Fundamentals, Capital Flows and Capital Flight: The German Banking Crisis of 1931

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July 6, 2005

Abstract

While the 1931 financial crisis is universally regarded as an important factor in the German depression, its causes are still disputed. This paper argues that the crisis was related to bank fundamentals such as liquidity and solvency and that it was precipitated by the flight of short-term foreign capital. Using monthly bank level balance sheet data and narrative evidence, I argue that the 1923 hyperinflation and the subsequent stabilization weakened banks significantly by lowering their capital ratios and liquidity relative to 1913 norms, rendering them vulnerable to crises. A comparison of the periods 1924-1928 and 1929-1933 shows that foreign capital inflows (especially short-term) masked these problems in the banking system in the late 1920's, but revealed and aggravated them in the period leading up to the crisis of 1931. The data provide evidence that banks favored by foreign depositors were able to engage in bank lending despite their narrow capital bases and low liquidity ratios because of their heavy reliance on foreign capital, and that these banks were the hardest hit during the crisis. Furthermore, high foreign liability coverage protected banks from failure during the 1931 crisis. The parallels between the 1931 crisis in Germany and the 1997 crisis in Asian highlight the importance of regulation of the banking system and hedging against short-term foreign capital reversals for financial stability.

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The menace of our situation lies in the fact that we cannot maintain our balance of international payments out of our own productive force and export surplus, but only by constantly resorting to foreign credits. If the foreign credits should cease or be recalled and we should be unable to maintain the balance by our own strength and normal commerce, then credit restriction and severe shocks to our economics life will be inevitable.

H. Schacht (1931)

1 Introduction

In 1931 the German economy was hit by a banking crisis that led to a banking holiday and by a currency crisis that resulted in the imposition of exchange controls. Several committees convened by the Bank of International Settlements (BIS) and the League of Nations stated that international cooperation was necessary in order to prevent the collapse of the German economy, and that the rescue of the German economy was crucial for the health of a world economy bound by the rules of the gold exchange standard. In the event, international cooperation to rescue the German banking and financial system was not forthcoming, and its collapse rained another blow on an already collapsing world economy.

Given the unusual severity of the German depression and the central role of the German economy in the propagation of the Great Depression, this German experience has been the topic of great debate in the literature.[1] This paper addresses this debate about whether the German crisis was predominantly a banking or currency crisis. The first hypothesis claims that at the root of the entire episode was the currency crisis, which itself was created by political issues. Political uncertainties prompted investors to withdraw their funds from Germany to beat the expected depreciation of the mark or imposition of exchange controls (in a classic currency crisis); this meant liquidating their mark deposits, in turn undermining the position of the banks. Deposit withdrawals were just a consequence of a run on the currency. The second hypothesis focuses, in contrast, on systemic issues in the banking sector such as risky credit policies and insufficient liquidity positions. In this view, the currency crisis, resulting in the introduction of exchange controls, was a consequence of these problems of bad loans and inadequate liquidity in the banking system.[2] In other words, lack of confidence in the banks led investors to shift out of mark deposits in favor of foreign currency

[1] In 1932, real per capita income was 24% lower than its 1913 level and unemployment levels reached 31%.

[2] The proponents of the banking crisis interpretation include Priester (1932), Born (1967), Kindleberger (1973) and James (1986). The currency crisis interpretation is advanced by Hardach (1984), Eichengreen (1992) and Ferguson and Temin (2001).

denominated assets, which in turn precipitated the currency crisis. This paper argues the second hypothesis: it claims that the banking crisis was caused by fundamental weaknesses in the banking structure. However, the interaction of these problems with the foreign exchange market was more complex than previously portrayed. In fact, currency market factors first delayed the banking crisis through the inflow of capital, and then helped precipitate it when political and economic events led foreign capital to flee in the summer of 1931.[3]

About the fact that Germany endured a serious banking crisis in 1931, there is no question. However, the causes of the banking crisis remain contested. Different theories about the causes of the banking crisis include management errors (e.g. dependence of small number of big clients), inadequate central bank policies (e.g. lack of regulation and failure to act as a lender of last resort), the close links between banks and industry (the universal character of banks), and contagion from Austria. This paper offers a different explanation for the banking crisis than those featured in the previous literature.

Specifically, I propose an explanation for the 1931 crisis which attributes it to weaknesses in the financial system created by WWI, the 1923 hyperinflation and the competitive environment after the inflation, but disguised by the capital inflows of the second half of the 1920s. I argue that the German banking system had structural weaknesses such as low capital and liquidity that initiated and increased the severity of the crisis, so the banking crisis was not solely a result of a currency crisis, caused by the economic and political uncertainties of the interwar era.[4] But for this theory to be correct, there also needs to be a story of why events occurring between 1914 and 1923 only precipitated a crisis much later, in 1931. Here is where the induced response of international capital flows plays a crucial role.

Although the role of foreign withdrawals has been considered as a cause of the German depression, the effect of these foreign capital flows on the structure and the business of banks has not been studied. Germany's position as a heavy borrower of foreign, especially short-term capital made its economy sensitive

[3]Other explanations in the literature for the reasons for the severity of the German Depression include incompetency of policymakers (not using credit expansion or deficit spending to take the economy out of the depression), deliberate policies on the part of the German government to get rid of reparation payments, and limited "room for maneuver" as reserve requirements and fear of devaluation and memories of inflation prevented monetary expansion.

[4]See Hardach (1995) and Ferguson and Temin (2001) for the currency crisis view. Ferguson and Temin claim that the crisis was mainly a currency crisis precipitated by domestic factors. They focus on the budgetary problems of the Weimar Republic as the stimulant that brought the German economy and in particular the banking system down.

to disturbances in international money markets. In particular, I compare the role of two types of banking system weaknesses in increasing the vulnerabilities of the banking system after 1923: those created by the war and the hyperinflation (the depletion of the capital base, reparations, excessive dependence on foreign capital, and high wages that led to competition for capital by public and private sectors) and those created by how the banks responded to these events (excessive competition, overexpansion, use of short-term credit for long-term investment). This paper differs from previous interpretations by focusing not only on the disequilibria in the banking system created by the war and inflation but also the restructuring (or, more precisely, lack of restructuring) that occurred under the cover of capital inflows in the period 1925-1928, rendering the banking system vulnerable to the crisis of 1931.

Most previous studies of the German banking crisis only use aggregate data. The small number of studies that use bank level data concentrate on a small sub-sample of unrepresentative banks.[5] In order to address this deficiency, I use individual bank balance sheets for 180 German banks between 1925 and 1933 gathered from *Deutscher Reichsanzeiger und Preußischer Staatsanzeiger*.

I show in Section 2 that the competitive environment created by the hyperinflation and the post-1923 hyperinflation response weakened the banks significantly by lowering their capital ratios and liquidity relative to their 1913 norms, leaving them vulnerable to shocks. Between 1922 and 1923, the hyperinflation destroyed domestic capital markets in Germany, rendering the raising of capital through new issues extremely difficult. As a result, the post-stabilization era (1925-1928) witnessed a great inflow of foreign capital that the German banks used to supply credit to industry. A comparison of the periods 1924-1928 and 1929-1933 in Section 3 examines the role that foreign deposits played in delaying the crisis and disguising underlying weaknesses in the banking system while capital was flowing in. It explains how these short-term deposits turned into a source of serious vulnerability for the banks when capital later fled. The competitive structure of the financial sector is key to understanding this vulnerability. Banks continued to lend, especially to industry, in order to gain new clients or not to lose old clients in the face of increased competition, despite the inadequacy of their capital and liquidity reserves. Competition came from new private sector banks, which mainly

[5]Exceptions are Petri (1998) and Schnabel (2003).

consisted of house banks founded by big industrial firms, public sector banks founded to provide finance to local authorities, and savings banks that had extended their business into securities.

The data provide evidence that banks favored by foreign investors were able to engage in bank lending despite their narrow capital bases and low liquidity ratios, and that these banks were the hardest hit when capital fled. This is evidence of the importance of capital flows to the banking crisis that unfolded subsequently. This fundamentally unsound structure collapsed as a result of the panic precipitated in the middle of 1931 by accelerated withdrawals of foreign balances from German banks, which in turn led to domestic withdrawals of deposits.

2 The Impact of Hyperinflation on Bank Balance Sheets and Bank Behavior

Traditional banking literature emphasizes the positive influence of capital adequacy requirements on bank stability. Capital serves as insurance against loan default and, thus as a buffer against bank failure.[6] Banks need capital to protect themselves against risk and to discourage gambling with depositors' money by bank managers. Currently, banks' capital ratios are regulated as a part of the government's safety net. The Basle capital requirements created a link between capital ratios and portfolio risk. Calomiris and Wilson (1998) examine New York banks during the Great Depression and conclude that losses in bank capital due to the shock of the Great Depression led to a decline in bank lending as the least cost response to the need to reduce deposit default risk. In contrast,when German banks faced a decline in their levels of capital during the hyperinflation that was not replaced, they did not cut down their lending due to the inflow of foreign capital.[7] The cash liquidity of Berlin banks in 1929 was 3.8% of deposits and acceptances compared to 7.3% in 1914 and 10% in British and American banks in the 1920s.[8]

This paper argues that WWI and the hyperinflation led to a competitive environment that prevented banks from restoring their capital ratios to their prewar levels, paving the way for the crisis of the entire banking system.[9]

[6] See J.R. Barth and Levine (2001) and Dewatripot and Tirole (1994) for the importance of capital requirements.
[7] See Section 3 for a detailed analysis.
[8] Cash liquidity is defined as cash, central bank deposits, checks and bills over total deposits and acceptances.
[9] In the 1920s, Germany and Austria experienced hyperinflation until 1923 as Belgium, Finland, Italy and France had inflation

The German hyperinflation has been the topic of an enormous debate, as different contemporaries and scholars blamed reparations on one hand and the excessive issue of paper money to finance state spending on the other hand.[10] The banking system was one channel through which these monetary events affected the real economy. Jonker and Zanden (1995) analyze the banking systems of twelve European countries in the interwar era. Regressing bank profitability on bank solvency (defined as the ratio of bank's own resources to liabilities) and liquidity ratios, and inflation levels, they find that the inflationary experience in the early 1920s was positively associated with banking instability in the second half of the 1920s. They argue that banks lent carelessly to fight the decline in their business in the post-inflationary period. This led to a decline in the quality of their assets and liquidity, which was exposed by the deflationary shock of the Great Depression.

The German experience is an example of this link between hyperinflation and banking crises. The German banking system underwent drastic changes during World War I and the subsequent hyperinflation. Figure 1 shows how the key balance sheet variables evolved. There are several important points about these figures. First, cash, cheques and most dramatically, capital levels are below their pre-war levels. Given that assets increased after the hyperinflation, this implies low capital ratios in the 1920s. Second, banks continued to extend loans from 1924 to 1928, despite their much lower capital base. This was evident in particular with banks that received foreign lending.

During the war, deposits increased, while acceptances became insignificant. Acceptances, defined as negotiable instruments drawn generally to finance trade, declined as a result of the depreciation that made it impossible to use mark bills in foreign trade. Capital resources and the stock market also diminished in importance. Government borrowing became an important part of the banks' actions as reflected by an increase in bills in their portfolios.

There were two important changes to the German banking system during the hyperinflation. First, at the end of the war, the real value of monetary aggregates and demand for marks declined and the term

that continued after 1920 whereas inflations in Norway, Sweden, Switzerland, Great Britain, Denmark and the Netherland were controlled by 1920.

[10] See Feldman (1993), Holtfrerich (1986) and Bresciano-Turroni (1968) for a detailed analysis of the hyperinflation.

structure of deposits shortened. Given the fall in the real value of money, depositors preferred to make 7 day maturity deposits rather than medium and long-term deposits. Faced with the inflation and the depreciation of the mark, banks attempted to invest in non-depreciating assets such as securities and deposits at foreign banks. However, they could not index their bills or advances (typically used to finance foreign trade), so it was difficult for them to offer value-maintaining deposits. Furthermore, banks could do little to prevent the erosion of their capital by the inflation.

