German Banking, 1850-1914: Development Assistance for the Strong

Richard H. Tilly
University of Münster

This paper is concerned with the contribution of financial institutions to economic development in Germany from roughly the middle of the XIXth century to 1914. In general, the literature considering this question has emphasized the development of "mixed banking", that successful combination of commercial and investment banking activities so well exemplified by the operations of such large Berlin banks as the Deutsche Bank or the Disconto-Gesellschaft in the decades before World War One.[1] Seen comparatively — and particularly from an Anglo-American perspective — this *is* German banking's most striking feature. Between 1870 and 1913 the value of "mixed banks' " assets rose from about 600 million to over 17.5 billion marks (or from roughly six to over 20 percent of the estimated value of the stock of industrial capital).[2] Concentration developed apace. By 1913 ab-

[1] The standard works are: J. RIESSER, *Die deutschen Großbanken und ihre Konzentration* (Berlin, 1910); O. JEIDELS, *Das Verhältnis der Großbanken zur Industrie mit besonderer Berücksichtigung der Eisenindustrie*, 2d. Ed.; (München und Leipzig) 1913; A. WEBER, *Depositenbanken und Spekulationsbanken. Ein Vergleich englischen und deutschen Bankwesens;* (Leipzig, 1902); R. HILFERDING, *Das Finanzkapital*, Berlin 1909. W.I. LENIN, *Der Imperialismus als höchstes Stadium des Kapitalismus* 1917, in: W.I. LENIN, *Ausgewählte Werke*, 3 Bde., East-Berlin (1966) here Bd. III; H. BÖHME, in H.U. WEHLER (Ed.), *Sozialgeschichte heute. Festschrift für Hans Rosenberg*, (Göttingen 1975), and also M. POHL, *Konzentration im deutschen Bankwesen, 1848-1980* (Frankfurt, 1982).

[2] W. HOFFMANN et al., *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (New York, Heidelberg, Berlin 1965), 255-56, 785. What I am calling "mixed banking" here is in German associated with "Universalbanken", the forerunners of which are called "Kreditbanken" — and unnecessarily broad label since all banks have to do with credit, but a useage nevertheless followed here.

out half of the assets cited above were held by the five largest Berlin banks. In that same year Germany's three largest incorporated enterprises were banks; indeed, 17 of the country's largest 25 enterprises were banks.[3] Those figures reflect a degree of prominence which can be found in the banking institutions of no other major industrial country at this time. The history of those banks is thus an important part of the history of Germany's financial and economic development during the period.

The story of the development of Germany's "great banks" has been so often told that it cannot be the task of this paper to merely repeat that story's facts. Instead, the following seeks to focus attention on four important and interrelated questions. First, following recent work on comparative financial history, it attempts to place the contribution of German banks to economic development in the context of the modern theory of risk and portfolio management. Second, it discusses the evolution of German mixed banking as an example of institutional change based on information or transaction costs. Third, it examines the bank's provision of financial services by utilizing new issues on the capital market as a proxy for their portfolios. Fourth, it returns to the second point and interprets the contribution of banks doing a "mixed" business as part of a larger institutional framework which encompasses practically the entire German financial system, from central bank policies to the preferences of rentiers.

I

The theoretical basis of this paper builds on a pair of claims. The first is that economic development depends to an important extent on a society's ability and willingness to undertake risky

[3] By paid up capital: Deutsche Bank (250 Mill. M.), Discont-Gesellschaft (200 Mill. M.) and Dresdner Bank (200 Mill. M.). from D. Weder, *Die 200, größten deutschen Aktiengesellschaften, 1913-1962*, Inaug. Diss. Univ. Frankfurt 1968. For an estimate of concentration: H. Mottek u.a., *Wirtschaftsgeschichte Deutschlands*, Bd. III, Berlin 1974, S. 100-101 (drawing on Riesser).

investment, particularly that associated with new technologies. The second claim is that financial institutions influence economic development mainly through the provision of opportunities for wealthholders to diversify their portfolios and the related stimulus to the supply of risk-bearing capital. This paper takes the first claim for granted. The second, however, in keeping with the paper's aims, deserves some discussion.

Modern portfolio theory turns on the relationship between the mean rates of return on capital assets and their variances. For any given period and any given asset the former are taken to represent the *expected* rates of return and the latter the expected risk. The real focus of this "Mean-Variance" theory, however, is not on individual assets, but on collections of assets in portfolios and, in particular, on gains realizable by diversification of those portfolios. The theory purports to show how efficient diversification of the portfolios of wealthholders can produce a maximum rate of return on portfolios for a given amount of variance (or risk), or a minimum variance for a given rate of return. For a portfolio, the rate of return (or yield) is an average of the yields of the component assets, each weighted by their share in the total values of the portfolio.

But the punch line of the theory is that the risk of any asset which is part of a wealthholder's portfolio is not its own variance about its mean yield, but the *covariance* of its yield with that of the entire portfolio. Thus the expected yield of a portfolio can be expressed as:

(1) $E_p = \sum_{i=1}^{N} \times_i R_i$, where

$\times_i$ = share of a given asset in the portfolio and
R_i = mean rate of return of a given asset and
N = number of assets in the portfolio.

The expected variance (or risk) of a portfolio is then:

(2) $V_p = \sum_{i=1}^{N} \sum_{j=1}^{N} \times_i \times_j C_{ij}$, where $\times_j$ and $\times_j$ are the shares of

component assets in the portfolio,

C_{ij} their covariance, and N the number of assets in the portfolio.

Portfolio risk is thus a weighted average of all of the possible covariances of component assets. The important point is that assets having uncorrelated or negatively correlated yields can be combined in portfolios to produce higher yields per amount of risk for their owners than those owners could obtain by holding the same amount of wealth in such assets alone. Diversification means precisely that: combining assets having differing (weakly correlated, uncorrelated or negatively correlated) mean-variance characteristics. According to the theory, wealthholders with a given risk-yield preference (conventionally expressed as α) will reach equilibrium by fulfilling the conditions expressed in the following equation:

$$(3)\quad z_{min} = \alpha \sum_{i=1}^{N} x_i E_i + \sum_{i=1}^{N}\sum_{j=1}^{N} x_i x_j C_{ij} + \lambda \left(1 - \sum_{i=1}^{N} x_i\right)$$

where λ is the Lagrange multiplier related to the budget constraint ($\Sigma x_i = 1$) and where $O \leqslant \alpha \leqslant L$ with L having values which can be arbitrarily large

By applying the assumption of homogeneous risk preferences, equal information and zero transaction costs for all wealthholders, the efficient portfolio becomes the (equilibrium) efficient market portfolio. Were it possible to describe in such terms the assets available to wealthholders in a given economy, we could then derive from them an "efficient portfolio frontier" — with which actual holding patterns could be compared and possible inefficiencies identified, i.e., the theory could be tested. Such a test is attempted in section III below.

The portfolio theory just described has obvious relevance for an evaluation of financial intermediation. It strongly suggests that diversification is the latter's key output. This is partly true. But since with negligible information and transaction costs individual wealthholders could diversify their own portfolios through direct

exchange, it seems clear that financial institutions owe their importance to information and transaction cost advantages (A variant of the "Coase Theorem"). We may speak of two functions performed by financial intermediaries related to such advantages: First, financial institutions reap economies of scale in the production of information on financial opportunities throughout a given economy and can thus distribute such information more cheaply (or with higher quality) than individuals could acquire it themselves. This is the information which permits diversification of portfolios. Second, thanks in part to this informational advantage' financial intermediaries can exploit differences in risk preferences, particularly between lenders and borrowers "by issuing liabilities of a kind attractive to lenders at relatively low yields and using the money thereby obtained to lend to borrowers at higher yields".[4]

The contribution of financial intermediaries to economic development has thus two components: 1) by offering wealthholders more information on asset return and hence greater diversification possibilities, the proportion of risky assets which can be directly marketed can grow; 2) by exploiting their informational advantages financial institutions can themselves diversify and offer wealtholders either well-diversified asset packages (equity claims, e.g.) or liabilities more suited to their particular preferences (e.g., interest-bearing deposits) in the process acquiring a higher proportion of risky assets than wealthholders as a sum of individuals would be willing to hold. Therefore, the above-mentioned claim that diversification is a key financial output has some merit. There is one problem remaining, however, which should at least be mentioned at this point: the willingness of individual wealthholders and financial intermediaries to acquire risky assets is not

[4] C.A.E. GOODHART, *Money, Information and Uncertainty* (London, 1975), 107. Chapters 2, 5 and 6 of this book are useful discussions of the theoretical issues touched on here. I have also profited from advance access to William Kennedy's and Rachel Britton's forthcoming article: "Portfolioverhalten und wirtschaftliche Entwicklung im späten 19. Jahrhundert — Ein Vergleich zwischen Großbritannien und Deutschland. Hypothesen und Spekulationen," in R. TILLY (Ed.), *Quantitative vergleichende Unternehmensgeschichte* (Stuttgart?).

solely a matter of portfolio diversification. Two limits deserve emphasis: 1) risk preferences can differ such that efficient portfolio diversification be consistent with a predominantly low-yield, low-risk financial portfolio. The realization of "gains from diversification" does not necessarily imply a better servicing of the high-risk end of the asset spectrum.[5] 2) There is a problem of non-diversifiable risk which may to some extent depend on financial institutions. In the course of their expansion, financial intermediaries will substitute their liabilities for cash in the hands of the public (or wealtholders) and transfer it to their borrowers. However, to some extent, both intermediaries and wealthholders may also want more cash to complement their holdings of other financial assets, for the two categories are not perfect substitutes for one another. Under certain circumstances, considerable swings in the demand for cash and in average returns can take place, even causing defaults and the collapse of financial institutions, with fairly long-lasting effects, particularly for high-risk investments.[6] Diversification through efficient-functioning markets is no answer to limits of these kinds.

