987's book value of assets. Individual accounts are aggregated over the entire decile and then normalized by total investment for that decile. All data is from the Compustat industrial tape. Not included in the sample are firms missing data item, firms incorporated outside the U.S., limited partnerships, banks, utilities, and insurance companies, The total number of firms is 1,677.

Table 4

Underwriting Spread and Issuance Expenses as Percentage of Offering Price for U. S. Registered Public Offerings, 1973-1989

Issue Size (Millions of Dollars)	Common Stock		Preferred Stock		Convertible Preferred and Convertible Debt		Bonds	
	(%)	Total	(%)	Total	(%)	Total	(%)	Total
Under 10.0		14.84		11.48		11.91		6.18
10.0 to 24.9		8.60		6.77		5.93		2.45
25.0 to 49.9		6.88		3.45		3.79		2.76
50.0 to 99.9		6.01		2.26		3.06		1.74
100.0 to 199.9		5.31		2.96		2.47		1.26
200 to 500		5.04		3.45		2.29		1.19
Over 500		6.10		3.80		2.98		1.94
Average		7.54		4.88		4.63		2.50

Includes underwriting spread, legal fees, accounting fees, SEC filing fee, blue sky expenses, printing, mailing, and miscellaneous out-of-pocket expenses. It excludes costs arising from asymmetric information.
Source: Emery and Finnerty (1991, p. 384).

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Notes

[1] In a historical study of the period from 1870-1914, Calomiris (1993) has argued that the German universal banking system dominated the U.S. system in the sense that the cost of capital was lower. Nevertheless, the U.S. economy outperformed the German economy.

[2] For an excellent recent survey of the theory of banking, see Bhattacharya and Thakor (1993).

[3] More complete descriptions of the financial systems of Germany and the U.S. are contained in Pozdena and Alexander (1992) and Baer and Mote (1992), respectively. This section draws heavily from these sources and unless otherwise noted statistics are drawn from them.

[4] Schneider-Lenné (1993), Table 1, p. 12.

[5] Kester (1993) p. 72.

[6] Timberlake (1978) p. 39.

[7] See Timberlake (1978) Chapters 1-3 for an account of the First and Second Banks and the controversy on rechartering the Second Bank.

[8] Roe (1991) carefully documents the role of political factors in the shaping of financial institutions and argues these factors have been critical.

[9] Monthly Report of the Deutsche Bundesbank, April 1992, p. 15.

[10] Qi (1994) investigates liquidity provision in a repeated version of Diamond and Dybvig's (1983) model. There is no aggregate uncertainty in his model so the nature of risk sharing between generations is very different from that suggested here.

[11] We are grateful to Jean Tirole for making this point.

[12] Schmid (1994) has used a Hotelling-type model to investigate differences in branching in Finland, Germany, Norway and Spain. He finds no evidence that any of these countries is overbranched.

[13] See, for example, Asquith and Wizman (1990), Pontiff, Shleifer and Weisbach (1990) and Rosett (1990).

[14] See Emery and Finnerty (1991), Table 14-3, p. 384