Second, the resulting competitive environment led banks to engage in imprudent lending in the late 1920s. Although the volume of business had gone down, by the end of the stabilization, the number of banks exceeded that of the prewar era except for the case of savings banks. The savings banks were hard hit because they had mainly long-term deposits; savings deposits shrank from 64% to 11% of their liabilities. Besides the savings banks, mortgage banks were also hurt because their assets, which were mainly long maturity mortgages with fixed interest rates, lost value due to the inflation. Although the mortgage banks never regained their prewar prominence, they were less affected by the 1931 crisis than other types of banks due to the long term nature of their assets and liabilities. On the other hand, the market share of credit banks and credit cooperatives increased sharply after the inflation. This all meant that there were more banks, resulting in an intensification of competition.

In addition, no attempt was made to maintain pre-war proportions between capital and foreign liabilities. Figure 2 shows the capital ratios of the German banks from 1913 to 1935. Figure 3 shows their capital and assets separately. Both capital and assets fell in 1923, but the decline in assets was greater than that in capital, leading to the spike in Figure 2. One reason for this disproportionate decline in capital relative to assets was the bank mergers between 1920 and 1922 that led to transfer of resources from provincial banks to big banks.[11] While competition increased as new banks were founded, the great banks turned from "bank alliances" to mergers since they were unable to protect their real capital and turnover and they perceived absorption as the easiest way to create new branches.[12] This led to a slight increase in their capital, although

[11] Apart from these takeovers, two mergers were especially important-those of Darmsädter Bank with the National Bank für Deutschland and of the Commerz- und Discontobank with the Mitteldeutsche Privatbank, Magdeburg.

[12] Furthermore, mergers were common due to the increase in the importance of Berlin as a result of the increased role of stock market and foreign exchange trading during the inflation. The revival of stock exchange activity was the result of the readiness of people to buy industrial shares, reflecting their attempts to protect their savings from depreciation, led to a boom of capital

the general trend shows that banks lost more than half of their pre-war capital resources by 1924. Banks lost capital as a result of forced closures, liquidation of foreign branches, loss of securities abroad and loans wiped out by the hyperinflation. Furthermore, when giving credits to their customers, banks had to use their capital besides their deposits. The losses of capital were proportionately smaller than those of deposits because banks tried to keep their capital safe to serve as guarantee against their deposits. The sharp decline in assets was due to increased banking costs, lower profitability of loans and the loss of the real value of their deposits and current account balances.

Then, in the late 1920s, banks rebuilt their assets but not their capital base.[13] Under competitive pressure, they scrimped on capital and sacrificed liquidity as ways of cutting costs and ignored the associated risks. In addition, raising capital was more costly since they could not increase their own capital through fresh securities issues due to malfunctioning capital markets. An indicator of the increased competition was lower net profits. One reason for the low levels of net profits relative to 1913 levels was higher administrative expenses and taxes. Expenses and taxes as a percentage of gross profits increased from 30-40% in 1913 to 70-80% in 1926 for the big Berlin banks. Feldman (1991) suggests that after the stabilization in 1924, banks should have limited their credits until they refilled their balance sheets in order to protect themselves against bank runs.[14] Instead, the banks reverted to their old practice of maturity mismatches in borrowing and lending without taking into consideration the higher risks of using foreign capital to fund assets and the shakier domestic and international situation.[15] Although the transformation of short-term deposits into long-term investment funds may be regarded as the prime function of investment banking, it requires a certain care in the selection of one's borrowers as well as considerable cash liquidity.

So, the effect of WWI and the hyperinflation was to lead to the collapse of domestic capital markets

issues.

[13] They advertised that banks were "in a position to meet every justified credit requirement of industry and commerce, that they have always done so readily in the past and will also do so in the future."

[14] According to Holtfrerich (1986), this would have led to an even higher unemployment rates than 10% between 1924 and 1929.

[15] State Secretary Hans Schäffer stated in a memorandum of August 3, 1931 that "the financing of the German economy and a portion of the financing of the public sector was conducted before the war in such a manner that first short-term credits were taken from the banks for the projected investments as was required by their progress and, afterwards, when the investments had progressed sufficiently and when the market offered special opportunity, these short-term credits were transformed into long-term loans."

and changes in bank balance sheets.[16] There were two important implications of these changes. First, the competitive environment led banks to engage in imprudent lending behavior despite their fundamental problems such as low capital and liquidity ratios. Second, banks relied on foreign capital to finance their lending, since domestic depositor confidence was slow to return and domestic capital markets did not function properly.

3 The Role of Foreign Capital in the German Crisis

3.1 Why did foreign capital come to Germany?

The dependence of the German economy on capital inflows was enormous. Between 1924 and 1930, $9 billion flowed from creditor nations to Europe.[17] Of this, 60% came from the U.S. and 1/3 was invested in Germany.[18] Table 1 compares the balance of payment statistics for Germany and other European debtors. Short-term flows accounted for 55 % of the total inflow into Germany. Furthermore, only 1/3 of these capital flows was used to pay reparations, leaving a large amount of capital to invest in industry.[19] In particular, for the banking system, short-term liabilities made up 35% of total liabilities (900 billion RM) in 1930 compared to 15% in 1913, when short-term deposits were supplemented with long-term bond flotations. The liquidity of the banking system was somewhat improved, but dependence on short-term deposits to make long-term loans made it much more vulnerable to capital outflows.

Several factors led to the inflow of foreign capital. On the demand side, the German economy was in great need of capital in the 1920s: Private and public institutions all demanded capital, financial markets were in chaos, and inflation had eroded the savings of Germans. After the stabilization, the destruction of capital markets in the hyperinflation meant that the financing of stocks/business and fixed investment became dependent on a banking system itself weakened by the inflation. All this elevated German yields. At first, the Reichsbank supplied credit to industry as the banking system sought to recover its strength.[20] Germans were still reluctant to put their money in the banks, having seen it wiped out during the hyperinflation.[21]

[16] According to Hardach (1995), in 1924, total assets of the banking sector had declined to 21% of their 1913 level.
[17] In 1929, foreign debt amounted to 1/3 of German GNP.
[18] Feinstein and Watson (1995).
[19] Schuker (1988).
[20] Disconto-Gesellschaft, *Monthly Report on the Economic Condition of Germany*, 30 January 1925, Berlin.
[21] Although German income levels in 1926 exceeded their 1913 counterparts, people saved only 12% of their income as opposed

Although the period between 1924 and 1933 witnessed a domestic accumulation of capital fueled by bank lending, this was not nearly enough to satisfy all the demand, since German industries, public bodies, and even religious societies all wanted to borrow abroad.[22] (See Table 2.)

The inadequacy of capital, the slowness of restoring confidence in price stability after the hyperinflation, and the high demand for capital by German industry was reflected in the high interest rates in Berlin relative to New York, London and Paris as reflected in Table 3. Yields in German bond markets ranged from 6 3/4 to 9 % during 1925-1928 compared to 4 1/2% in the US bond market. Money market rates were also higher in Germany than abroad due to higher uncertainty associated with the German economy. Figure 4 shows differentials on market discount rates on prime bills in Berlin and New York.

On the supply side, foreign investors were willing to lend to Germany not only due to higher German interest rates but also due to the confidence created by two factors: the Dawes Plan and the restoration of economic growth in Germany. The Dawes Plan (1924) opened German capital markets for the first time since World War I.[23] Ritschl (1995) claims that the transfer protection clause in the plan gave commercial credits de-facto seniority over reparation claims and this was a major reason why capital flowed into Germany.[24] Parker Gilbert, the American head of the Control Commission set up to administer the Dawes Plan, considered foreign capital inflows as essential to building Germany's industrial base and thereby to its capacity to pay reparations. Stolper (1940) describes 1924-1928 as "a period of recovery the scope and intensity of which are unparalleled in previous German history." Between 1924 and 1928, industrial production rose by 40%, labor productivity by 25% and value of exports doubled. This *Wirtschaftswunder*[25] and the introduction of the Dawes Plan increased lender confidence.

Given these favorable conditions, foreign capital flowed into Germany in many forms. Table 4 shows that the banks were the the major players in this process. The problem with the banks' dependence on

to 20% in 1913.

[22] See Kuczynski (1927) for a detailed analysis.

[23] The Dawes committee was entrusted with finding a solution for the collection of the German reparations debt, set at almost 20 billion marks. Dawes Plan provided that the Ruhr area be evacuated by Allied occupation troops, that reparation payment should begin at 1 billion marks for the first year and should rise over a period of four years to 2.5 billion marks per year, and that the sources for the reparation money should include transportation, excise, and custom taxes.

[24] He also states that the introduction of the Young Plan-which set the total reparations at $26,350,000,000 to be paid over a period of 58 1/2 years- in 1929 was a regime change that led to a reversal of commercial loans, depression and political chaos.

[25] The economic recovery miracle according to Brown (1988), p212.

foreign capital was that, especially after 1929, the capital inflows were of short term maturity as a result of the Reichbank's policy of discouraging the floatation of foreign bonds and conditions in foreign markets, especially the United States.[26] (See Table 5.)

Total foreign borrowing between 1924 and 1929 was 18 billion RM. Foreign investment accounted for one third of total capital formation, and 40% of private bank deposits in 1928 were short-term foreign deposits.[27] This dependence on short-term foreign debt was a large problem for the German banking system. Northrop (1938) suggests that the big issue was not the universal character of the banks, but their dependence on short-term foreign capital to engage in industrial finance. Table 6 confirms that these banks were the largest recipients of foreign capital.

There was no limit to the German banks' willingness to accept foreign short-term deposits. For example, whereas Darmstädter und Nationalbank, had short-term deposits of 1 billion Reichsmarks in the summer of 1931, its capital was only 60 million Reichsmarks. This money enabled the German banks to lend to industry, but made them very vulnerable to capital outflows, so banks have been blamed for accepting these short-term foreign deposits.[28]

3.2 What measures were taken to discourage capital inflows?

The role of the Reichsbank in the crisis is twofold. First, the Reichsbank did not force banks to follow more prudent policies in the 1920s. Second, it failed to act as a lender of last resort when banks turned to it for liquidity. The Reichsbank chose to impose credit restrictions to maintain the gold standard. Its statute required it to maintain a 40% note cover and as this ratio was approached, insufficient access to Reichsbank discounting forced all banks to close on July 13th as a general banking holiday was declared.

In order to improve banking standards, the Reichsbank required the publication of monthly balance sheets to be quoted on the stock market, and a uniform system of checks.[29] This measure was adopted to

[26] "It is no accident that Germany's short-term foreign indebtedness is larger than her long-term. This is related to the fact that the capital demand for the short-term commercial turnover, especially for foreign trade, is relatively greater than the demand for capital to be invested in production.", Schacht (1931), p165.

[27] It increased from 35% in 1927 to 43% in 1928 according to the *The Economist*, Banking Supplement, 11 May 1929, p9.

[28] A counterargument to this is that if the big Berlin banks had not accept foreign deposits, interest rates would be higher as non-bank institutions without as much credibility got them. This would lead to lower amounts and but also a slower recovery between 1924 and 1929.

[29] Northrop (1938) gives a detailed analysis of the role of central banking in Germany between 1924 and 1933.

make the public aware of the position of individual banks in order to address the asymmetric information problem. Banks continued with their investment banking activities and giro deposits (deposits that can be used as secondary cash reserve by commercial banks) were only voluntary. But beyond these initiatives to encourage transparency, there was little effective regulatory discipline. The Reichsbank did not have the power to control the banks by preventing the flow of foreign funds or by improving the fiscal positions of the Reich, the States or the communes, although the Reichsbank was aware of the dangers of both. There were no bank regulations stipulating the amount of capital, required cash reserves or guidelines for proper activities of banks.