II

Hindsight suggests to me that mixed banking definitively established itself in Germany during the "take-off" phase of the country's economic development, i.e., in the period from the 1840's to the 1870's. This was closely associated with the expansion of Germany's railroad network — a dominant feature of Germany's "take off" — and with the unincorporated private banking firms which organized and financed that expansion.[7] As

[5] This is inherent in the concept of an efficient portfolio frontier.

[6] Goodhart, *Money*, 139. See also H. MINSKY, "A Theory of Systemic Fragility", in *Financial Crises. Institutions and Markets in a Fragile Environment.* Edited by E. ALTMAN and A. SAMETZ (New York, London, 1977), 138-52; and C. KINDLEBERGER, Manias, Panics and Crashes (New York, 1978).

[7] See A. KRÜGER, *Das Kölner Bankiergewerbe vom ende des 18. Jahrhunderts bis 1875* (Cologne, 1925) esp. 55-56; for further examples, R. TILLY, *Financial Institutions and the Industrialization of the Rhineland* (Madison, 1966).

early as the 1830's we find private bankers prominently represented in the early railroad organizing committees; and in the 1830's and subsequently those bankers took virtually complete charge over the finances of the companies formed — in the important states of Prussia and Saxony corporations with limited liability which involved unprecedently large collections of capital.[8] Bankers not only underwrote the issue of railroad securities but also managed the companies' current accounts; and to insure their investments they occupied key positions in the management — the continuity of which was strengthened by their ability to control votes taken at shareholders' meeting through the machinery of power of attorney.

An important feature of early railroad financing was that the sums to be mobilized tended to exceed the resources of individual bankers, thus necessitating the formation of cooperative syndicates with as many as a dozen members. Difficulties experienced in forming and holding such syndicates together motivated bankers to search for alternative institutional solutions. As early as 1839 Rhenish bankers, faced by difficulties in the marketing of railroad securities, were discussing the possibility of organizing a large incorporated bank as an answer to such difficulties.[9] At first nothing came of this, for under the circumstances of the times, incorporation was a privilege carefully rationed by the ruling bureaucracies in most German states — particularly in the field of banking — and private bankers themselves had mixed feelings toward the possibility of incorporated banks. Nevertheless, a powerful strain of continuity between private bankers and positive interest in corporate banks is unmistakeable (and important as an

[8] On this R. FREMDLING, *Eisenbahnen und deutsches Wirtschaftswachstum, 1840-1879* (Dortmund, 1975), esp. 123 ff. See also D. EICHHOLTZ, *Junker und Bourgeoisie vor 1848 in der preußischen Eisenbahngeschichte* (Berlin, 1962) and P. BEYER, *Leipzig und die Anfänge des deutschen Eisenbahnbaus* (Weimar, 1978), R. TILLY, *Financial Institutions*, Chap. 7; and W. STEITZ, *Die Entstehung der Köln-Mindener Eisenbahn* (Cologne, 1974).

[9] See TILLY, *Financial Institutions*, 110 and note 80.

example of "market failure" calling for "institutional innovation".[10]

Such continuity is clear in the early history of the first corporate banks, the A. Schaaffhausen'sche Bankverein (founded in the crisis of 1848 on the illiquid remains of the private banking firm of Cologne, A. Schaaffhausen & Co), the Bank of Darmstadt, founded in 1853 with the help of the French founders of the Crédit Mobilier), and also the Berlin banks, the Disconto-Gesellschaft and Berliner Handelsgesellschaft (1856).[11] However diverse the details of their founding, they were soon operating as "mixed banks", in the image of the private banking firms responsible for their launching. Gustav Mevissen, a well-known Rhenish entrepreneur and co-director of both the A. Schaaffhausen'sche Bankverein and Bank of Darmstadt, described the former (in 1853) as a "private banker of a higher order". Waxing eloquent, he claimed that:

> "The banker is in high degree the irreplaceable confidant of industry and capital, the regulator of economic activity in general. In the degree to which banks and bankers extend or restrict industrial credit, is industrial production either encouraged to accelerate or wisely retarded. The banker is in equal measure the confidant of the capitalists, who as a rule follow his advice..." [12a]

But this relationship was of a special nature, as Mevissen's instructions to the management of the Bank of Darmstadt a few years later underscored:[12b]

[10] Not only the size of financial demands was relevant, but, given those demands, the savings in transactions costs associated with decision-making about risky investments within larger corporate banks as compared to coalitions among independent firms. See L. Davis and D. North, *Institutional Change and American Economic Growth* (Cambridge, 1971), esp. 105 ff., for some still relevant statements of the issues.

[11] See Tilly, *Financial Institutions*, Chap. VIII. The Disconto-Gesellschaft was actually founded in 1851 but its "mixed banking" programme really began in 1856. Interestingly, it found little support from Berlin bankers and required Rhenish Capital to get started.

[12a] In Joseph Hansen, *Gustav von Mevissen*. 2 Vols (Berlin, 1906), 768.

[12b] Provisional Norms for Management of the Bank for Commerce and Industry, Darmstadt (Provisionelle Normen für die Geschäftsführung der Direktion der Bank zu Darmstadt), in Nachlaß Mevissens, Nr. 101[a], *Historisches Archiv der Stadt Köln.*

> "The task of our bank is not to attract the business of industrial and commercial enterprise in *general.* On the contrary, it will be our mission to establish contact with all government institutions, joint-stock companies and wealthy private persons in the hope of obtaining as large a share of the business of governments, of princes and principates as well as of joint-stock companies and wealthy private persons as possible..."

These instructions were accompanied by the following specification:

> "A basic principle of our bank is that it is to conduct business only with banking firms of the highest rank and with industrialists of importance, furthermore that it must in principle reject any ongoing connection which does not promise to generate a business volume of at least 50.000 Gulden per year".[13]

With those words Mevissen was outlining the programme of "development help for the strong" which already characterized the work of the larger private bankers and to which most of the newly created corporate banks would remain true in the decades which followed. It is interesting to note that such a programme seems to have been well fitted to the peculiar demands and possibilities of the "take-off" period, for the period's economic growth was clearly dominated by railroads and related heavy industries — precisely those sectors in which large-scale enterprises worthy of the "mixed banks" attention were concentrated — and by a pattern of income distribution conducive to growing concentration of savings and wealth.[14]

However, there is one additional institutional element which contributed significantly to the establishment of corporate "mixed banking" in Germany at this time and which thus deserves men-

[13] A few years later this minimum was raised to 150,000 Gulden and an additional restriction was introduced to the effect that no credit should exceed the estimated total wealth of the debtor, regardless of collateral. *Ibid.*

[14] See R. TILLY "The Take-Off in Germany", in E. ANGERMANN and M.L. FRINGS (Eds.), *Oceans Apart? Comparing Germany and the United States* (Stuttgart, 1981), 47-59.

tion here. That is the strict control of bank note issue in Prussia and its virtual monopolization by a government bank, the Prussian Bank. Up until the second half of the 19th century, the public debate in Germany concerning the desirability of incorporated joint-stock banks (with limited liability) concentrated upon banks of issue, probably because contemporaries believed the greatest private benefits and greatest social costs to be associated with banks of issue.[15] With the founding of the Prussian Bank in 1846 and its growth in subsequent decades the debate became increasingly academic. For private capital, banks of issue were, increasingly, an object with no future. The significance of this development lies in the fact that banks of issue must hold relatively liquid portfolios in order to be able to redeem their notes in cash when they are presented for payment. That dictates an emphasis upon short-term credit, secured, if possible, by liquid assets such as bills of exchange bearing more than one signature. Thus, neither banks of issue nor their logical — and chronological — extension, deposit banks, would be fruitful grounds for the growth of a large business in the underwriting of capital issues, and for the concentration on the needs of a relatively small number of large industrial companies. The German private bankers and their corporate successors worked increasingly with the current account funds on deposit with them, but these were liabilities the repayment of which was more predictable and controllable than were the liabilities of banks of issue and deposits. This was in part because the customers represented a selected circle with well-monitored payments needs. The historical result was a division of labour which left most of pure payments and short-term trade credit business of the economy to the government bank of issue and most of the industrial credit and also the security issue business to the private

[15] The contemporary German discussion of English, Scottish and American banking in relation to German needs focused largely on note-issuing banking and their problems. See, for instance, A. WAGNER, *Beiträge zur Lehre von den Banken* (Leipzig, 1857), which only discusses banks of issue. See also Tilly, *Financial Institutions*, Ch. III.

bankers and their protegés, the corporate "mixed banks". In addition, the latter found themselves increasingly able to turn to the former for payments services, cash, and for short-term discount credits when the need arose. By establishing a thick network of branch offices covering most of Germany, the Prussian Bank contributed to a significant reduction in transaction costs of trade and finance, illustrated, for example, through the setting of one rate of interest and fixed exchange rates for bill payments anywhere in Prussia as early as 1848. Thus, to some extent, even before the 1870's, the "mixed banks" could build their growing business upon the security that the bank of issue could and would supply it with liquidity, if necessary.