Given the lack of good banking regulation, there was little the authorities could do to monitor the banks. However, the Reichsbank president Dr. Hjalmar Horace Greeley Schacht, frequently expressed his concerns about the liquidity of banks: "I believe that the principle of liquidity must be maintained under all circumstances. This is just as important for the private banks as for the Reichsbank. I do not believe that the mere desire for the higher profit of the current account business is an acceptable banking standard."[30]

The Reichsbank feared the volatility of large-scale foreign capital flows, which could easily be pulled out due to changes in U.S. monetary policy or German politics. It therefore responded by attempting to discourage capital inflows in general. In August 1926, the Reichsbank slightly broadened the range of fluctuation for the RM against the dollar in order to introduce an element of exchange rate risk that might dampen demand for foreign loans. In May of 1927, the Reichsbank restricted credit due to its concerns about the stock market speculation. German banks were heavily involved in stock market loans and depended on the Reichsbank for rediscount credits. The Reichsbank's gold and foreign exchange fell by 230 million RM between January and April as its domestic bill credits increased by 650 million RM. On May 11,1927, Schacht told the members of the Berlin Banker's Association (*Stempelvereinigung*) that their access to discount credit would depend on the ratio of their liquid reserves (cash and giro deposits) to their total liabilities. Although the Reichsbank did not specify a bound for cash liquidity, it indicated that the average liquidity of the six big banks (2.8%) was too low and threatened a policy of credit restriction if there was no improvement. The

[30] *Die Reichsbank, 1901-1925*, p262.

Bankers Association agreed to comply: "The members of the Berlin Association of Banks and Bankers have agreed among themselves to reduce, gradually but radically, their report and lombard loans and all other loans secured by shares. They will accordingly reduce their bourse report and forward exchange business by 25% by the middle of June and will further limit their loans for the following month. Their customer loans against securities will in the same manner be reduced."[31]

Another important event of 1927 was the cancellation of the tax exemption of German bonds floated abroad. In the autumn of 1927, foreign bond issues by the state and local governments were stopped by this measure, but short-term borrowing was unaffected. Schacht (1931) discusses how long-term investment should be preferred over short-term investment. However, unlike his policies, such as withdrawing of tax privileges from foreign investors, that decreased long-term foreign capital flowing through the bond market, Schacht had no means to control the short-term capital flowing through the banking system that are particulary dangerous to an economy.[32] In return, Schacht publicly criticized the inflow of short-term foreign debt and the government public finances, resulting in a decrease in the confidence in the German economy. So, although he recognized the dangers of short-term foreign capital and a weakly capitalized banking system, his policies and speeches had the unintended consequence of aggravating the very problems he wished to address.

Figure 5 shows weekly data for Reichsbank gold and foreign currency reserves and its portfolio of rediscounts. The decrease in Reichsbank reserves is matched by an increase in rediscounts, which were mostly to banks. Banks presented bills to the Reichsbank and received foreign exchange in return to pay their foreign currency liabilities. So, the Reichsbank supported banks by discounting their bills, but this came to a stop as the gold note cover was approached and it chose not to act as a lender of last resort.[33]

[31] *Die Reichsbank, 1901-1925*, p68.

[32] "This dependence of Germany's currency upon foreign countries implies no immediate danger so long as foreign capital enters Germany upon long terms. The Reichsbank can adjust itself in time to meet any long-term developments. But it is otherwise with short-term credits. I have often been criticized abroad for references to this danger. Anyone who speaks critically of Germany's credit position is suspected abroad of deliberately painting Germany's conditions as blacker than they are because Germany wishes to escape paying reparations. I was once asked; at a meeting of the general council of the Reichsbank whether I did not think the short term credits granted Germany safe. I answered then, and I should like to emphasize it here, that the short-term credits too are fully secured. Some eleven billion marks of short-term foreign credits are outstanding in Germany. Since we have a free gold and exchange market in Germany, these eleven billion marks are covered by about three billions of foreign claims held by German private banks, and the equal sum represented by the gold and exchange reserves of the Reichsbank", p144.

[33] For a view on how the central bank provided preferential treatment to the big Berlin banks, see Schnabel (2003). Balderston

Although the Reichsbank was aware of the danger of the dependence of the banking system on short-term foreign debt, it was unable to prevent the inflow of foreign capital. Interwar Germany was characterized by lack of prudential supervision and regulation of the banking system that prevented authorities from forcing banks to increase their capital ratios or to engage in more prudent lending behavior. As a result of the absence of this regulatory backstop, when capital declined there was nothing else to discourage additional risk taking by bank managers.

3.3 Foreign Capital and Bank Lending

Link (1970), McNeil (1986) and Schuker (1988) argue a causal relationship between German capital imports between 1924 and 1929 and later defaults on reparations and commercial debts. Ritschl (2003) agrees that given these reparations and commercial debts, the Reichsbank and the German government had to deflate the German economy in order to create balance of payments surpluses and to avoid default, leading to a deepening of the depression. He also claims that without the artificial credit boom of the early 1920s brought by the Dawes Plan, the German economy would have had a recession then, but would not have been so hard hit by the great slump in 1930. This paper develops this point further by focusing on the role of foreign capital in delaying the banking crisis after the hyperinflation by masking the fundamental weaknesses in the banking system and enabling banks to lend.

Before World War I, banks relied on domestic deposits and bond flotations to finance industry. In 1913, total foreign liabilities of the banking system were 600 million marks (1% of total liabilities). As a result of the hyperinflation, credit banks lost half of their assets while savings banks and mortgage banks lost 90%. This led to an increase in the relative importance of credit banks, especially Berlin credit banks. The big Berlin banks were able to diversify more and suffered smaller losses because they had relatively better access to international markets and short term assets. With stabilization came some rebuilding of assets. The number of credit banks declined, reflecting the rationalization of excess capacity created by

(1994), on the other hand, states that the Reichsbank started its policy of credit rationing on June 22nd towards provincial banks and on July 10th to the great banks. This double treatment was not necessarily to save great banks, but the Reichsbank was anxious about the unpaid part of a 250 million RM credit that the Reich had negotiated from the big banks for delivery on June 15th and 30th. So, it was possible that exposure to the Reich, the States or municipal loans could lead to being favored by the Reichsbank, even though the Reichsbank was technically independent of the government.

the hyperinflation. 1925-1929 was a time for competition, including competition through mergers, as banks competed to take over smaller banks to develop branching networks. Reliance on foreign funds increased after the inflation. At the end of 1930, foreign liabilities peaked at 7.3 billion reichsmark (12% of total liabilities).

Dependence on foreign capital increased dramatically after stabilization. Almost half of this consisted of short-term foreign debts. Table 7 shows that banks were the most willing participants in this new system of foreign credit. This was especially true for credit banks. In 1929, the foreign deposits of credit banks were 40% of their total deposits. Foreign short-term assets, on the other hand, were only 40% of their assets, so there was also the risk of currency mismatches in banks' balance sheets.[34]

Credit banks combined deposit and investment activities and were more sensitive to stock market fluctuations than other types of banks after the hyper-inflationary period.[35] Before the war, credit banks converted their industrial loans into long-term funding, by floating bonds in the capital market to cover the bank debt and to supply the firm with more long-term credit. This securitization of their loans enabled banks to diversify risk. The successful flotation of securities also provided them with enough credit to cover their liabilities. This relationship between industry, credit banks and the capital market broke down once the hyperinflation destroyed the capital market. The prewar capital funds to deposit ratio of 1:3 rose to 1:15 in the second half of the 1920s. This left the banks vulnerable, such that the loss of 5-10% of total assets was enough to wipe out their capital.[36]

It is important to understand why banks took risks by lending to industry despite changes in their capital, liquidity and funding positions and became vulnerable to bank runs. According to Wixforth (2003), during the inflation credit banks lost their power over industrial firms who started to depend on more than one bank for their finances.[37] The profits firms made during the war permitted them to reduce their dependence

[34] *Enquête Ausschuß: Der Bankkredit* (1930).

[35] As a contemporary put it, "The fact that the banks allowed themselves to be made the buffers between industrial and agricultural debtors, bent on long investments, and the commercial and banking creditor, wishing for a quick return of their money, has shaken their foundations completely. It made them the chief sufferers, when, owing to political and commercial panic, billions were suddenly withdrawn."Bonn (1931), p36.

[36] Stolper (1940).

[37] Other possible explanations for such non-prudent lending behavior include the lack of good banking regulation by today's standards, and the banks' belief that the Reichsbank would act as a lender of last resort by rediscounting their bills in the case of a need for liquidity.

on bank credit. Furthermore, there was increased competition as changes in banking laws allowed savings banks and government-owned banks to accept deposits like credit banks. So, the banks lent generously in mid 1920s in order to avoid losing their long term customers. As described by Feldman (1991), Danatbank, the first bank to experience serious difficulty, still supplied easy credits to maintain close relations to customers, resulting in risky credit transactions and dubious accounts.[38]

While the banking system succeeded at increasing its assets from 1925 to 1930 at incredible rates, banks neglected to address a fundamental issue: They did not take the necessary measures to insure themselves against bank runs and neglected to take even the traditional security standards. One measure of this fact is the decline in their liquidity ratios. The credit banks' ratios of cash and Reichsbank balances to deposits declined from 7.3% in 1913 to 3.8% in 1929 and their ratios of capital and reserves to assets declined from 22% to 7%.[39] Figure 6 also shows this decline in cash liquidity, which made banks dependent on the Reichsbank. This was especially dangerous with the gold standard as the decline in reserves made them more vulnerable to sudden reversals of capital without the Reichsbank acting as a lender of last resort.

Thus, this subsection shows that in the competitive environment created by the hyperinflation, banks engaged in imprudent lending in order to keep their prominence in the economy. They were able to do so because of high levels of foreign capital inflows that authorities were not able to curb. However, banks did not consider the potential volatility of these short-term foreign capital flows and were not ready to protect themselves through high levels of capital and liquidity ratios when capital fled.

3.4 Why did foreign capital leave Germany?

The role of U.S. loans to Germany during the interwar era has been the topic of great debate. Even if the end of capital flows did not precipitate the crisis, they added to its severity.[40] This section focuses on the effect of foreign capital outflows in precipitating withdrawals from the banking system.

[38] Other big banks refused to bail Danatbank out in July 1931 because they wanted to punish it for its non-prudent lending policies (that gained it excess profits earlier) and to get rid of a big competitor.

[39] *Enquête Ausschuß: Untersuchung des Bankwesens* (1933).

[40] Temin (1971), Balderston (1993) and Ritschl (2002) focus on the domestic aspect of the crisis, claiming that the onset of the German depression as measured by the decline in investment preceded the withdrawal of foreign, mainly U.S., loans. Lewis (1949), Schmidt (1934), Landes (1969), Falkus (1975) and Sommariva and Tullio (1987), on the other hand, emphasize the role of reduced foreign investment into Germany as a precipitating factor of the German depression.

Figure 7 shows total assets for the main categories of banks. One important feature is that the great banks (*bbb*) and other credit banks experienced a sharp decline in total assets after 1929. This is in parallel with deposit withdrawals German banks faced as foreign capital fled.

The main debate regarding the German banking crisis is whether capital flight was primarily domestic or foreign in origin. Was the German economy pushed into a depression because of the behavior of foreign creditors who withdrew their deposits (as a result of contagion from Austria or lack of trust in German authorities) or domestic deposit withdrawals?[41] Kindleberger claims that the Credit Anstalt crisis spread to many countries including Germany because foreign creditors failed to differentiate between Austria and Germany.[42] These two countries had similar banking structures and both showed symptoms of possibly going off the gold standard by imposing exchange controls.[43]

James (1986) focuses more on domestic aspects of the banking crisis. He categorizes banks facing runs as fundamentally weak due to insufficient capital and low liquidity. Furthermore, he blames the withdrawal of German, not American, funds for precipitating the crisis. Contemporary reports by the *Enquete-Ausschuß* also focused on the importance of domestic withdrawals because they were accompanied by the weakening of the reichsmark against the Swiss franc and the Dutch guilder.[44]

We can make more sense of this debate by distinguishing subperiods. There were three phases of capital flight between 1929 and 1931: April 1929, September 1930 and May 1931. They were associated with investors' fears about the uncertainty of the German economy, and the possibility of the imposition of exchange rate restrictions. In April 1929, capital flowed out with the breakdown of reparation negotiations in Paris. This outflow proved short-lived as the signing of the Young Plan in May calmed the markets down. In September 1930, when elections gave Hitler's party the second largest bloc of seats in the Reichstag, gold outflows resumed. In May 1931, a combination of diplomatic, fiscal and business fears led to heavy

[41] Frankel and Schmukler (1996) analyzes whether it was the Mexicans or foreigners who began pulling their funds out of Mexico in 1994.