The foregoing observations are not intended to suggest that subsequent events in the 1870-1914 period were of no significance for the development of mixed banking in Germany. They were. This was particularly true of the boom and bust of the business cycle in the 1870's, for it was associated with some very important forms of institutional change (involving important shifts in property rights). One such change came with the liberal incorporation law of 11 June 1870: henceforth securing a corporate charter was virtually automatic. The very enactment of this law reflected the growing weight of industrial and financial business interests within the German political system, possibly also the monetary effects of a strong upswing in profit expectations.[16] But an additional factor — no doubt partly related to rising business influence —

[16] The former point is argued by H. BÖHME, *Deutschlands Weg zur Großmacht* (Cologne, 1966), 285-86, where it is emphasized that aristocratic landed interests conceded this law as a quid for the quo of a freeze on iron duties desired by heavy industrial and important financial interests, while Bismarck served as honest broker between the two groups. The latter point can be documented by a number of indicators, e.g., the share price index for German stock exchanges, 1866-71. For this see R. SPREE, *Die Wachstumszyklen der deutschen Wirtschaft, 1840-1880* (Berlin, 1977), 377. See also T. HAMEROW, *The Social Foundations of German Unification, 1858-1871* (Princeton, 1972), 342-43. I should perhaps add that these comments are not an attempt to exhaust the subject of factors influencing the development of Germany's large banks after 1870. For instance, no mention is made here of the founding of the Deutsche Bank, with its initial orientation toward foreign business, and so on.

was the still ascendant ideology of liberalism, in this case connected with the fact that growing numbers of applications for incorporation rights placed an increasing burden on the government bureaucracies processing them and, moreover, implied a degree of government approval which, given increasingly superficial processing, was becoming less and less justified.[17] The answer was to let the market — or the capitalists — decide. Abandonment of state controls meant a decrease in the costs of launching new corporate enterprises — a form of transaction costs — and an increase in their number. This resulted in a considerable increase in the scale of operations for mixed banking, not only because of an increase in the size of industrial enterprises using such banking services but also because increases in the size of banks themselves became easier thereby.

However, in long-run perspective, the sequel to this phase was just as significant. What had gone up like a kite came down like a rock. In the wreckage of the financial crisis of 1873 and the long depression which followed it, large numbers of newly created corporate enterprises became insolvent and had to be liquidated. Banks were especially hard hit: directly, since so many of them were new, ill-conceived and without financial reserves; and indirectly, since many of them — including some of the older ones — had invested heavily in the promotion and underwriting of new corporate enterprises. According to one statistical count (for Prussia) more banks went down in the crash than had existed in early 1870: on 29 of 103 banks founded, 1870-74, had failed by the end of 1874, their capitals amounting to over 175 million mark and well over a third of the capital of all "new failures" in all branches. By 1875 the market value of all corporate bank equity still in the market had fallen from the peak value of 124 percent to 70 percent

[17] The point is made in an interesting subsequent commentary on incorporation laws by a Prussian official in 1876 (probably Ernst Engel, then head of the Prussian Statistical Office) "Bestimmungen über Aktien-Gesellschaften", *DZA*, Rep. 120, IIa, Report of 28. October 1876, p. 5b.

of par and even the older banks' shares had gone below par at this time.[18]

But what became significant at this point was what one historian (Rosenberg) has called the "discrediting of liberalism" and the resurgence of a conservative ideology in German public life calling for restraints on market competition, or, to use the terminology of another historian (North), for a respecification of property rights.[19] Of special concern here was the strongly articulated belief that the free incorporation law of 1870 had eased, if not positively encouraged, fraudulent and otherwise unethical business dealings, with "insider" groups responsible for the flotation of new companies exploiting the largely passive and poorly informed investors.[20] Eventually, in 1884, a new company law went on the statute books which placed relatively strong restraints on promoters vis-à-vis suppliers of capital and which effectively and considerably strengthened the position of the already established "mixed banks". It did so by a number of means, for example, by raising the minimum size of shares, by lengthening the time lag between company formation and the earliest permissible listing of its shares on the stock exchange, or by strengthening the position of the supervisory board (*Aufsichtsrat*) and of the general shareholders' meetings which were increasingly — thanks to the simultaneous easing of the use of proxy voting of shares by virtually automatic powers of attorney — dominated by the large banks.[21]

[18] This is not the place for a full review of the evidence on banking difficulties and failures. The data cited are from E. ENGEL, *Die erwerbstätigen juristischen Personen insbes. Die Aktiengesellschaften im preussischen Staate* (Berlin, 1876) and R. VAN DEN BORGHT, *Statistische Studien über die Bewährung der Actiengesellschaften* (Jena, 1883).

[19] H. ROSENBERG, *Große Depression und Bismarckzeit* (Berlin, 1967), esp. Ch. 3; D. NORTH, "Government and the Costs of Exchange in History", *Jorunal of Economic History*, XLIV (1984), 255-64.

[20] ROSENBERG, *Große Depression*, esp. 69-73. See also the interesting commentary (mainly on Berlin) by F. STERN, *Gold and Iron* (New York, 1977), Ch. 9.

[21] See N. REICH, "Auswirkungen der deutschen Aktienrechtsreform von 1884 auf die Konzentration der deutschen Wirtschaft", in: *Recht und Entwicklung der Großunternehmen im 19. Und frühen 20. Jahrhundert:* Edited by J. KOCKA and N. HORN (Göttingen, 1979).

In fact, one can well imagine that the leaders of those banks — by this time established members of the financial elite and perhaps thankful for the opportunity to block the social rise of parvenus and weaken potential competition — might have actively pressed for the law's enactment, though I know of no evidence on the point. In any case, it does seem clear — with hindsight — that this new set of arrangements not only conformed well to the peculiar priorities of Germany's mixed banks at the time, but also positively formed their further expansion — including and especially by means of absorbing their competitors.[22]

Further measures of relevance to the development of mixed banking in Germany in the years after 1870 were: 1) the establishment of a national central bank, the Reichsbank in the mid-seventies on the basis of a uniform gold-standard currency, the Mark: 2) the nationalization of the Prussian railway companies in the late-1870's; and 3) the tightening up and restriction on the activities of the major stock exchanges in the 1880's and 1890's. The first of these further reduced transaction costs for all economic actors in the making of money payments and thus further reduced the comparative advantage of "mixed banks" in the production of such services, though, as argued earlier, this only reinforced a tendency already brought into being in the 1850's. The second measure set free financial resources for investment in other assets, including the shares of banks and industrial corporations. The last — which included the taxation of stock market transaction — made access to the current account, placement and brokerage

[22] Large Berlin banks had obvious advantages in the capital market over smaller banks — in and especially outside Berlin — due to economies of scale in the issue business. This advantage also applied to non-banks, of course. On this, see REICH "Auswirkungen"; and also POHL, *Konzentration*, 176-78. Organizationally, the advantages of better coordination within hierarchical firms were offset to some extent by monitoring difficulties, especially acute where functional specialization involving special knowledge and spatial divisions — related, e.g. to branch banking — were or had been increasing. One possible index of this difficulty in German banking was an alleged increase in cases of embezzlement in the 1890's. See, e.g., the *Deutsche Ökonomist*, 12. Sept. (471-72 and 475), 19. Sept. (479-80) and 26. Sept. 1891 (491-92).

services of the large Berlin banks relatively more attractive and thus enhanced their overall competitive position — which was of course built precisely upon the union of those services.

In summing up this part of the story, it would seem useful to restate the questions at issue. They are two: (1) Why did "mixed banking", or the combination of short-term commercial business with investment banking activities, become so characteristic of Germany's most important banks? (2) Why were these banks so large and so concentrated? They are related, of course.

The tentative answer to the first question must be that the mixed banking programme represented the extension of pre-industrial court banking — in which a banker served *all* of the financial needs of his principal and powerful client — to the sphere of industrial finance and was thus already present in private banking activities in the very early stages of industrialization. It retained during industrialization, albeit in ever-more diluted form, its concentration on few and relatively powerful customers. This development was aided by the great and highly concentrated demands for finance associated with railroad building in Germany from the 1830's on. A further contributory factor was a largely politically determined institutional pattern making note issue and the payments business — which necessarily served a wide public — very largely a government monopoly. This insured that when the transition from private family or partnership banking to joint-stock banking took place, it would not involve expansion in this area of banking activity (which might well have posed a liquidity brake on investment banking).

With the answer to the first question an answer to the second question has been implied. Mixed banking concentrated on large projects and customers and during the early railway age private bankers found their own resources so limited and the formation of effective syndicates of bankers so difficult, that they believed the proper institutional solution to lie in corporate banks with limited liability — which they duly began organizing in the 1850's. These corporate banks soon enjoyed obvious advantages over their unin-

corporated founders (and rivals) in the handling of large transactions and by the 1870's outstripped the latter. Subsequent changes in company law, stock exchange regulations and the concentration of large security transactions in the large financial centres such as Berlin, contributed to the process of concentration referred to at the beginning of the paper.