[42] See Schubert (1991) for an analysis of the Austrian crisis

[43] Eichengreen (1992) emphasizes this point further by linking the currency crisis to international causes. He points to a loss of confidence created by the Austrian crisis despite the lack of direct deposit links between the banks of the two countries and the contagion from Austria to Germany.This is the main sentiment in the contemporary press, e.g. *The Economist*, June 13, 1931. He also focuses on the failure of international cooperation in creating and deepening the German depression.

[44] *Die Bank* (1930), p1586.

deposit withdrawals. Capital left Germany as Wall Street experienced a boom, the Federal Reserve increased the interest rates and alarm about Germany's foreign liabilities increased. The reparation declaration by Brüning, the issuing of the "Second Emergency Fiscal and Economic Decree" by the government and the failure of the Credit Anstalt all contributed to this final wave of capital flight that led to the banking holiday.[45]

Given this environment of rising uncertainty and declining confidence in the German economy, it is clear that banks' policies toward liquidity, capital and lending were important factors in the crisis. The crisis was not a mere reflection of political uncertainty or the volatility of capital flows. In addition it reflected something more. That something more was distortions in incentives in the banking system that led banks to engage in imprudent lending behavior on low capital and liquidity ratios, rendering them vulnerable to external shocks.

4 Empirical Analysis

I now document these points further by analyzing the evolution of these balance sheet variables further. This analysis establishes the following.

- First, vulnerability was created by WWI and the hyper-inflationary experience of 1923. A comparison of capital and liquidity ratios in the 1920s with that of 1913 shows this deterioration in bank fundamentals.

- Second, foreign deposits played a key role in delaying the German crisis and disguising fundamental weaknesses in the banking system. The periods of capital inflows and outflows are analyzed to determine the role of foreign capital inflows in increasing lending between 1924 and 1928 and foreign capital outflows in showing weaknesses in bank fundamentals.

- Third, a logit model is used to analyze the determinants of the likelihood of failure. Results show that bank fundamentals matter even after controlling for macroeconomic and international factors. This

[45]The Reichsbank published reassuring statements after the Credit-Anstalt crisis about how the German banks were not fundamentally weak like the Austrian banks. The Reichsbank president Hans Luther told the Governor of the Federal Reserve Bank of New York, George Harrison on June, 1931: "Periodical publications of German banks' statements provides safe means for judging their situation which is sound notwithstanding large foreign withdrawals." An analysis of the contemporary American and German press by Petri (1998) shows that there was optimism up until the crisis about the solvency of banks.

suggests that bank failures were not a result of the currency crisis alone, but were also affected by weaknesses in bank balance sheets that were exposed by the currency crisis.

4.1 Data

The data used in this study cover the period from January 1925 to November 1932. These dates include the post-stabilization era following the conclusion of the 1923 hyperinflation, the reparations crisis of 1929 that led to the introduction of the Young Plan, the September 1930 election crisis, the May 1931 Austrian crisis, the July 1931 banking crisis and the first part of recovery from the Great Depression after the imposing of exchange controls in July 1931.

The data set is made up of the balance sheets of 187 major German banks. These include 140 joint stock credit banks (*Kreditbanken*), 20 state banks (*Staats und Landesbanken*), 25 savings & loans clearing banks (*Girozentralen*), and 2 mortgage banks (*Hypothekenbanken*). The credit banks are the universal banks in the sample.[46] These banks had close ties with industry. They would arrange mergers and acquisitions, underwrite stock and bond issues, trade securities and offer brokerage services.[47] The state banks are owned by the governments of the *Länder*, while the clearing banks are owned by savings banks and serve as regional clearing houses for savings banks.

The data were published monthly by the statistical department of the Reichsbank in the *Deutscher Reichsanzeiger und Preußischer Staatsanzeiger*. This sample represents 60 percent of all German banking assets in 1930.[48] The Reichsbank was concerned throughout the 1920's in improving banking standards, especially the banks' liquidity position as explained above.[49] Until 1928, the balance sheets were published bi-monthly. Then, a joint conference between the Reich Minister of Economics and the representatives of the Reichsbank and the other banks resulted in an agreement to publish monthly balance sheets and to improve the contents to make balance sheets more uniform and informative. In addition to these reports of

[46] More details on the structure of the banking system can be found in Pohl (1993), Born (1983) and Hardach (1984). Whale (1930) specifically focuses on joint-stock banking in Germany before World War I.

[47] See Neuburger (1977) and Fohlin (1994) for the relationship between the operation of universal banks and pre-war economic growth in Germany. Fohlin (1994) suggests that the role of universal banking in promoting growth in Germany was not as important as once thought by analyzing the links between banks and industry through supervisory boards.

[48] Deutsche Bundesbank, *Deutsche Geld und Bankwesen in Zahlen 1876-1975*, 1976, p.121. Savings banks and credit cooperatives are the two main banking group that are excluded from the sample. Given that these banks served local markets and did not receive much foreign capital, their absence does not affect the analysis greatly.

[49] See *Annual Reports of the Reichsbank, 1924-1934*.

balance sheets, the banks also had to declare to the Reichsbank the percentage of their deposits that were of foreign nationality. The Reichsbank, in turn, agreed to publish these figures only as an aggregate amount (MacKenzie 1932).

I collected these balance sheet data in the state library in Berlin. The balance sheet data were complemented by detailed weekly information from financial magazines such as *Die Bank*, *Magazin der Wirtschaft*, *Wirtschaft und Statistik* and books such as *Saling's Börsenpapiere: Deutsche Banken und Bankiers*. These magazines offer both quantitative and qualitative accounts of the state of the economy as well as the sentiments of people. The library also had yearly statistical yearbooks of Germany that provided monthly macroeconomic variables such as index of industrial production, the consumer price index, the stock market index, the number of corporate bankruptcies and the unemployment rate.

4.2 Definition of Banking Trouble

The German banking crisis differs from other banking crises in that not many banks failed in the sense of disappearing from the sample. A bank holiday was declared on July 15, 1931 as a result of which 19 banks failed. Therefore, it is necessary to find another way to determine the experience of individual banks in the summer of 1931. The published balance sheets do not include information on the fate of the issuing banks. Instead, I collected this information using *Die Bank*, a weekly banking magazine that gives detailed information on what happened to individual banks. These data were complemented by the *Handbuch der deutschen Aktiengesellschaften*, which has information about the liquidation of banks and firms for joint-stock banks. The *financial distress* variable is defined to include banks that were closed, failed, merged or experienced serious financial difficulty.

4.3 Empirical Results

4.3.1 Bank Characteristics in 1913 and 1928

There are several points to keep in mind when analyzing interwar German capital ratios. The capital ratio of credit banks was 8 to 10 percent before the crisis. This ratio is higher than both the capital ratios of German banks today and internationally required ratio of 8 percent. Capital adequacy is considered important in

stabilizing the banking system.[50] However, as discussed above, the German banks' capital ratios, liquidity ratios, and foreign liability coverage declined dramatically from 1913 levels, rendering them vulnerable at the end of the 1920s.

Figures 8 and 9 show capital and liquidity ratios for the big Berlin banks between 1912 and 1928. There are two important results from Figure 8. First, there was a slight recovery in bank capital ratios after the hyperinflation of 1923. This increase may have delayed the banking crisis in Germany, in comparison to other European countries such as Denmark and the Netherlands that experienced banking crises in the early 1920s. Second, the capital ratios never regained their 1913 levels, despite the fact that lending to industry recovered to prewar levels.[51] The data in Figure 9 reinforce this fact, as the liquidity ratios follow a similar pattern.

4.3.2 Comparison of Periods of Capital Inflows and Outflows

Next, I compare bank behavior in the two periods 1924-1928 and 1929-1932 in order to show the importance of foreign capital in delaying the crisis. Table 8 shows summary statistics by bank type. First-order liquidity is defined as sum of cash and deposits at central banks over deposits and acceptances. Second-order liquidity adds checks and bills and inter-bank loans to the numerator. The share of securities in total assets is used to measure asset liquidity. Last, foreign deposit growth is compared across banks because the withdrawal of foreign deposits is purported to be one of the precipitating factors of the crisis.

The results shows that second-order liquidity was higher for all types of banks before 1930. Liquidity ratios declined even more after 1929 as banks faced deposit withdrawals. Most importantly, the post-1930 sample shows a sharp decline in foreign deposits, while banks experienced foreign deposit growth in the pre 1930 sample. This finding is consistent with with the hypothesis that foreign capital inflows were keeping the banking system afloat in the earlier period by hiding their weaknesses.

In order to understand the differences in bank distress between the two periods, I analyze a precursor

[50] There has been many reforms to increase capital adequacy requirements in the 1990s–See *International Convergence of Capital Measurement and Capital Standards* (1988) and *Capital Requirements and Bank Behavior: The Impact of the Basle Accord* (1999).

[51] Voth (2003) shows that the German stock market was slumping due to Schacht's policies. This was one of the reasons that prevented banks from raising capital through equity flotations.

to the 1931 crisis–August of 1929, when seven banks failed. This relatively small crisis was associated with falling stock prices and the cyclical downturn which had started somewhat earlier in Germany than other countries. This experience can be used to show how foreign deposits masked the most severe problems in the banking system in the late 1920s, but exacerbated those problems in the crisis of 1931. I conduct t-tests to compare means for having no distress, pre-1930 and post-1930 distress.

The results in Table 9 indicate that no-distress banks have higher liquidity and foreign liability coverage. This confirms the common argument that if a bank does not have maturity or currency mismatches in its balance sheet, it will be better insulated from trouble. Another important result is that banks that experience distress later have higher foreign deposit ratio to total deposits than the ones that fail early. So, foreign deposits delayed the crisis for some banks as they survived in 1929, but they failed as foreign deposit withdrawals intensified in 1931.

I also examine the effect of foreign deposits on lending behavior. I split the sample into the pre-1930 and post-1930 periods in order to compare periods with different levels of foreign capital flows. Table 10 shows the results from regressions for these two sub-samples. The dependent variable is the ratio of loans to assets. The explanatory variables include bank balance sheet and macroeconomic variables. The variable of interest is the ratio of foreign deposits to total deposits in March 1928(before capital fled). Having a high initial foreign deposit to total deposit ratio evidently increases lending in the first half of the sample (when foreign capital was flowing into Germany). However, after 1929, when capital flows reverse direction, the relationship becomes negative. This result shows that foreign capital enabled banks to lend between 1924 and 1928 despite low levels of domestic savings after the hyper-inflationary period. Then, capital left Germany, leading to a decline in bank lending in banks that had accumulated a high level of foreign debt. The decline in bank loans added to the severity of the depression as it increased business defaults. Furthermore, having a higher capital ratio, and being a universal bank increase lending. An increase in the central bank discount rate decreases loans in the first period when the central bank was willing to work with the banks, whereas the opposite is true in the second period. Next, I run regressions using the growth rates of foreign deposits and loans instead of levels. A higher growth in foreign deposits leads to higher growth in bank loans in the

period between 1924 and 1928 compared to the latter period.

Thus, the analysis of this section confirms that foreign capital inflows delayed the banking crisis. There are clear differences in terms of bank fundamentals and lending behavior in the two periods, 1924-1928 and 1929-1932, that show that foreign capital inflows masked weaknesses in the banking system that were only shown by capital outflows.

4.3.3 Determinants of Likelihood of Failure

Given the dangers of sudden reversals of short-term foreign capital, banks presumably should have hedged themselves against risk by keeping high capital and liquidity ratios and engaging in prudent lending behavior. However, given the lack of regulatory standards and inadequate capitalization to induce prudent management behavior, banks became very exposed to risk in the late 1920s.

To verify that it was the banks that failed to hedge adequately which experienced distress, Table 11 divides the sample into distressed and non-distressed banks and compares several banking characteristics across these two groups.[52] Non-distressed banks have higher capital ratios, liquidity, and foreign liability coverage as predicted. They also lend less to industry and do not lose as much foreign deposits during the crisis times of mid 1931.[53]

Next, I turn to logit regressions to estimate the likelihood of failure in a multi-nomial framework. Estimates of the probability of failure using a logit model that links bank characteristics with bank failure have been widely used in the analysis of the U.S. banking failures for the 1920s and 1930s.[54] I follow a similar methodology. and use the bank distress defined in Section 4.2 as the dependent variable. The right hand side variables are chosen to capture bank performance, capital adequacy, asset quality, liquidity, exposure to risk and the maturity and composition of liabilities. Specifically, I include log of assets, capital ratio, log of bank loans to industry, the ratio of foreign reserves to foreign deposits and dummies for being a universal bank and a big Berlin bank.

[52] Liquidity is defined as sum of cash, deposits at central banks, checks, bills and inter-bank loans over deposits and acceptances.

[53] In the analysis of bank balance sheets, medium-term deposits can be used as a proxy for foreign debt. "Cash credits were placed in German banks by foreign industry and trade, and by foreign banks, as demand deposits or as deposits for a fixed period of time, from one to three months." Northrop(1938), p148.

[54] See White (1984), Calomiris and Mason (1997) and Wheelock (1992).

The distress variable can be coded as 0 or 1, in which case, a log-likelihood function can be written as:

$$\log L = \sum_{i=1}^{n} \{y_i \log F(\beta' \mathbf{x}_i) + (1 - y_i) \log[1 - F(\beta' \mathbf{x}_i)]\}, \tag{1}$$

where y_i equals 1 if the event occurs, $\mathbf{x}_i$ is a vector of regressors for bank i (including potential bank and time fixed effects), and $F(\cdot)$ is an appropriate c.d.f.

Given the logistic distribution, the probability of failure is:

$$Prob(Distress_t = 1|X_t) = \exp(\beta' X_t)/1 + \exp(\beta' X_t), \tag{2}$$

and the probability of survival is:

$$Prob(Distress_t = 0|X_t) = 1/1 + \exp(\beta' X_t), \tag{3}$$

The ratio of (2) over (3) is the odds ratio in favor of failure, where β measures the change in the logs-odds ratio for a unit change in X_t. However, the marginal effect of a regressor on the dependent variable, is different from β and is given by:

$$\partial(Prob(Distress_t = 1|X_t))/\partial(X_t) = \beta \cdot \left(\frac{\exp(\beta' X_t)}{1 + \exp(\beta' X_t)} \right) \cdot \frac{1}{1 + \exp(\beta' X_t)}, \tag{4}$$

Note that equation (4) will vary with X_t. The marginal effects are calculated at the mean of the regressors. Thus, the marginal effect of a regressor measures the change of the likelihood of the failure given a change in one unit of the regressor from its mean.

Table 12 presents estimates for various specifications. These specifications uses the ratio of foreign reserves to foreign deposits to control for the role of foreign deposits in creating a vulnerability for banks. The second specification adds macroeconomic variables to bank fundamentals used in the first one. Table 13 uses the ratio of foreign deposits to deposits and log of foreign reserves separately. The coefficients and marginal effects, calculated at mean values of the regressors, are reported. The direction of the effect of the variables on the probability of failure can be inferred from the signs of the coefficients of the estimates. For example, a positive sign indicates an increase in the probability of failure. However, the magnitude of

the effect of the variables on the likelihood of failure is determined by their marginal effects. The marginal effect of a variable measures the change in terms of probability points, caused by a change in one unit of the regressor from its mean.

The dummy for universal banks suggests that being a universal bank raises the probability of failure. Universal banks were more exposed to risk because of their close ties to industry and riskier lending policies. Universal banks had lower liquidities and capital ratios and higher levels of foreign debt than other banks, but the fact that this coefficient dummy is still significant after controlling for other effects implies that the universal character of the German banking system played a role in the banking crisis.

The natural logarithm of assets is used as a proxy for bank size. It is generally expected that banks with smaller asset size are more vulnerable to crises owing to poorer portfolio diversification. Large banks are better able to diversify their loan portfolios, reducing their asset risk. The coefficients for this variable show, consistent with the hypothesis, a large size decreases the probability of failure. Furthermore, a one percent increase in log assets decreases the probability of failure by 0.01 probability points.

The results also show that higher capital ratio decreases the probability of failure and is significant. A lower equity ratio entails higher risk taking and makes a bank more vulnerable to failure. I also include a dummy for capital adjustment made in the last 11 months. This analysis shows that banks with changes to their capital base were more likely to experience trouble.

Next, I add variables to test for the importance of foreign deposit withdrawals. Foreign deposit withdrawals are cited as a large reason for the trouble German banks experienced during the Great Depression. Having access to foreign capital strengthens a bank but it makes it more vulnerable in times of capital outflows. However, it is not sufficient just to look at the liability side of a balance sheet without considering the asset side. Thus, I also consider *nostrobalances*, which represents reserves held against foreign deposit liabilities. In specifications (1) and (2) from Table 12, the ratio of these reserves to foreign deposits are included and it is negative even after controlling for macroeconomic variables. Having reserves on the asset side to back up foreign liabilities protects banks from the consequences of heavy foreign deposit withdrawal. A one percent increase in foreign liability coverage decreases the probability of failure by 0.001 probability

points.

As a robustness check, in Table 13, the ratio of foreign deposits to deposits and log of foreign reserves are included separately and both decrease the probability of failure. This result, again, reflects that foreign liability coverage protected banks from failure.

I also include balance sheet variables designed to capture the close industry ties of universal banks in order to differentiate the effect of these characteristics on failure. One such variable is current account advances, which reflects bank loans to industry. Current account credit is a combined demand deposit and line of credit. It is used to provide fixed and working capital to firms and is covered by securities quoted on stock exchange or mortgages and insurance policies. In all the specifications, the log of industrial debt is positive and significant. This implies that higher loans to industry increases the probability of failure. This result is in line with the universal banking hypothesis that the frozen loans to industry hurt banks by worsening their balance sheets.

Including measures of liquidity shows that higher liquidity reduced the probability of failure. Illiquid banks were much more vulnerable to shocks. Faced with deposit withdrawals, banks turned to the Reichsbank to discount their bills which made up of a large part of the liquid assets of German banks in the 1920s. The Reichsbank, however, refused to discount bills in fear of going off the gold standard. So, a large number of bills may make a bank more vulnerable during a crisis as banks might have made riskier loans thinking that the Reichsbank would act as a lender of last resort. The results indicate a positive effect, i.e., having a large amount of bills increases the likelihood of failure.

Finally, macroeconomic variables such as corporate failures, stock market index (1928=100), the discount rate of the Reichsbank, and the gold cover of the Reichsbank that are included in specifications (2) in Tables 12 and 13 to capture the aggregate economic environment that was prevailing at the time, have the expected signs. Corporate failures and the higher discount rate should increase the probability of bank failure and increases in the stock market index and the gold cover should decrease it. I use one month lag for these variables because they should influence banks with a time lag.

The sign of the stock market index is negative as expected. A higher stock market index decreases the

probability of failure. Given that universal banks held a lot of industry stocks, this was another channel through which their balance sheet was affected during the Great Depression. An increase in the number of business failures increases the probability of bank distress. This finding is expected given the theory that the inability of firms to repay their loans worsened bank balance sheets. Furthermore, a higher central bank discount rate increases the probability of failure by making it costlier for banks to borrow and a higher unemployment rate reflecting the decline in economic activity also increases the likelihood of bank failure.

Finally, Table 14 repeats the regression with bank fixed effects and time dummies. In different specifications, I experiment with including a time trend and annual time dummies. Including bank fixed effects to control for heterogeneity across banks in specification (1) and time dummies in specification (2) do not change results. When bank fixed effects are included together with time dummies in specification (4), most variables become insignificant. Being a large bank and having a high capital ratio still decrease probability of distress.

Thus, this section shows that after controlling for macroeconomic variables, bank fundamentals are important in determining which banks experienced trouble during the Great Depression. Specifically, the troubled banks have high levels of short-term foreign deposits, high levels of lending to industry and low levels of capital and liquidity ratios. This supports my arguments that foreign capital inflows enabled banks to lend carelessly on low capital ratios and delayed the banking crisis by masking the fundamental weaknesses in the banking sector.

5 Conclusion

I analyze the German Depression by linking the political and economic developments of the 1920s to what happened in the summer of 1931. The deep origins of the German banking crisis lie in the structural changes resulting from WWI and the hyperinflation of 1923. Germany faced high reparations and reconstruction costs that it was unable to finance, especially after the hyperinflation wiped out a large part of Germany's saving capacity. Since domestic capital was insufficient to meet the demands of private and public institutions, the economy relied on foreign capital between 1924 and 1928. Foreign capital was used to rebuild the economy

and to repay the reparation obligations.

There were two problems with this. First, banks did not have good fundamentals such as high capital and liquidity ratios, and these weaknesses were masked by the inflow of foreign capital that enabled banks to continue lending. Second, most of the foreign capital was short-term and subject to sudden withdrawals. When economic activity declined in Germany and the United States, and domestic and international political problems and fears of German default on its debt or devaluation led to withdrawals of these short-term deposits, the banking system collapsed. While currency factors played a role in the banking crisis through the inflow and outflow of foreign capital, bank fundamentals were critically important for determining which banks failed. Dependence on foreign capital, insufficient capital and liquidity ratios and imprudent lending practices as a result of competition and the close ties of banks to industry all contributed to a high probability of failure. As a result, the banking crisis increased the length and the severity of the German depression.

This interwar German experience can be used to draw inferences about recent events. The frequency and the severity of the banking and currency crises of the 1990s were only matched by those of the 1930s.[55] In particular, given similarities in reliance on short term foreign debt, poor banking regulation and the close connections between banks and industry, there is a close analogy between the European experience in the 1930s and the East Asian crisis of the late 1990s.[56]

According to Montiel and Reinhart (1999), high interest rates induce larger net flows and a higher share of interest sensitive short-term flows. These flows, in turn, make a country vulnerable to shifts in credit and cyclical conditions. Both episodes witnessed large scale foreign capital inflows while these regions were attractive to foreign investors due to their high yields, promising futures and the confidence created by their fixed exchange rate regimes in conjunction with the belief that banks would be bailed out in case of crises (the too big to fail problem).

Another feature in common to these two episodes was that foreign borrowing was mainly short-term and went predominantly through banks, heightening the fragility of the economy.[57] Germany in 1931 and Korea

[55] See Bordo, et al. (2001).

[56] See Goldstein (1998) for an analysis of the Asian crisis.

[57] Goldstein and Hawkins (1998) claims that the composition of external debt is much more important than the size of the debt in determining the vulnerability to crises Between 1990 and 1996, 50 % of capital flows into Thailand were short-term and between 1994 and 1997, this ratio was 62 % for Korea.

in 1997 both depended on short-term foreign capital as a result of government policies that attempted to control foreign capital flows. For example, the Korean government discouraged long-term borrowing because it did not want large Korean corporations to be sold off, even in part, to foreign investors. Instead, it allowed, indeed encouraged, the banks to take 30 to 90 day deposits from abroad.

Furthermore, expectations of bailouts by lenders make banks less cautious in their lending policies.[58] This is especially true if there is relationship banking. In both instances, there was the close link between banks and industry. In the 1920s, the foreign capital led some banks, most notably the Credit Anstalt of Austria, to undertake unsound lending. Similarly Asian banks believed that their debt would be rolled over indefinitely, and financed long-term investments that were not productive. This created a source of vulnerability in both episodes as liquidity and currency mismatches between deposits and loans made banks more vulnerable to attacks.[59] Given this dependence on short-term foreign deposits, central banks in both instances were then faced with the dilemma of using precious reserves to protect the banking system or to defend the exchange rate when capital fled.