III

The contribution of mixed banking to Germany's economic development corresponds to the social return to such banking activities and can be represented, loosely speaking, by the real investment and related growth of output they financed. Empirical studies of the relationship by Hoffmann and by Eistert have found it significant and positive, the former linking aggregate net investment and net assets held by the credit banks, 1850-1913, the latter focusing on the time series correlations of current account credits extended by the banks and an indicator of new net spending on goods and services, 1883-1913.[23] Neuburger and Stokes, on the other hand, have placed Eistert's data in the context of an explicit macroeconomic growth model for Germany, 1883-1913, and estimated a *negative* effect for the banks.[24] They argue that the large banks doing the mixed banking business *did* help heavy industry, but that they did so at the expense of light industry, and to such an extent that misallocation resulted, with the net effect on the economy's growth being negative. This is not the place for a full discussion of these empirical studies — that has been attempted

[23] See W. Hoffmann, "Il Contributo delle istituzioni finanziarie e delle branche di credito in particolare all'investimento netto in Germania, 1850-1913", *Rivista internazionale di Scienza Economiche e Commerziali* XV, n. 9, 871-900; E. Eistert, *Die Beeinflussung des Wirtschaftswachstums in Deutschland von 1883-1913 durch das Bankensystem* (Berlin 1970); E. Eistert and J. Ringel, "Die Finanzierung des Wirtschaftswachstums durch die Banken. Eine quantitativ-empirische Untersuchung für Deutschland 1850-1913", in: W.G. Hoffmann (ed.), *Untersuchungen zum Wachstum der deutschen Wirtschaft* (Tübingen, 1971).

[24] H. Neuburger and H. Stokes, "German Banks and German Growth: An Empirical View, *Journal of Economic History*, XXXIV (1974), 710-31.

elsewhere [25] — but an occasion for refocusing on the nexus between banking and economic growth, on the one hand, and the allocation of financial resources, on the other. This paper, as outlined in Section I above, sees the major contribution of banks to economic development to lie in the provision of opportunities for portfolio diversification and the related supply of finance for risky activities with high growth potential. It now remains to be seen whether this contribution can be verified for the historical case of German mixed banking in the XIXth century. In the following, then, an estimate of German portfolio diversification opportunities for the 1880-1913 period is attempted which is then compared with an estimate of the portfolio actually held by the banks. These estimates are based on the methodology applied by William Kennedy to British development in roughly the same period,[26] so that some comparison between German and British portfolios — which helps in assessing the efficiency of German financial intermediation — is also possible.

The first step in the analysis is to assume that the portfolio choices open to wealthholders in the German economy during the period comprehended all of the major branches of non-agricultural activity, furthermore, that the mean expected yields can be characterized by the average annual rates of growth of output and the expected risks by the annual deviation from these averages in the branches distinguished.[27] The branches — set out in

[25] R. Tilly, "Banken und Industrialisierung in Deutschland: Quantifizierungsversuche", in: F.W. Henning (Ed.), *Entwicklung und Aufgaben von Versicherungen und Banken in der Industrialisierung*, (Berlin, 1980).

[26] The present study owes much to William Kennedy's work on the British capital market — including some of his observations comparing British to German conditions. See W. Kennedy "Institutional Response to Economic Growth: "Capital Markets in Britain to 1914", in L. Hannah (Ed.), *Management Strategy and Business Developemt* (London, 1976). I have also had the opportunity to consult the forthcoming study by Kennedy and Britton, "Portfolioverhalten" (cited in note 4 above).

[27] The estimates in Table One are trend and trend deviations of regressions of the natural logarithms of annual output figures on time. The output index is taken from W. Hoffmann et al, *Das Wachstum*, Tables 76, 101 and 103. Covariance estimates for the branches are in an appendix to this paper.

Table One — thus represent "assets" available for incorporation into individual portfolios. There are a number of reasons for regarding this approach with suspicion. Taking the linear trend of sectoral output over the 1880-1913 period as an indicator of expected yields to investors is somewhat deterministic in that investors form their expectations early on, so to speak, with shifts within the period based on learning experience (which would be based in turn on real shifts) ruled out by assumption. Intrasectoral variety — among firms, for instance — is similarly ruled out. The procedure also assumes that assets of the different sectors are in principle equally available for sale to investors in equally divisible lots, whereas even a superficial knowledge of sectoral differences (e.g., between heavy chemicals and retail trade) suggests that such an assumption does violence to reality. Then there is the related shortcoming of describing assets solely in terms of their mean yield and variance; investors, after all, were unlikely to have based decisions to buy or sell assets on these characteristics alone, and other ways of expressing risk perception might be considered. Nevertheless, the methodology does have the advantage of providing an approximate yardstick of overall wealth allocation which is itself not directly dependent upon the financial institutions whose behavior it is intended to measure.[28]

The foregoing remarks, however, take us ahead of our story. For the second step in the portfolio analysis involves creating the "yardstick" referred to — by computing the "efficient portfolio frontier" mentioned in Section I using the data just described and Equation (3). This computation assumes that the observed data on sectoral growth rates (treated here as expected yields and risks) were not affected by the portfolio choices. It then applies a number

[28] This interdependence makes the interpretation of a financial "efficient portfolio frontier" critical. Nevertheless, the present author is preparing an estimate of such a frontier for Germany, 1880-1913, for it will permit useful comparison with the results published by M. EDELSTEIN on British financial asset holding. See M. EDELSTEIN, "Realized Rates of Return on U.K. Home and Overseas Portfolio Investment in the Age of High Imperialism", *Explorations in Economic History*, 13 (1976), 283-329.

of arbitrarily chosen values for the variable representing risk preference, or α, to identify those combinations of assets or portfolios which are efficient in the sense of representing maximum yields for given variances and which, according to the underlying portfolio theory, contain no diversifiable risk.

Figure One below is a graphical representation of an estimate of the efficient portfolio frontier for Germany, 1880-1913, based on the data of Tables One and Two and the assumptions discussed above. It depicts a series of combinations or "bundles" of yield and risk of assets which are equally "efficient" but which denote differing risk preferences.

Considerations of time and space preclude here a discussion of estimating problems — which are and have been serious.[29] Readers' attention is called to the somewhat artificial character of the riskless portfolio on the vertical axis of Figure One (i) and also to the second portfolio (ii) — which also reflects a risk-minimizing preference (or $\alpha = o$) and which would be a contradiction in terms unless one assumes, as one must here, that this second portfolio represents the risk-minimizing choice which would follow should a zero-risk portfolio, for whatever reason, not be available. I should add that the zero variance portfolio follows the assumption used by William Kennedy (cited above) for construction of the British efficient frontier, namely that there are available two assets, one with the mean yield-variance characteristics of NNP and another, "Cash", with an assumed yield of 25% of NNP and variance perfectly and negatively correlated with NNP. Otherwise, the main message would seem to be that so many of the available assets do not find their way into the efficient portfolios. Even the risk-minimizing portfolio (ii), inclusion in which re-

[29] My thanks are due here to Thomas Wellenreuther, University of Münster, for able research assistance and especially for providing the programming skills without which Equation (3) could not have been estimated. Attention is called in this connection to the mathematical possibility that the frontier of minima estimated is not the "true" ("smallest value of the function") set of minima.

TABLE I

EXPECTED YIELDS AND RISKS IN MAJOR BRANCHES OF GERMAN ECONOMY, 1880-1913 (Annual Averages in %)

Branch	Nr.	Assumed Yield	Assumed Standard Deviation
Mining	1	4.13	4.41
Quarrying	2	4.30	8.58
Metals	3	5.65	7.64
Engineering	4	6.01	6.34
Chemicals	5	5.98	3.85
Textiles	6	2.52	8.11
Wood and Leather	7	3.62	7.75
Food and Drink	8	2.81	3.91
Utilities[a]	9	9.80	10.37
Construction	10	4.22	7.17
Transportation	11	5.63	3.19
Trade, Finance and Insurance	12	3.50	2.27
Miscellaneous[b]	13	2.73	2.33
Net National Product	14	3.03	2.60
Cash	15	0.75	2.60

Sources: See Text. (a) Includes Water, Gas and Electricity; (b) Includes paper, clothing and leather working.

TABLE II

ESTIMATED EFFICIENT PORTFOLIO OF GERMAN ECONOMY 1880-1913 (Shares of Assets in Portfolio in %)

Branch	Values of α						
Nr.	(I) o	(II) o	(III) 1	(IV) 2,5	(V) 5	(VI) 10	(VII) 100
1	0	0	0	0	0	0	0
2	0	7	11	16	21	28	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	15	22	25	27	24	0
6	0	1	0	0	0	0	0
7	0	4	13	13	11	5	0
8	0	0	0	0	0	0	0
9	0	6	11	15	21	35	100
10	0	0	0	0	0	0	0
11	0	4	20	23	20	6	0
12	0	38	23	7	0	0	0
13	0	25	0	0	0	0	0
14	50	—	—	—	—	—	—
Yield	1,89	4,17	5,21	5,65	6,07	6,66	9,80
Standard Deviation	0	0,92	1,01	1,35	1,80	2,79	10,37

Source: Table 1, Appendix and Text.

quires fulfillment of the least stringent conditions, excludes more than one third of all assets. It is interesting to note that that pillar of German industrialization, mining, appears in no efficient portfolio, and one is tempted to speculate on whether its exclusion might reflect the considerable extent to which German mining was vertically integrated in other sectors (metals and energy [30]). But the temptation of such speculations must be resisted. What can be stressed here is the fact that the exclusion of so many assets from the efficient portfolios means — in terms of the rules of the model — that apt investors would have been able to reap large "arbitrage" gains by transferring funds from "dominated" sectors to those on the frontier, e.g., from metals to chemicals. The argument of this paper is that *one* reason why such arbitrage did not take full effect is that barriers to capital flows existed, although, as will be argued later, the market imperfections here reflected could have other causes and, moreover, could have been worse under an alternative set of financial institutions than they appear to have been on these results.