A final parallel between interwar Germany and East Asia in 1997 is that authorities failed to address these dangers since they lacked a sound system of bank supervision and regulation. Such buildup of lending booms, liquidity and currency mismatches in bank balance sheets and connected loans to industry (together with concentration of credit risks) could have been avoided with a good regulatory system.[60]

The parallels between the 1931 crisis in Germany and the 1997 crisis in Asian highlight the importance of regulation of the banking system and hedging against short-term foreign capital reversals for financial stability. As this study shows, these issues have resonated throughout history – both the far and recent past. Furthermore, other emerging economies still face fragility in their banking sectors. Therefore, it is important for regulators to pay attention to composition of foreign borrowing (in terms of maturity and currency denomination), lending booms with bad loans, and bad fundamentals in the banking system such as low capital ratios. In monitoring banking systems (both at the aggregate and individual bank levels),

[58] See Dooley (1997) for this view.
[59] See Calvo and Goldstein (1996) for this argument for the case of Mexico in 1994 and Ito (1999) for the case of Korea.
[60] See Lincoln (1997), Goldstein (1997) and Fund (1998) for the importance of banking regulation weaknesses in emerging economies.

drawing evidence from historical episodes can help formulate the correct policy prescriptions to avoid future crises.

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Table 1: Germany and the rest of Europe: 1924-1930, ($m to the nearest $10m)

Balance of Payments	**Germany**	**Other Debtors**	**Total**
1. Current Account Balance	-3620	-2810	-6430
2. Gold and Foreign Currency	-570	-790	-1360
3. Total Capital Movement	-4190	-3600	-7790
Capital Transactions			
Long-Term Capital			
4a. New Bond Issues Abroad	1610	1790	3400
Central and Provincial Govn'ts	470	1030	1500
Municipalities	160	210	370
Corporations	980	550	1530
4b. New Share Issues Abroad	90	240	330
5. Less: Repayments of Debt	-260	-530	-790
6. Direct Inward Investment	120	200	320
7. Foreign Purchases of	1350	0	1350
Domestic Securities and Real Property			
8. Other Capital Flows	30	420	450
9. Less:Investment Abroad by Debtors	-1050	-150	-1200
Net Long-Term Capital Movement	1890	1970	3860
Short-Term Capital			
10. Increase in Assets	-1050		
11. Increase in Liabilities	3450		
Net Short-Term Capital Movement	2400	1150	3550
12. Total Capital Movement	4290	3120	7410
Errors and Omissions	-100	480	380

Note: Other European debtors are France, Austria, Italy, Romania, Poland, Hungary, Greece, Belgium, Norway, Yugoslavia, Bulgaria, Finland, Denmark, Estonia, Latvia, Lithuania and Ireland.
Source: Feinstein and Watson (1995).

Table 2: Volume of Savings (in millions of Reichsmark)

		Volume of Domestic Capital Issue	
Year	Total Savings	Bonds	Stocks
1924		440	148
1925	1629	1080	656
1926	3091	3579	988
1927	4665	2841	1438
1928	6990	2905	1339
1929	9016	1553	979
1930	10400	2667	555
1931	9722	1333	784
1932	9917	558	145

Source: Statistisches Reichsamt: Statistisches Jahrbuch für das Deutsche Reich, 1928-1932, *Institut für Konjunkturforschung: Konjunkturstatistisches Handbuch*, 1926-1933.

Table 3: Private Discount Rates on Prime Bankers' Acceptances

Year	Berlin	London	Paris	New York
1913	4.98	4.39	3.84	5.58
1924	9.20	3.46	5.21	3.11
1925	7.62	4.13	5.77	3.32
1926	4.88	4.46	5.66	3.59
1927	5.47	4.23	2.91	3.45
1928	6.54	4.16	2.98	4.10
1929	6.87	5.26	3.46	5.03
1930	4.43	2.57	2.32	2.46
1931	6.19	3.60	1.57	1.58
1932	4.95	1.88	1.31	1.31

Note: Annual averages. *Source:* Statistisches Jahrbuch.

Table 4: German Debts, July 1931 (in billions of RM)

	U.S.A.	**U.K.**	**Holland**	**Switzerland**	**Others**	**Total**
German banks to banks	1.7	1.1	0.4	0.6	1.1	4.9
Banks to industry	0.4	0.5	0.8	0.5	0.2	2.4
Banks to public bodies	0.1	0.06	0.02	0.06	0.06	0.3
Banks to Reichsbank	0.2	0.02			0.38	0.6
Total Bank Debts						8.2
Industry to Industry	0.5	0.3	0.6	0.3	0.9	2.6
Industry to banks	0.2	0.04	0.2	0.3	0.2	0.94
Total						19.94

Source: Economist, Reparations and War Debts Supplement

Table 5: Net Inward or Outward Payments on Account of Principal International Transactions

Year	Goods and Services	Gold	Long-term Capital	Short-term Capital
1924	-405	-60	238	227
1925	-715	-12	289	549
1926	-23	-153	346	-170
1927	-1013	-24	424	613
1928	-747	-220	426	541
1929	-572	90	157	325
1930	-126	-3	266	-137
1931	266	274	43	-583
1932	60	43	3	-106

Source: International Capital Movements During the Interwar Period*, p19.*

Table 6: Short-Term Debt of Germany

	(in billions of Reichsmarks)	
	Short-Term	Long-Term
Banks	1.234	6.442
Financial Companies	.669	.524
Traders and Industrialists	.203	1563
Other Creditors	8.075	.818

Source:Report of the Second Basle Committee.

Table 7: Components of the Short-Term Debt of Germany, (in billions of Reichsmark)

	Dec-30	Jul-31
Public authorities	1.1	0.8
Banks	7.2	5.1
a) Current accounts and acceptance liabilities	7	
b) Other liabilities	0.2	
Other short-term liabilities	2	1.5
Total	10.3	7.4

Source: Report of the First Basle Committee, 1931.

Table 8: Comparison of Pre-1930 and Post-1930 Means

Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Universal Banks		**Pre-1930**			**Post-1930**	
First Order Liq.	1538	0.0295	0.0210	751	0.0241	0.0191
Second Order Liq.	1530	0.3361	0.1394	740	0.2815	0.1227
Sec/Assets	2915	0.0480	0.0815	2273	0.0562	0.0976
For.Dep. Gr	1360	0.0354	0.4758	2062	-0.0194	0.2662
State Banks						
First Order Liq.	143	0.0212	0.0326	190	0.0128	0.0118
Second Order Liq.	138	0.4005	0.1577	190	0.3045	0.1119
Sec/Assets	552	0.0312	0.0312	465	0.0392	0.0304
For.Dep. Gr	259	0.0592	0.3490	411	-0.0220	0.2655
Clearing Banks						
First Order Liq.	66	0.2451	0.3112	180	0.0112	0.0135
Second Order Liq.	63	1.0648	1.4121	173	0.1601	0.1189
Sec/Assets	388	6.3905	0.6272	396	0.0501	0.0419
For.Dep. Gr	223	-0.0153	0.2710	351	-0.0279	0.1953

Source: Deutscher Reichsanzeiger und Preußischer Staatsanzeiger.

Table 9: Timing of Distress

Variable	Obs	Mean	Std. Dev.	T-Tests
		Liquidity		
Distress after 1929	1797	0.253	0.079	
Distress before 1930	259	0.263	0.037	-3.395
No Distress	9424	0.345	0.071	-45.616
		Capital		
Distress after 1929	1826	1.082	2.864	
Distress before 1930	379	0.169	0.020	13.619
No Distress	9576	0.975	1.871	1.5312
		Foreign Deposits		
Distress after 1929	1826	1.657	2.776	
Distress before 1930	379	0.362	0.093	19.879
No Distress	9576	2.211	3.537	-7.446
		Foreign Liability Coverage		
Distress after 1929	1826	0.454	0.564	
Distress before 1930	379	0.282	0.364	7.471
No Distress	9576	1.044	3.675	-14.836

Source: Deutscher Reichsanzeiger und Preußischer Staatsanzeiger.

Table 10: Relationship between Foreign Deposits and Lending Behavior

	(1)	(2)
	1925-1928	1929-1932
Initial For. Dep/Dep.	0.072***	-0.184***
	(0.024)	(0.020)
Capital Ratio	0.192***	0.048***
	(0.028)	(0.018)
Universal Dummy	0.076	0.611***
	(0.050)	(0.034)
Discount Rate	-0.016	0.019**
	(0.027)	(0.008)
Big bank Dummy	-0.001	-0.098***
	(0.027)	(0.023)
Stock Market Index	0.003***	0.001
	(0.001)	(0.001)
Constant	0.079	-1.569***
	(0.322)	(0.166)
Observations	2651	4362
R-squared	0.20	0.24

Notes: The dependent variable is Loan/Assets. Standard errors in parentheses,* significant at 10%; ** significant at 5%; *** significant at 1%.
Source: Deutscher Reichsanzeiger und Preußischer Staatsanzeiger.

Table 11: Means For Surviving and Distressed Banks

	For. Res/For. Dep.		*Industry Debt*	
	No distress	Distress	No distress	Distress
1925m2	0.85	1.06	8.10	8.68
1928m2	0.44	0.33	9.01	9.52
1929m3	0.30	0.28	9.29	9.50
1930m3	0.33	0.25	8.96	9.19
1931m2	0.38	0.19	9.01	9.44
1931m3	0.36	0.20	9.00	9.42
1931m4	0.33	0.16	8.97	9.43
1931m5	0.38	0.18	8.92	9.59
1931m6	0.37	0.20	8.97	9.92
1931m7	0.39	0.17	8.94	9.71
1931m8	0.43	0.17	8.91	9.67
1931m9	0.45	0.17	8.91	9.89
1931m10	0.44	0.18	8.89	10.01
1931m11	0.48	0.23	8.87	10.13
	Liquidity Ratio		*Capital Ratio*	
	No distress	Distress	No distress	Distress
1925m2	0.39	0.41	0.22	0.23
1928m2	0.32	0.26	0.17	0.18
1929m3	0.34	0.27	0.15	0.15
1930m3	0.34	0.25	0.18	0.18
1931m2	0.33	0.32	0.18	0.18
1931m3	0.33	0.20	0.18	0.19
1931m4	0.33	0.20	0.19	0.19
1931m5	0.33	0.19	0.19	0.17
1931m6	0.31	0.17	0.20	0.15
1931m7	0.33	0.16	0.20	0.16
1931m8	0.31	0.17	0.20	0.17
1931m9	0.30	0.16	0.21	0.16
1931m10	0.29	0.18	0.21	0.15
1931m11	0.32	0.18	0.21	0.16

Source: Deutscher Reichsanzeiger und Preußischer Staatsanzeiger.

Table 12: Determinants of Likelihood of Bank Failure

	(1)		(2)	
	Estimates	Marg. Effects	Estimates	Marg. Effects
Universal Dummy	0.135	0.000137	0.427*	0.00136
	(0.233)		(0.242)	
Log Assets	-0.911***	-0.00096	-1.174***	-0.00413
	(0.262)		(0.246)	
Capital/Assets	-0.111**	-0.00012	-0.511*	-0.00136
	(0.056)		(0.307)	
For. Res/For.Dep	-0.785***	-0.000982	-0.510**	-0.00023
	(0.286)		(0.212)	
Log Industrial Debt	1.469***	0.001541	1.799***	0.00632
	(0.277)		(0.266)	
Cap. Adj. Dummy	0.927***	0.001456	0.097	0.000354
	(0.201)		(0.216)	
Big Bank Dummy	-0.996***	-0.0007	-1.446***	-0.0029
	(0.354)		(0.395)	
Stock Market Index			-0.038***	-0.00013
			(0.011)	
Corp. Failures			0.000**	1.61E-06
			(0.000)	
RB Discount rate			0.136**	0.000477
			(0.057)	
Unemployment Rate			0.073***	0.000256
			(0.028)	
Constant	-7.556***		-8.470***	
	(0.723)		(1.594)	
Observations	6845		6854	
Log-likelihood:	-651.55		-539.37	
pseudo-R^2:	0.12		0.28	

Notes: Standard errors in parentheses,* significant at 10%; ** significant at 5%; *** significant at 1%. *Source:* Deutscher Reichsanzeiger und Preußischer Staatsanzeiger.