The purpose of the frontier estimated is to serve as a basis for comparison with historical evidence on financial intermediation. Relevant data for the latter proved difficult to mobilize, for published information on the portfolios of Germany's most important intermediaries in the period — the credit banks doing a "mixed banking" business — is highly aggregate in nature, distinguishing only between broad classes of assets such as cash, bills of exchange, securities, etc., and unpublished evidence is virtually inaccessible. Fortunately, however, a proxy for the missing data on banks' assets could be found: the semi-annually and annually published

[30] The large swings in coal output and coal prices are well known in the literature. Indeed, they were partly responsible for the cartellization of this branch, quite effective since 1893. See C.L. HOLTFRERICH, Quantitative Wirtschaftsgeschichte des Ruhrkohlenbergbaus im 19. Jahrhundert, (Dortmund, 1973) for a discussion of pre-1893 developments. See also W. FISCHER, "Bergbau, Industrie und Handwerk", in W. ZORN (Ed.), *Handbuch der deutschen Wirtschafts— und Sozialgeschichte*. Vol. 2 (Stuttgart, 1976), 527-62 for further remarks and literature.

reports on new capital issues introduced in the Berlin stock exchange, 1883-1913.[31] These reports identified the individual firms issuing securities and thereby also the branches of activity receiving funds. It is well known that most of these issues were intermediated by the larger Berlin banks. It is also well established that the prospective success of such issues had a fairly close relationship with the current account credits the banks were willing to advance.[32] There are thus grounds for arguing that the sectoral distribution of new issues in the Berlin market not only reflects the pattern of banks' promotional and issue services — and hence the pattern of asset holding they felt their capitalist customers were willing to endorse — but also the broad structure of their most important earning asset, their current account advances. At the very least, the sectoral pattern of overall bank support was bound to resemble the long-run pattern of new issues even though, given the banks' intermediary function of risk bearing, discrepancies at particular points in time were to be expected.[33]

Table Three presents the evidence on the banks' collective portfolio, utilizing the same sectoral categories which distinguished assets on the efficient portfolio frontier. A concentration in

[31] These reports appear in the German weekly, *Deutsche Ökonomist* from 1883 on; for the 1898-1913 period the data collected in the official publication, the *Vierteljahreshefte der Statistik des Deutschen Reiches*, are superior and have been used here. For some discussion of these data — and their British counterparts — see R. TILLY, "Zur Finanzierung des Wirtschaftswachstums in Deutschland und Großbritannien, 1880-1913", in E. HELMSTÄDTER (Ed.), *Die Bedingungen des Wirtschaftswachstums in Vergangenheit und Zukunft* (Tübingen, 1984), 263-86.

[32] See J. RIESSER, *Die deutschen Großbanken und ihre Konzentration*, esp. 204-15 und 260-88. See also M. POHL, "Festigung und Ausdehnung des deutschen Bankwesens zwischen 1870 und 1914", in: *Deutsche Bankgeschichte*, Vol. 2, Edited by Institut für bank-historische Forschung e.V. (Frankfurt, 1982), 281-82.

[33] The banks extended much current account credit to unincorporated enterprises which had no access to secondary security markets, occasionally to enterprises which preferred not to issue securities, and often to listed enterprises during periods in which new issues had poor prospects. For some examples involving heavy industry, see W. FELDENKIRCHEN, *Die Eisen— und Stahlindustrie des Ruhrgebiets, 1879-1914* (Wiesbaden, 1982), esp. 275-77; also Riesser, *Die deutschen Großbanken, 262-67*, for some other examples for the riskiness involved.

the high-yield and high-risk sectors is unmistakeable: just four sectors accounted for over two-thirds of the portfolio's value excluding trade and finance, and well over 50 per cent including trade and finance. This produced a portfolio yield of nearly twice the yield of a portfolio reflecting the value-added-weighted average of all sectors of the economy. Moreover, these sectors represented a significant chunk of the German economy of the time: about one fifth by the value-added weights estimated (excluding agriculture) for 1907-13.[34] Banks thus lent significant support to the economy's growth during the period.

TABLE III

ASSUMED ASSET YELDS AND ASSET SHARES
IN BANK PORTFOLIO GERMANY, 1880-1913 (in %)

Branch	Nr.	Assumed		Share in Portfolio	
		Yield	Standard Deviation	Including Sector 12	Excluding Sector 12
Mining	1	4.13	4.41	5.3	6.8
Quarrying	2	4.30	8.58	1.2	1.5
Metals	3	5.65	7.64	15.8	20.4
Engineering	4	6.01	6.34	10.5	13.5
Chemicals	5	5.98	3.85	4.8	6.2
Textiles	6	2.52	8.11	2.1	2.7
Wood and Leather	7	3.62	7.75	2.2	2.9
Food and Drink	8	2.81	3.91	3.2	4.2
Utilities	9	9.80	10.37	16.6	21.4
Construction	10	4.22	7.17	2.5	3.2
Transportation	11	5.63	3.19	10.4	13.4
Trade, Finance and Insurance	12	3.50	2.27	23.8	—
Miscellaneous	13	2.73	2.33	2.2	2.9
Portfolio Yield				5.51	5.96
» Standard Deviation				3.09	

Source: See Text.

[34] The shares are the cumulative total for all issues, 1880-1913. The data on output weights are from Hoffmann et al, *Das Wachstum,* Tables 76 and 102. It should be pointed out that property is missing from both the set of assets available and from the estimated bank portfolio. This is a lacuna which must be kept in mind here, and which requires further research attention. For the moment, perhaps it may suffice to note that the credit banks were not heavily engaged in the financing of housing, though they had a share in some of the mortage banks which were.

But was this allocation and support efficient? It certainly appears to have been so, at least on the criterion of the mean yield-variance relationship. Note that the portfolio's yield is almost twice as high as its standard deviation. In this connection the role of diversification deserves some emphasis, for the large share of investment in trade and finance (and insurance) pulled the variance, or risk, of the portfolio down, not only because of the low own-variance of this sector but because of its largely negative convariance with the yields of the other assets. This is a good illustration of what portfolio diversification can achieve. It might also be supporting evidence for the advantages of a mixed banking system, because the banks' large, short-term commercial business which is indirectly, though inadequately, reflected in the portfolio share indicated here, provided — beyond the oft-cited information about customers' profitability and liquidity positions — an offset to swings in the investment banking side of their business dominated by such sectors as mining, metals, utilities and transportation. Having an offset of this kind was no doubt one reason why German banks supported risky, high-growth sectors to the extent that they did.[35]

The efficiency of the German bank portfolio can also be discussed by comparing it with the estimated efficient portfolio frontier illustrated by Figure One. Note that the asterisk just within the frontier in that Figure represents the yield and standard deviation of the bank portfolio. Ideally, comparison should involve more than one actually realized portfolio. As it is, the reader may have

[35] The reader must be warned against overinterpreting these data, for the new issues represented here were largely made on behalf of banks and the output or yield series was dominated by trade. Still, a good share of bank resources did flow towards trade, and the point is worth illustrating. Combining the relatively high-yield high-risk assets of heavy industry in one portfolio improves the risk-yield relationship as compared to an undiversified set of arrangements (from 6.14/5.26 to 5.49/5.26), but the coefficient of variation is still quite high (= 1.04). Adding the sector trade and finance to this portfolio does reduce the average yield, but by much less (about 8 per cent) than the portfolio's variance (about 26 per cent) and the coefficient thus falls to .84, or to a position even better than that estimated fro the economy as a whole (line 14 of Table One).

difficulty accepting my assertion that the German bank portfolio is "quite close" to the efficient portfolio frontier. In this connection the already cited work of William Kennedy on British portfolios for the same period is relevant, for it allows a direct, if rough, comparison with the German realized portfolio. Two rough measures are available. First, following the German approach, one may estimate a collective portfolio for Britain on the basis of new capital issues in the London market, 1880-1913. This can be linked to the sectoral growth rates as discussed above and a mean yield and variance calculated. The result (in Table Four) is unfavourable to Britain in the sense that the portfolio's ratio of yield variance to mean is higher than the German estimate but also in the sense that it lies relatively further away from the efficient portfolio frontier (as calculated by Kennedy) than the German one. The British "capital market" portfolio lies, given its variance, more than 100 per cent below the corresponding yield on the frontier (about 5.33-2.45/2.45 = 1.17), whereas the German bank portfolio lies about 25 per cent below the frontier at the relevant point (6.78-5.51/5.51 = .23).[36] Second, Kennedy's estimates of a large number of Scottish portfolios suggest that movement to the efficient frontier could have produced a gain in yield for a given level of risk of about 40 per cent — once again, well above the German figure.[37] In short, to the extent that the data are comparable, the results tend to confirm historiographical judgements about the role of German banks as efficient organizers of the financing of industrial growth and also concerning the inefficiencies of the British capital market in the same period. It will be interesting to see whether this result

[36] The figures may be biassed against Great Britain due to the missing years in the issue data reported here (1901-03, 1906, 1908-9 and 1913), and also to the inclusions of many more years (1855-79) in the output (or yield) series. However, for another study the estimated portfolio yield based on 1880-1913 output growth was only 19 per cent higher: 2.92 instead of 2.45. See R. Tilly, "Zur Finanzierung des Wirtschaftswachstums", esp. 269-70. Unfortunately, this study did not calculate the corresponding covariances.

[37] Kennedy and Britton, "Portfolioverhalten".

will obtain for the financial portfolios and portfolio frontiers which have still to be estimated.[38]

TABLE IV

ASSUMED ASSET YELDS AND ASSET SHARES IN BRITISH CAPITAL MARKET PORTFOLIO, 1882-1913* (in %)

Branch	Assumed Yield	Assumed Standard Deviation	Share in Portfolio
1. Mining			3.33[1]
2. Quarrying	2.31	7.28	2.00[2]
3. Metals	2.55	9.05	1.43[1]
4. Chemicals	3.63	8.71	4.31
5. Engineering	3.00	9.84	10.60
6. Textiles	1.52	9.33	4.82
7. Food and Drink	1.38	4.36	20.71
8. Gas, Electricity and Water	4.86	3.89	5.16
9. Paper	5.04	10.78	1.76
10. Transport and Communications	2.74	2.44	26.60[3]
11. Distribution	2.16	4.00	1.28
12. GDP	2.00	2.64	18.00[4]
13. Portfolio	2.45	8.20	100

* Actually covers years 1882-1905, 1907 and 1910-1912.

1) Data on new issues of mining and metal production enterprises were merged as originally collected. Here they are assigned to coal and iron and steel as in the 1907 production census: 3:1.

2) As in 1) with 1907 weight = 13/126 for coal mining.

3) Includes "Docks and Shipping".

4) Category "Other" in "Capital Created" Statistics of IMM.

Source: R. Tilly, Zur Finanzierung des Wirtschaftswachstums in Deutschland und Großbritannien, 1880-1913, and Text.

Independently of such comparative results, interest attaches to the importance of portfolio diversification for German economic development. Unfortunately, the contribution of the banks to economic growth via this financial service cannot be precisely quantified. It is probable that in the absence of such diversification as did take place — clearly aided by the banks — there would have

[38] Work on the British side of this comparative question is much further along than that done for Germany. A study of the kind executed by M. EDELSTEIN (cited in note 28 above) is badly needed.

been a smaller supply of funds to the higher risk, higher yield sector of the economy. As was suggested above, this would have meant less growth for the economy as a whole. But the question of how *much* growth might have been lost has no single answer. Instead, its answer depends on one's assumptions about the scope and impact of the financial intermediation under investigation. One way of looking at the matter is to assume that income from capital would have been less in the absence of diversification in proportion to the difference between the ratio of yield to risk (or variance) of the banks' portfolio and the ratio calculated for the economy as a whole when the sectors are weighted by their value added (line 14 of Table One). That difference of around 50 per cent multiplied by the share of capital income in net domestic product (of roughly 25-28 per cent, 1880-1913) produces a potential loss from non-diversification of about 12-14 per cent of social product [39]). A more extreme variant of this measurement assumes that investment in the high-yield and high-risk portions of the economy would have been less without the observed portfolio diversification in proportion to the same difference just noted (of 50 per cent) but with the result that these sectors and their weight in the economy would have been so much lower that the average rate of growth would have declined by the same percentage from its historically observed 3.03 per cent to about two per cent per annum. There is no point in describing further possible alternatives. The point is clear: diversification could have had large, positive consequences. The problem with such speculations, however, is that they do not take account of the weight and cost of the financial intermediation being assessed. In the concluding section of the paper, therefore, these points are taken up. This last section also attempts to return the discussion to the question of the character of the financial intermediation developed in Germany in the period and to offer some reasons for its peculiar, historical effectiveness.

[39] The data on income from capital are from Hoffmann et al., *Das Wachstum*, Tables 23 and 33.

IV

The first question for discussion is the cost of riskbearing financial intermediation. From a comparative point of view one of the clearest costs of the German mixed banking system was the relatively large share of equity capital in the operations of its principals. This was a cost in the double sense of being more expensive for banks than the use of borrowed money (or deposits) would have been at going rates of financial return and of representing an important barrier to entry — given economies of scale in the capital market already mentioned [40] — which may have dampened competition in German banking. In Germany, as elsewhere, banking was the business of working with borrowed funds, but in Germany, owing to the initial riskiness of the combined investment and commercial banking business, a relatively large equity capital was regarded as a necessary guarantor of safety. The crisis of the 1870's after all, had shown how risky that combination could be. The banks which survived owed their survival, in large measure, to their capital strength.[41].

It may be helpful to view this feature in comparative perspective. Table Five therefore arrays some of the data relevant to an Anglo-German comparison. Note the difference in the share of loans and advances in the banks' portfolios. This is related to the differing importance of deposits and capital in the two systems. It is evident that "leverage" in the German system was rising, but a significant difference remained throughout the period nevertheless.

A major reason for this difference was the relatively strong demand for bank shares in the German capital market. In spite of

[40] This was mentioned in Section II in connection with the institutional changes following the crisis of the 1870's. See also R. TILLY, "Mergers, External Growth and Finance in the Development of Large-Scale Enterprise in Germany, 1880-1913", *Journal of Economic History*, XLII (1982), 629-58.

[41] RIESSER, *Die deutschen Großbanken*, 454-56, 479-81; also VON DER BORGHT, *Statistische Studien über die Bewährung der Actien-Gesellschaften*, 179-83; and Pohl, Konzentration, 119-59.

TABLE V

INDICATORS OF BANKING GROWTH,
UNITED KINGDOM AND GERMANY, 1880-1910

(a) United Kingdom[1]

	(Million of £)				Annual Rates of Growth (%)			
Years	Total Assets	Paid-Up Capital	Cash and Call Money	Loans + Advances	Total Assets	Capital	Cash Call	Loans + Advances
1880/2	297	51	57	157				
1890/2	462	68	89	232	4.4	2.9	4.5	3.9
1900/02	681	80	154	337	3.9	1.6	5.5	3.7
1910/12	837	81	209	399	2.1	0.1	3.1	1.7
(b) Germany[2]								
	(Millions of Marks)							
1883	1961	796	554	1109				
1890/2	3135	1248	938	1780	5.9	5.6	6.6	5.9
1900/02	6895	2354	1851	4131	7.9	6.3	6.8	8.4
1910/12	15505	3649	3792	9345	8.1	4.4	7.2	8.2

1) Joint-Stock Banks in England and Wales, from Table (a) 1.2 in D.K. Sheppard, *The Growth and Role of U.K. Financial Institutions, 1880-1962* (London, 1971), 118-19.

2) German "Aktienkreditbanken" from Deutsche Bundesbank, *Deutsches Geld— und Bankwesen in Zahlen, 1876-1975* (Frankfurt/Main, 1976), Table 1.01, 56-57.

the relatively greater increase in the equity capital of the German banks, the realized rates of return to shareholders of the latter during the period compared unfavourably with those produced by British banks. The following data — biassed in favour of lower returns for British bank shareholders — illustrate the point (annual rates of return are in per cent):[42]

Equity, British Banks, 1870-1913 ..... 5.18
Equity, British domestic shares, 1870-1913 ..... 6.44

[42] See COTTRELL, *Industrial Finance*, 244; A. WEBER, *Depositenbanken und Spekulationsbanken*, 3d Ed. (München und Leipzig 1922), 307-21. The realized rates of return for British banks and for British equities are from Edelstein, Realized Rates. The rates of return for German banks are from a sample of 62 banks analyzed in an unpublished paper by the author, those for German domestic non-financial equities fom Rettig, *Investitions— und Finanzierungsverhalten*. The bond rates are from Sheppard (for the U.K.), The Growth, and (for Germany) from Deutsche Bundesbank, *Deutsches Geld— und Bankwesen in Zahlen*. The sample in Edelstein, "Realized Rates", contains 19 banks.

Bond Rate, British Consols (3%), 1880-1912	2.86
Equity, German Banks, 1871-1910	6.53
Equity, German Domestic, 1870-1913	9.35
Bond Rate, German Reich and States, 1870-1913	3.65

This strong demand meant relatively cheap equity capital, particularly for the large Berlin banks.[43] These banks thus not only had access to a frequently welcome source of additional liquidity, but were provided thereby with an additional incentive for takeovers of other banks whose capital market positions were not so strong.[44]

In the context of the present paper, the relationship just discussed is particularly significant, for it raises the question of whether and to what extent the much-noted emergence of concentration in German banking in the period was caused by capital market conditions and, in particular, by the preferences of German capitalists. This is not the place to treat this subject with the detailed attention it merits. Two points deserve mention, however, First, there is some evidence that banks and bankers themselves figured prominently among bank shareholders in the period.[45] To the extent that

[43] For the seven largest Berlin banks, 1871-1910, the "price" of new equity capital as measured by the yield-share price ratio was 4.51, which compares favourably with the estimated market average of 5.35. The latter can be calculated from the data in Deutsche Bundesbank, *Deutsches Geld— und Bankwesen in Zahlen, 1876-1975* (Frankfurt, 1976), Table 2.01, p. 294.

[44] RIESSER, *Die deutschen Großbanken*, 479-81, 483-89, 497-500. See also Pohl, *Konzentration*. Estimated "returns to volatility", which relate the returns on a share or portfolio to their covariance with all other share returns (or the market average) show a negative correlation with size of bank capital, which means that larger banks enjoyed a bonus ($r = .11$). This is not very significant, but varying the sample of banks (by taking out extreme values or particular sets of banks) over a wide range (from 44 to 62 banks) did not alter the sign of the coefficient.