Table 13: Robustness Check: Determinants of Likelihood of Bank Failure

	(1)		(2)	
	Estimates	Marg. Effects	Estimates	Marg. Effects
Universal Dummy	0.137	0.001586	0.457*	0.00321
	(0.253)		(0.260)	
Log Assets	-0.736***	-0.0088	-0.950***	-0.00734
	(0.236)		(0.241)	
Capital/Assets	-0.529**	-0.00632	-0.003	-2.5E-05
	(0.267)		(0.080)	
Log Industrial Debt	1.812***	0.02165	1.890***	0.14611
	(0.270)		(0.276)	
Cap. Adj. Dummy	0.533**	0.007718	0.019	0.000148
	(0.208)		(0.221)	
Big Bank Dummy	-0.928**	-0.00763	-1.422***	-0.00635
	(0.396)		(0.430)	
For.Dep/Dep.	-3.072***	-0.03672	-1.629**	0.01259
	(0.674)		(0.686)	
Log For. Reserves	-0.423***	-0.00505	-0.272***	-0.00210
	(0.066)		(0.070)	
Stock Market Index			-0.046***	-0.00036
			(0.013)	
Corp. Failures			0.001***	0.00000
			(0.000)	
RB Discount rate			0.191***	0.00010
			(0.072)	
Unemployment Rate			0.042	0.00032
			(0.050)	
Constant	-9.916***		-5.266**	
	(0.876)		(2.424)	
Observations	4629		4632	
Log-likelihood:	-538.56		-469.34	
pseudo-R^2:	0.15		0.26	

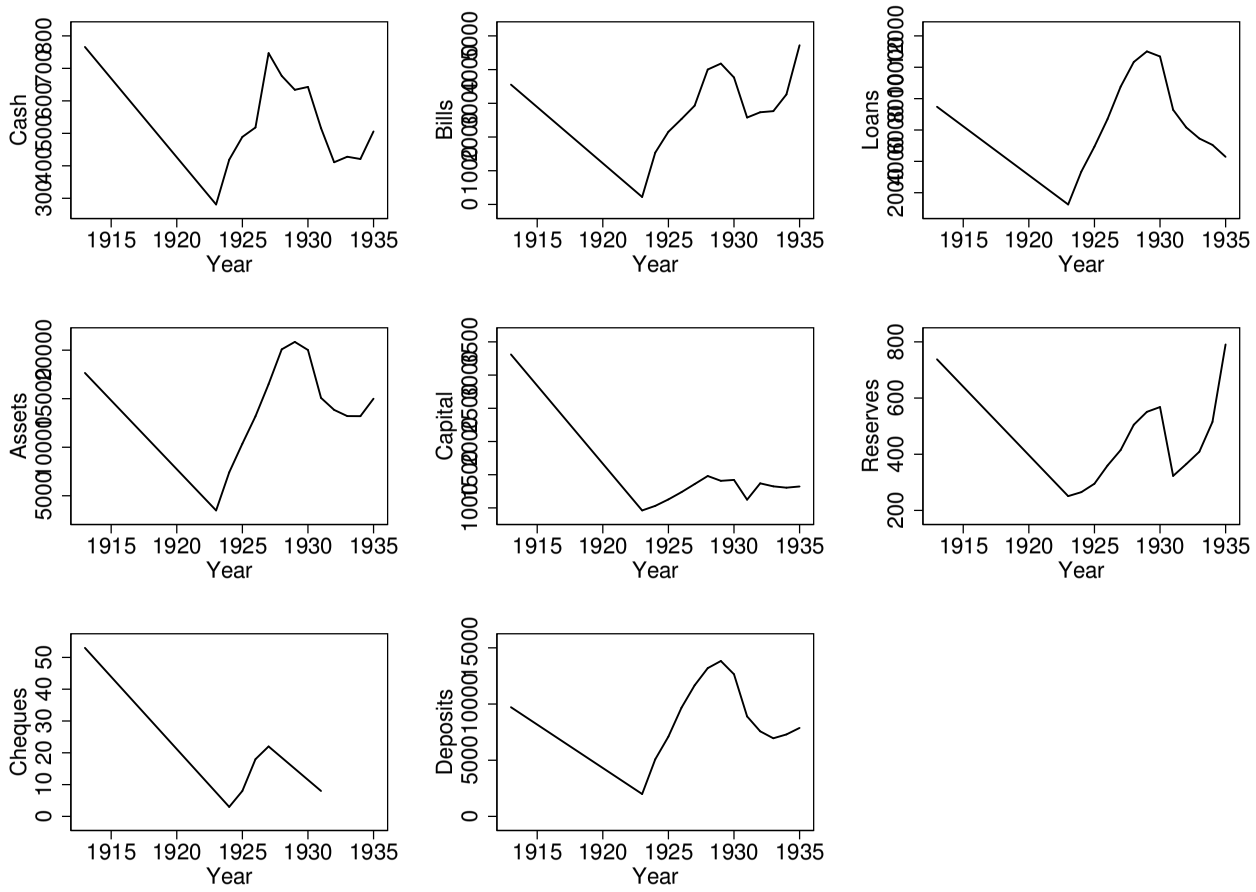
Notes: Standard errors in parentheses,* significant at 10%; ** significant at 5%; *** significant at 1%. *Source:* Deutscher Reichsanzeiger und Preußischer Staatsanzeiger.

Table 14: Failure Determination Again, Including Bank and Time Dummies

	(1)	(2)	(3)	(4)
Log Assets	-6.299***	-1.053***	-2.425	-3.720**
	(0.953)	(0.232)	(2.802)	(1.746)
Capital/Assets	-4.055***	-1.565*	-1.217	-12.055*
	(0.611)	(0.942)	(1.837)	(6.684)
For. Res/For.Dep	-1.841***	-2.029***	-0.520	-1.449
	(0.508)	(0.684)	(1.986)	(1.316)
Log Cur. Acct.	6.070***	1.560***	1.048	0.564
	(0.892)	(0.249)	(1.475)	(0.624)
Time Trend			0.787***	
			(0.128)	
Annual Dummy,1929		-2.062***		-30.750***
		(0.383)		(11.693)
Annual Dummy,1930		-1.452***		-26.507**
		(0.295)		(11.987)
Annual Dummy,1931		0.528***		
		(0.190)		
Bank Dummies	Yes	No	Yes	Yes
				(4.333)
Constant	0.286	-6.648***	-49.351**	52.263
	(3.681)	(0.664)	(22.201)	(0.000)
Observations	1297	4229	1297	801
Log-likelihood:	-309.48	-538.84	-85.02	-122.96
pseudo-R^2:	0.35	0.19	0.82	0.69

Notes: Standard errors in parentheses,* significant at 10%; ** significant at 5%; *** significant at 1%. *Source:* Deutscher Reichsanzeiger und Preußischer Staatsanzeiger.

Figure 1: Balance Sheet Variables, All Banks

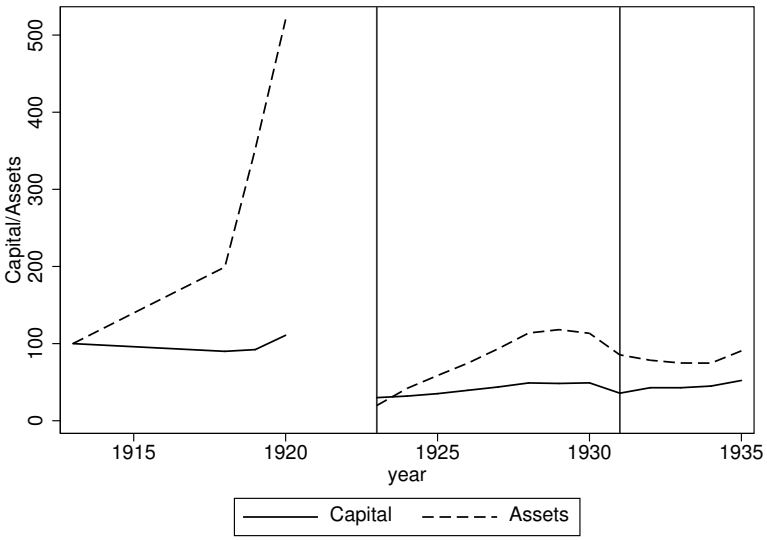


Source: League of Nations, *Commercial Banks*.

Figure 2: Capital Ratios

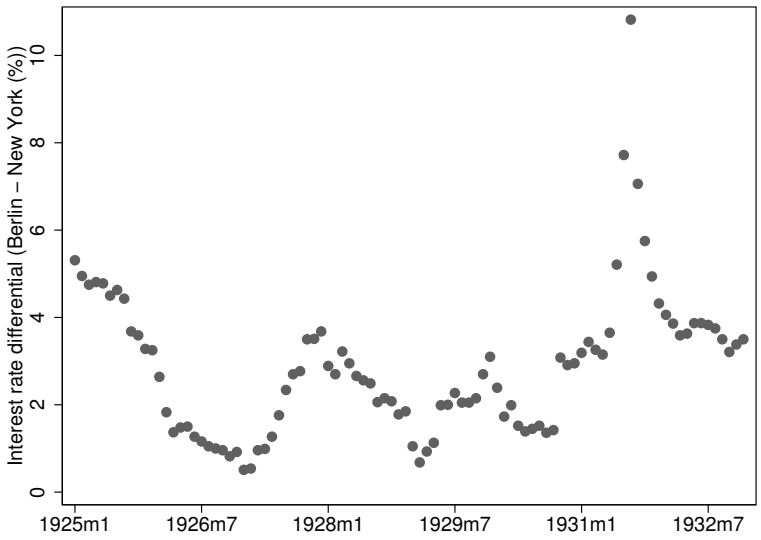
Source: League of Nations, *Commercial Banks*.

Figure 3: Capital and Assets



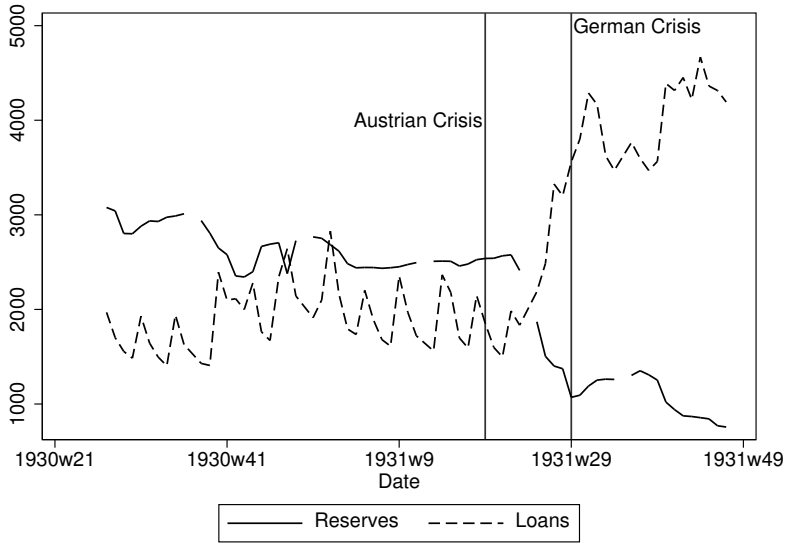
Source: League of Nations, *Commercial Banks*.

Figure 4: Interest Rate Differentials between Berlin and New York



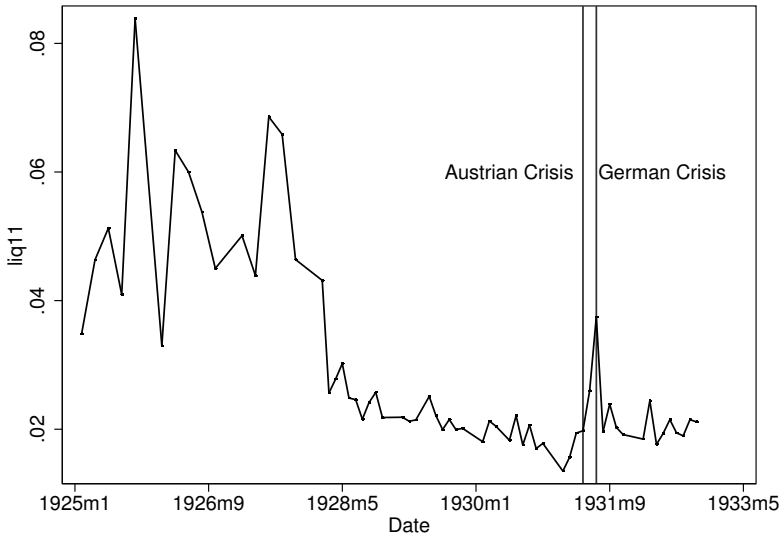
Source: Balderston (1993)

Figure 5: Reichsbank Reserves and Loans, in billions of Reichsmark



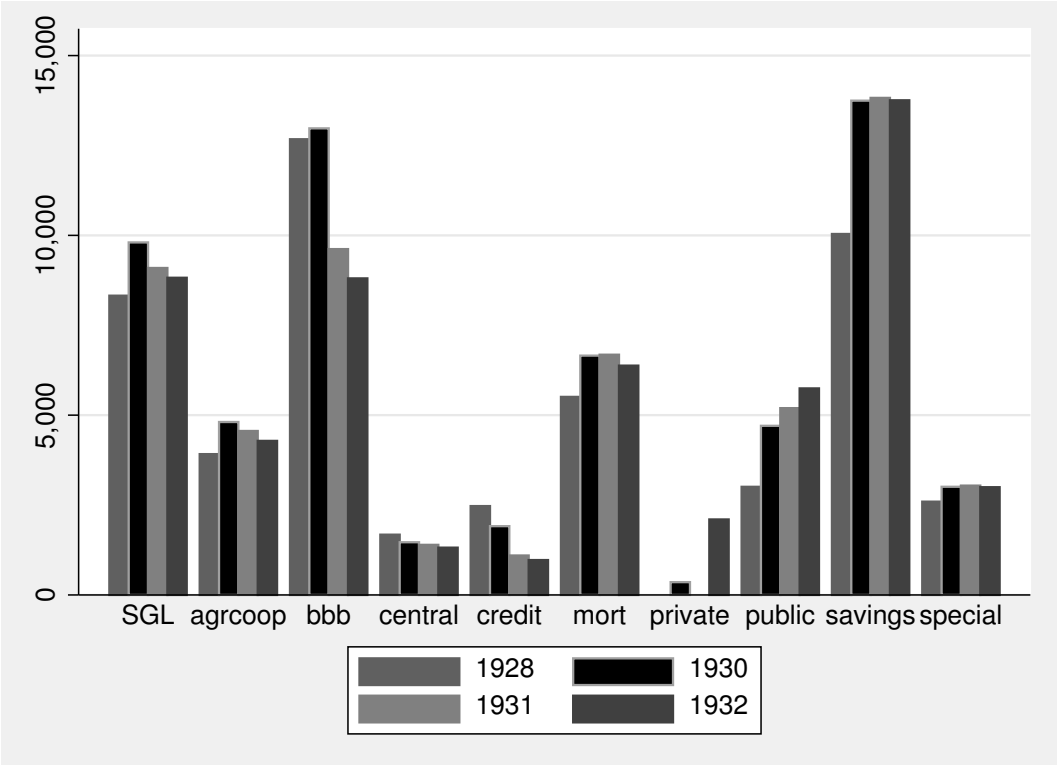
Source: Institut für Konjunkturforschung: Konjunkturstatistisches Handbuch (1933).

Figure 6: Cash Liquidity, All Banks



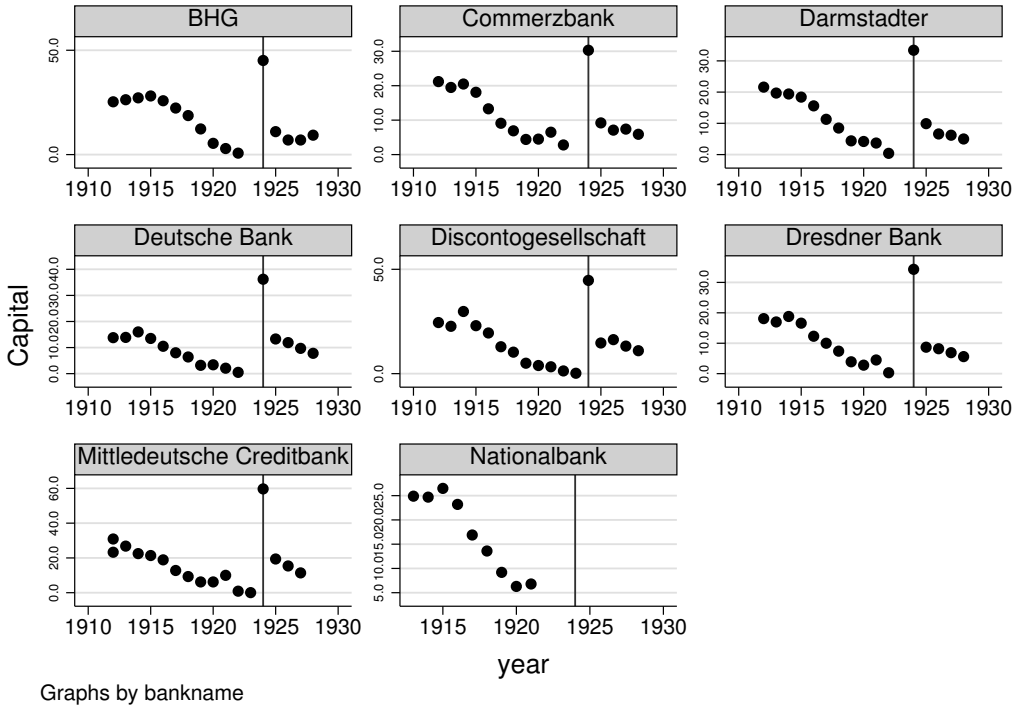
Note: Cash liquidity = Cash + Deposits at the central bank)/Deposits.

Figure 7: Total Assets across Bank Types, in billions of Reichsmarks



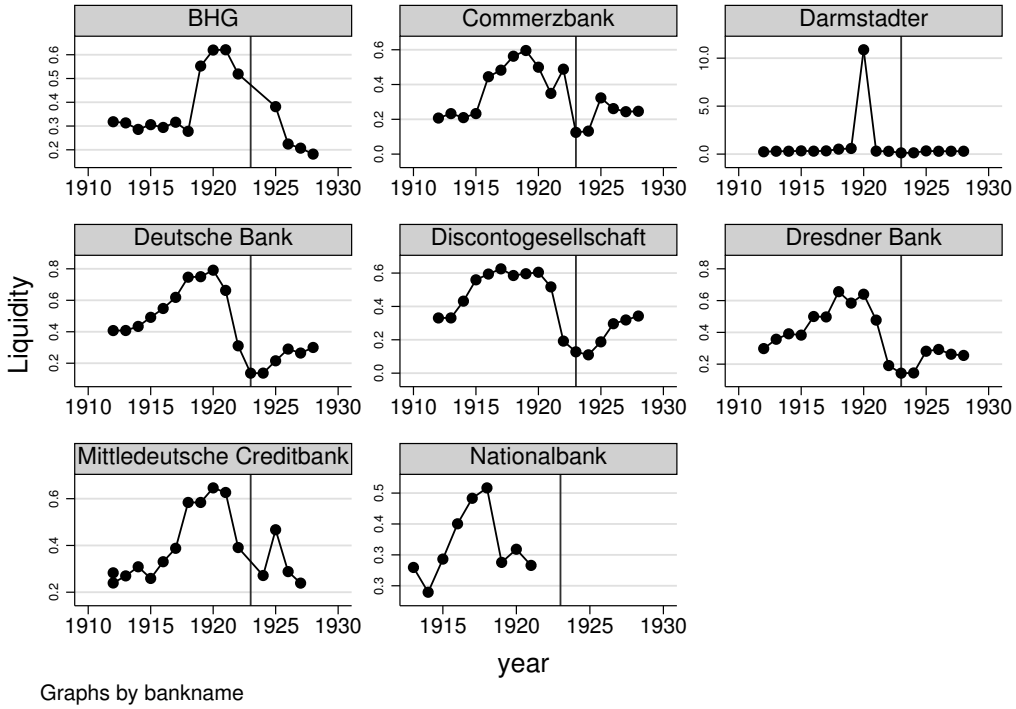
Source: Deutsche Bundesbank: Deutsches Geld und Bankwesen in Zahlen (1976).

Figure 8: Capital/Liabilities of the Great Banks, 1912-1928



Source: Whale (1930).

Figure 9: Liquidity of the Great Banks, 1912-1928



Source: Whale (1930).

A Variable Definitions

Variable	Description
Foreign Liability Coverage	Foreign Reserves/Foreign Deposits
Current Account	Loans to Industry
First order Liquidity/ Cash liquidity	(Cash + Deposits at the central bank)/Deposits
Second order Liquidity	(Cash + Deposits at the central bank + Cheques + Bills+ Interbank Loans)/Deposits
Capital Ratio	Capital/Assets
Foreign Deposit Growth	
Endorsement Growth	
Security Ratio	Securities/Assets
Big Bank Dummy	Dummy=1 if bank is one of the 6 big Berlin banks
Log Assets	
Branch Dummy	Dummy=1 if bank has a branch
Berlin Dummy	Dummy=1 if bank is in Berlin
Universal Dummy	Dummy=1 if bank is universal
Capital Adjustment	Dummy=1 if a cap. adjustment made in the past year
Discount Rate	
Stock market index	
Gold cover	
Corporate Failures	

B Balance Sheet Variables

Assets

1. Unpaid Capital
2. Cash, foreign currency and interest coupons due

   Balances at note issuing and clearing banks

3. Total
4. Of this total, at German note-issuing banks only

   Checks, bills and non-interest bearing short-term treasury bills

5. Checks and bills (without items (a), (b), 6-8)
   non-interest bearing short-term treasury bonds and treasury bills issued by the Reich and the Länder
   (a) Total
   (b) Of these rediscountable at the Reichsbank
6. Own acceptances
7. Own drawings
8. Promissory notes drawn by customers payable to bank's order

9. Total (5, (a), 6-8)

Balances at other banks due in less than 3 months

10. Total
11. Due in less than 7 days

Reports and Lombard loans against quoted stock exchange securities

12. Total
13. Of this, Reports only

Advances on shipped or stocked goods

14. Acceptance credits
    (a) secured by shipping and warehouse warrants
    (b) secured by other securities
    (c) without real security
    (d) total (items (a)-(c))
15. Other short-term credits on pledge of defined marketable goods
16. Total ((d) and 15)

Own Securities

17. Loans and interest bearing T bonds of Reich and Lander
18. Other securities pledgeable at the Reichsbank or other central banks
19. Other quoted securities
20. Other securities
21. Own securities total (items 17-20)
22. Participations in issuing syndicates
23. Permanent Participations in other banks

Current Account Advances

24. Total
    (a) Credits to banks, savings banks and other credit institutions
    (b) of total covered by the stock market tradable securities
25. Covered by other securities
26. Long-term loans against mortgage backing or communal backing
27. Bank buildings

28. Other buildings
29. Other assets
30. Sum of assets (1-3, 9, 10, 12, 16, 21, 22-24, 26-29)
31. Claims as guarantor

Liabilities

1. Share capital
2. Reserves

Due to Creditors (Deposits, Current Account Balances)

3. Credit to customers obtained from other banks
4. due to German banks, savings banks and other German credit institutions
5. Due to other creditors
6. Sum due (items 4 and 5)
7. Total sum due (items 3 and 6)
   Of the total under item 6 are due
   (a) within 7 days
   (b) 8 days to 3 months
   (c) more than 3 months
8. Acceptances

Long-term Borrowings

9. Mortgages and local government bonds outstanding
10. Other long-term borrowing
11. Total long-term borrowing (items 9 and 10)
12. Other liabilities
13. Sum of liabilities (items 1, 2, 7, 8, 11, 12)
14. Guarantees given (bills outstanding on which the bank has a liability as drawer)

Contingent liabilities on indorsement

15. From bank acceptances passed onto third parties
16. From bills drawn on customers to the order of the bank
17. From other rediscounts
18. Total (items 15-17)

19. Of the total (item 18), due within at most 14 days

Liabilities on own drawings

20. Total
21. Of those on behalf of third parties