[45] Banks and bankers were listed as owners of from about 55 to nearly 70 per cent of the shares of the large Cologne-Berlin bank, the Schaaffhausen'sche Bankverein, 1895-1899. See R. TILLY, "Kapital und Kapitalisten des Schaafhausen'schen Bankvereins, 1895-99", in: *Wirtschaftskräfte und Wirtschaftswege. Festschrift für Hermann Kellenbenz*. Edited by J. SCHNEIDER (Stuttgart, 1978), 501-20. I know of no other comparable evidence.

this was true, not only financial returns but also considerations of influence and control over bank enterprises will have played an important role.[46] Second, given the diverse investment activities of the banks and the related mechanisms by which they monitored and influenced their non-bank customers — mechanisms which included majority shareholdings when they proved necessary — bank shares offered their buyers a means of portfolio diversification which could significantly improve their yield-risk positions. Two examples must suffice (both in Table Six): 1) Substituting shares of the largest Berlin banks for a mixed portfolio of shares in large industrial companies in the 1880-1910 period would have reduced yield minutely and variance significantly. 2) On the basis of experience in the 1890's, an investor in 1900 could have compared the yield of 7.23 per cent year for industrials with that of 4.85 per cent for bank shares (with their standard deviations of 10.4 and 5.5, respectively). Had he then chosen to combine the two types of assets in his portfolio on a 50:50 basis he would have done significantly better in the subsequent decade in terms of the mean yield-variance comparison than had he chosen either of the two exclusively.

Such behaviour would not have been possible for German capitalists as a whole, to be sure, for there were not enough bank shares to satisfy the assumed 50:50 relationship: the market value of "industrials" in the period was about three times that of bank shares. Nevertheless, the general point seems clear: the preferred positions which banks enjoyed in the German capital market as

[46] This may be one reason why the measured "returns to volatility" are negatively related to the size of banks' equity capital (as noted above). Even if it should turn out that banks invariably sold their holdings shortly after subscribing, their intermediation would affect the price. Given the ease with which banks could mobilize proxy voting rights over shares kept on deposit with them — which they could also legally trade in the stock market so long as they were not otherwise needed — control over enterprises did not depend on the banks having large, permanent holdings of shares; but once again, the possibility of control will have affected the price of shares.

TABLE VI

ANNUAL AVERAGE YELDS AND STANDARD DEVIATIONS OF GERMAN BANK AND INDUSTRIAL SHARES, ALONE AND IN PORTFOLIO, 1880-1910 (in %)

	Average Yield	Standard Deviation
a) Example One 1880-1910		
50 Industrials	9.62	9.68
9 Large Banks	9.43	8.78
b) Example Two 1901-1910		
50 Industrials	13.11	13.29
62 Banks	6.55	7.50
Both (50:50)	9.83	8.60

Source: Author's Calculations from data cited in footnote 42 and R. Rettig, Investitions— und Finanzierungsver— halten deutscher Großunternehmen, 1880-1911 (Münster, 1978).

fund seekers could have been a crucial element in their overall success.[47]

A second important feature of the syndrome within which German mixed banking developed was the role of central banking. For the credit banks' powerful support of industry and trade rested in part on the payments network and liquidity guarantee provided in the central bank of issue, first mainly the Bank of Prussia and, from 1876 on, the Reichsbank. As noted earlier, this government institution dominated the payments business in Germany by the 1880's, by which time it worked with more than 200 branches. The credit banks used it extensively, eventually even when they were transferring funds between offices of their own systems.[48] But most important in the present context was the virtually unlimited access to the Reichsbank's discounting facilities which the credit banks enjoyed. Table Five above recorded the

[47] And especially for those firms which survived the concentration process.

[48] RIESSER, *Die deutschen Großbanken*, esp. 121-25, 171-74 and 205. See also M. GÖBBELS, *Der Filialbetrieb der deutschen Kreditbanken* (Berlin, 1923); and M. POHL, *Konzentration*, 203. It is worth noting that in Great Britain a dense network of branches was developed by the commercial banks and not by the central bank.

relatively weak growth of cash and liquid assets held by the credit banks (compared with the British banks). The German banks could get by with less liquidity and "lend to the hilt" if demands warranted because the Reichsbank provided extremely liberal rediscounting facilities. In fact, they were so liberal — though not cheap — that bills of exchange held by the banks or their acceptance could be seen as substitutes for central bank notes.[49] This was in contrast to the Bank of England, which frequently resorted to credit rationing.[50] This central bank behaviour tended to stabilize the business cycle in Germany, for through its discount policy, the Reichsbank tended to attract business in upswings and repel it in downswings, which meant a substitution of central bank money or gold coin for short bills, or what was, in effect, *potential* central bank money. (The reason for this was that the Reichsbank discount rate was generally higher than the market rate, but it rose and fell proportionately less than the latter). With this stabilizing guarantee behind them, the German banks did not have to live with the fear of illiquidity which combining commercial and investment banking activity might otherwise — e.g., under the British set of arrangements — have dictated.[51] Liquidity pressures emerged and crises took place during the period, e.g. in 1900 and 1907, but they did not reach the proportions which such crises took on in other countries (such as the U.S.).

The relationship between Reichsbank and the credit banks can be generalized: the more one looks at the operations of the latter in

[49] On this see K. BORCHARDT, "Währung und Wirtschaft", in: Deutsche Bundesbank, *Deutsches Geld— und Bankwesen*, esp. 46; and an unpublished paper by P. MCGOLDRICK on the "Operations of the German Central Bank and the Rules of the Game, 1879-1913".

[50] And not in an easily predictable way, as e.g. the Investor's Monthly Manual (IMM) complained in 1899. See *I.M.M.*, Nov. 30, 1899; for the bank of England's policy in respect to the British joint-stock banks see C. GOODHART, *The Business of Banking, 1891-1914* (London, 1972), esp. 100 ff.

[51] McGoldrick's unpublished paper makes the point that the Reichsbank was, in effect, stabilizing gold flows and by so violating the "rules of the game", contributing to Germany's strikingly stable monetary growth over the period.

this period, the clearer it becomes that they were only one part of a highly structured financial system. One crude way of making this point explicit is to list the major financial institutions and the estimated value of their portfolios. Table Seven (below) does just that. The data of Table Seven, interesting in many respects, underscore two points of special interest to this paper. First, the sheer quantitative weight of the credit banks in the German financial system was at no time sufficient to justify a description of the latter solely in terms of the former. Hoffmann's estimates of the contribution to the financing of aggregate net investment in Germany in the 1850-1913 period confirm the order of magnitude of 15 or 20 per cent suggested in Table Seven.[52] The "bank portfolio" discussed in the previous section must be interpreted against the background of such numbers: a vast hypothetical deterioration in that portfolio's composition (from the point of view of yield-variance results), unless accompanied by a very significant hypothetical increase in the relative size of the credit banks themselves, could have hardly had the deleterious effects on aggregate economic activity on the order of 50 per cent of annual capital income, let alone 50 per cent of social product, the figures suggested above for argument's sake. Perhaps 15 or 20 per cent of the former figure would be a more reasonable estimate.

Table Seven, however, suggests a second reason for qualifying assertions about the positive growth-producing contributions of the credit banks: they left an important part of the economy's financial business to other institutions. Note, for example, the great size and growth of both savings banks and mortgage banks. These institutions were responsible for financing a very large share of the housing sector — which accounted for something like one third of annual aggregate net investment in the German economy in the period and which of course represented a correspondingly important part of total private wealth. In addition, the savings banks financed public and especially municipal spending — before

[52] Hoffmann et al, *Das Wachstum*, Tables 207 and 239.

TABLE VII

ASSETS OF GERMAN FINANCIAL INSTITUTIONS, 1860-1913
(in Millions of Marks)

	1860	1880	1900	1913
Banks of Issue	0.95	1.57	2.57	4.03
Credit Banks	0.39	1.35	6.96	22.04
Private Banks	1.50	2.50	3.50	4.00
Saving Banks	0.51	2.78	9.45	22.56
Credit Cooperatives	0.01	0.59	1.68	6.17
Mortage Banks	0.09	1.85	7.50	13.55
Public Land and Mortage Institutions	0.68	1.76	4.05	7.20
Life Insurance Co's	0.07	0.44	2.42	5.64
Other Insurance Co's	—	0.35	0.83	2.05
Social Insurance	—	—	0.87	2.25
Other	—	—	—	0.98
Total	4.25	13.50	40.50	91.00

Source: R. Tilly, in: Handbuch der deutschen Wirtschaftsgeschichte, 591.

1914 mainly on social overhead capital — and also lent to local, small and medium-sized businesses. Small business, besides farming, was also the major recipient of capital mobilized by the rapidly growing credit cooperatives. And the private banking firms, though no doubt disproportionately engaged in security dealings, were still a further significant source of credit for local businesses, particularly those having no access to the larger credit banks or the stock exchange.[53] Unfortunately, the activities and in particular the asset portfolios of these institutions are, historically speaking, *terra incognita*. We know even less about them than about those of the credit banks. However, given the well-documented preference of the latter for large customers, it is probable that the former financed a disproportionately large share of the needs of small business enterprise — so far as their needs were not self financed. In fact, evidence on the larger, listed companies shows the predominance of self financing and this finding can doubtless be

[53] See HOFFMANN et al, *Das Wachstum*, 747. Eistert, *Die Beeinflussung*, 24; Pohl, Festigung und Ausdehnung, 258-63.

applied, *a fortiori*, to smaller, unincorporated firms.[54] Clearly, then, a great deal of investment and economic activity was being financed outside the purview of the credit banks.

The question which reasserts itself at this point concerns the relationship between such financial needs, on the one hand, and risk and innovation, on the other. There is reason to believe that much risky and innovation-rich investment went on in sectors dominated by relatively small enterprises. Metal working and light engineering are almost classic examples.[55] There are thus good reasons for qualifying the case for a clear-cut connection between credit banks and risky, innovation-intensive investment. Available evidence, though patchy, suggests that those banks concentrated mainly on large enterprises, preferrably corporate enterprises whose liabilities could be traded in secondary markets. Certainly, new issues made in those markets overwhelmingly involved the very large enterprises and as a rule, moreover, favoured old and well-established businesses.[56] New and medium-sized enterprises, of the kind with which one might well associate innovation, could not expect to obtain ready access to such secondary markets and thus depended upon direct credit. To the extent that innovation, risk, and newness (and size) of enterprise are linked, and insofar as new issues in the Berlin capital market indicate the nature of the credit banks' business, the latter was not primarily risk and innovation-oriented.

[54] See R. RETTIG, *Das Investitions— und Finanzierungsverhalten*, esp. 138-52.

[55] See, for example, W. FISCHER, "Bergbau, Industrie und Handwerk", in ZORN (Ed.), *Handbuch der deutschen Wirtschafts— und Sozialgeschichte*, II, esp. 537, 549-52. Hoffmann et al, *Das Wachstum*, 41, attribute about half of all German patents in the 1850-1913 period to metalworking (including engineering).

[56] An unpublished study (by Jacques Beuchat of Geneva) comparing business incorporations with listed companies for Germany, 1887-1907, shows that less than one fifth of all such corporations ever became listed in the period, with the listed companies being more than 20 per cent larger than the average for all incorporations. See also Tilly, *Zur Finanzierung des Wirtschaftswachstums*, esp. 277-81, where this and other materials comparing the German and British stock markets in this period are presented — all of which support the argument in the text.

However, I feel it appropriate to close this paper on a more positive and assertive note. That can be done by calling the reader's attention to two facts. First, the credit banks *did* finance risky innovations in episodes which can be documented. Deep-shaft coal mining, Bessemer steelmaking, and the launching of vertically integrated coal, iron and steel-producing enterprises are examples taken from the history of Rhenish Westphalian heavy industry which involved large and risky — in the 1870's indeed almost fatally risky — investments by the credit banks (e.g. by the Schaaffhausen'sche Bankverein or the Disconto-Gesellschaft).[57] And there is the classic case of the support of the Mannesmann seamless tube enterprise in the 1890's by the Deutsche Bank until the stage was reached in which the wider capital market could be tapped for assistance.[58] Second, as the above examples show, risk and innovation were by no means exclusively a matter of small and new enterprises and, moreover, not only technological in nature. Vertical integration of heavy industrial enterprise was an important organizational innovation which clearly involved very large enterprises and very large risks.[59] And the history of the electrical engineering industry from the 1880's on is clearly just as much a history of organizational as of technological innovations. Judging from the enterprise history of the period, furthermore, these innovations called for very large investments and for the financial help of the credit banks.[60] That such investments were risky is clear

[57] See once again, RIESSER, *Die deutschen Großbanken*, 262-67 and 378-84; and POHL, *Konzentration*, 88-96 and 142-59.

[58] See MANNESMANN, *Kleine Chronik der Mannesmannröhrenwerke* (Düsseldorf, 1940), esp. 17-65; F. SEIDENZAHL, *100 Jahre Deutsche Bank*, 1870-1970 (Frankfurt, 1970), 186-92.

[59] It may be worth repeating that innovations involving large-scale organizations will be likely to have larger positive effects on economic growth than those working through small-scale operations. The growth of Germany's vertically integrated heavy industrial sector — absolute and relative to Britain's — is an example of the former well discussed by S. WEBB in his article: "Tariffs, Cartels, Technology and Growth in the German Steel Industry, 1879 to 1914", *Journal of Economic History*, XL (1980), 309-29.

[60] See, e.g., H. NEUBURGER, *German Banks and German Growth from Unification to World War I* (New York, 1977), esp. Ch. III; also J. KOCKA, *Unternehmensverwal-*

from the relevant historiography and can also be inferred from the disappearance of quite a few of the contending large enterprises from the market by World War One. Big business, it seems, was also risky business.

In conclusion, then, one may say that the German credit banks, by devoting their attentions and their resources mainly to the support of already strong and large industrial enterprises, did in fact, systematically neglect an important part of their country's financial business. In so doing, however, they were not pursuing a policy of risk avoidance, nor did they succeed in escaping the taking of risks. For even if one could assume that most bankers were totally lacking in a spirit of adventure, competition for the big industrial business — often involving new products and new technical and organizational methods — forced risk-taking upon them. The banks took what precautions they could, including diversification of their portfolios, and the history of their growth in the period up to World War One suggests a considerable measure of success. At the same time, not all banks were equally successful and many — indeed, by the period's end, most — disappeared or lost their independence.[61] The resultant concentration is a least in part an indirect indicator of the riskiness of the mixed banking business.

tung und Angestelltenschaft am Beispiel Siemens, 1847–1914 (Stuttgart, 1969), 319-35 and the literature cited there.

[61] This concentration process has been described by RIESSER, *Die deutschen Großbanken*, and by POHL, *Konzentration*, esp. 161-283. The latter particularly stresses the "profit pools" or "communities of interest" ("Interessengemeinschaften") as the main form of concentration from the 1890's to 1914, but though these preserved the formal existence of many banks, they were a step towards organizational integration and, moreover, a step which reflected the need and desire to spread risks — the point being emphasized here.

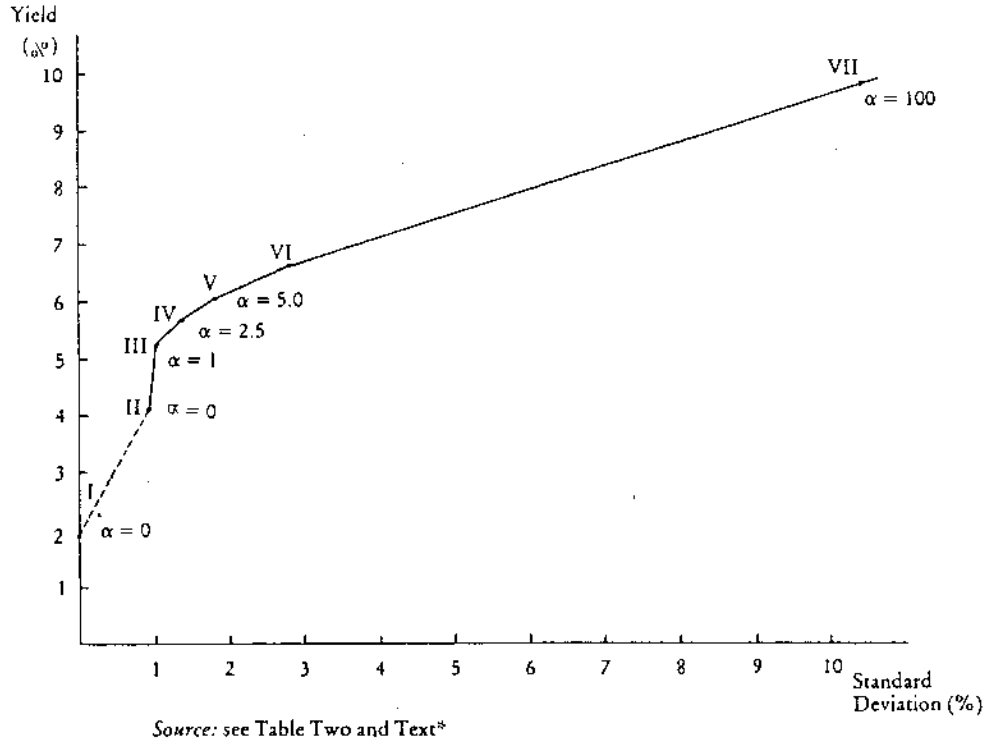
Appendix

COVARIANCES OF ASSUMED YIELDS IN BRANCHES OF THE GERMANY ECONOMY, 1880-1913

Branch Nr.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	.183												
2	−.236	.693											
3	.265	−.370	.549										
4	.188	.09	.350	.378									
5	.0653	−.142	.137	.031	.140								
6	−.148	.376	−.134	−.071	−.012	.618							
7	−.161	.224	−.162	−.138	−.122	.130	.565						
8	−.033	.075	−.044	.010	−.048	.009	.079	.144					
9	.291	−.598	.341	.184	.153	−.440	−.417	−.180	1.075				
10	−.022	.173	−.020	.105	−.013	.050	−.123	−.057	.062	.485			
11	.096	−.068	.157	.161	.013	−.074	−.115	−.003	.115	.069	.096		
12	−.016	.038	−.033	−.005	−.017	.041	−.010	.057	−.085	−.022	.001	.049	
13	.033	−.056	.076	.042	.006	−.077	.046	−.003	.063	.042	.023	−.018	.051

FIGURE I

ESTIMATED EFFICIENT PORTFOLIO FRONTIER FOR GERMANY, 1880-1913



Source: see Table Two and Text*
* bank portfolio