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One Bad Apple Spoils The Whole Bunch

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Abstract

The current literature is inconclusive on the relative importance of foreign and domestic factors in bringing about the Austrian financial crisis in 1931. This paper offers new data to bring further clarity to this issue and emphasises the importance of a domestic factor: universal banks' exposure to industrial enterprises. Industrial enterprises were the universal banks' main borrowers and creditors. During the 1920s they did not perform well, and made the universal banks insolvent. The Credit-Anstalt, which became an 'acquirer of last resort' for weak universal banks during the 1920s, may have avoided its own demise had it been spared of one bank's, the Unionbank's assets.

Keywords: Great Depression, banking crisis, Credit-Anstalt, 1931, Central Europe, Austria
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THE AUSTRIAN BANKING CRISIS OF 1931

ONE BAD APPLE SPOILS THE WHOLE BUNCH

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The current literature is inconclusive on the relative importance of foreign and domestic factors in bringing about the Austrian financial crisis in 1931. This paper offers new data to bring further clarity to this issue and emphasises the importance of a domestic factor: universal banks' exposure to industrial enterprises. Industrial enterprises were the universal banks' main borrowers and creditors. During the 1920s they did not perform well, and made the universal banks insolvent. The Credit-Anstalt, which became an 'acquirer of last resort' for weak universal banks during the 1920s, may have avoided its own demise had it been spared of one bank's, the Unionbank's assets.

The role of banks in bringing about crises has recently received renewed interests. What we have re-learned since 2007 is the banking system's enormous ability to hide insolvency behind liquidity. Even though banks may carry non-performing, perhaps 'sub-prime' loans, they can still continue to operate as long as they are liquid, and there is no regulator who would force them to write off these assets and raise new capital. It is hence theoretically possible that the number of defaulted borrowers only reveals itself once the crisis has already erupted. This has been particularly problematic during the Great Recession in the United States and researchers have identified the same problem in the context of the Great Depression of the United States.¹ This paper shows that a Central European country had the same experience in 1931.

The debacle of Austria's largest bank, the Credit-Anstalt (CA), was a global turning point in the Great Depression. The CA's losses were publicly announced on 11 May 1931, and in the following months not only Austria, but several other countries in Central Europe and beyond experienced financial distress. The gold exchange standard began to disintegrate, the international

¹ Eichengreen, *Hall of mirrors*; Postel-Vinay, 'What caused Chicago bank failures'.

flow of goods and capital became hindered by emerging trade and exchange system blocs, and what was previously a global recession deepened into a prolonged depression.²

What factors led to 11 May 1931? The historiography offers a number of explanations for the distress of the CA and the Austrian banking sector. One argument places the Austrian story into an international context and posits that the flight of foreign creditors played a pivotal role in bringing about the banking crisis.³ On the other hand, there are explanations which emphasize the domestic nature of the crisis.⁴

The purpose of this paper is to reassess the arguments of the historiography regarding the causes of the Austrian crisis in 1931 in light of new data compiled for this research. The paper presents two micro-level datasets. One includes the balance sheets and profit and loss statements of the financial system between 1925 and 1933, bank-by-bank. This dataset covers approximately 300 financial institutions for each year. The purpose of this dataset is to obtain a clear overview of the whole financial system, how it evolved in the years preceding the crisis, and how important foreign creditors were in sustaining this banking system. The other database incorporates the balance sheets and profit and loss statements for the ‘Konzerns’, in other words, the industrial network of four universal banks. These four banks - the Verkehrsbank (VB), the Unionbank (UB), the Boden-Credit-Anstalt (BCA), and the CA - were the universal banks, which experienced distress⁵ between 1925 and 1931. This dataset includes approximately 160-80 enterprises for each year. The purpose of this collection is to uncover the extent to which the Konzern, the heart of the universal bank, contributed to the distress of these four banks.

These data sources together allow a close insight into the factors that contributed to the failure of the VB, the UB, and the BCA in the 1920s, and the reasons that had led to the CA’s application for state support on 8 May 1931, and eventually to the demise of the Austrian banking system in 1931.

² Eichengreen, *Golden fetters*; Kindleberger, *The world in depression*; Obstfeld, ‘The Great Depression as a watershed’, pp. 12-25.

³ Eichengreen, *Golden fetters*, pp. 262-9; Fior, ‘The financial instability’, pp. 132-5; Kindleberger, *The world in depression*, pp. 145-7; Schubert, *The Credit-Anstalt*, pp. 33-9, 44-6.

⁴ Eigner, ‘Die Konzentration’, pp. 481-4; März, *Austrian banking*, pp. 347-66; Mosser and Teichova, ‘Investment behaviour’, pp. 122-57; Schubert, *The Credit-Anstalt*, pp. 35-40; Stiefel, ‘The bankers’ view’, pp. 10-2; Stiefel, ‘The reconstruction’, pp. 178-93; Stiefel, ‘For better, for worse’, pp. 178-93; Teichova and Cottrell, ‘Industrial structures’, pp. 31-55; Weber, ‘From imperial’, pp. 340-50; Weber, ‘Austrian banking’, pp. 76-98.

⁵ The paper defines distress as financial difficulties which end up in a failure, a merger with another bank, or a bailout.

The paper is structured as follows. The next section offers an overview of the historical context and the existing literature which is followed by an overview of the banking system. Afterwards, I discuss the financial system's exposure to foreign creditors, which is followed by the analysis of the sector's domestic creditors. Next, I assess the performance of the Konzerns of the four universal banks that discontinued their operations, and subsequently demonstrate that the Konzerns were at the heart of each bank's demise. The final section concludes.

HISTORICAL BACKGROUND AND LITERATURE

The Austro-Hungarian Monarchy was on the losing side after World War I and the Peace Treaties dismembered the Empire and deprived Austria of approximately two-thirds of its territory and population. The country was also liable to paying reparations to compensate the winners for their war losses and, since its assets were used as collateral against the reparations, the country could not borrow. In the immediate post-war period, the state hence resorted to using the printing press of the central bank to finance the expenses arising from the dislocation caused by the war.

The state's excessive reliance on central bank financing produced hyperinflation in the first two years of the 1920s. When the situation became untenable, the help of the League of Nations was sought and the economy was stabilized through a large foreign loan arranged by the international organization. The loan was conditional on a reconstruction scheme overseen by the League which implemented a new currency, the Austrian Schilling (AS), established an independent central bank, the Austrian National Bank (ANB), and, through very strict surveillance measures, ensured a balanced government budget.⁶ By 1924 Austria was back on its feet and its economy was guided by contemporary liberal economic tenets: a currency fixed to gold, free capital mobility, fiscal stringency, and a restrictive central bank.

What followed the stabilization was, according to the historiography, a 'borrowing binge'. The Austrian state as well as its banking system excessively exposed themselves to short-term foreign creditors during the second half of the 1920s.⁷ Banks borrowed short-term and in foreign currency and extended these resources to Austrian industry as long-term loans denominated in Austrian Schillings, thereby generating currency and maturity risks. Authors argue that, due to

⁶ Marcus, *Credibility, confidence*, pp. 1-93.

⁷ Eichengreen, *Golden fetters*, pp. 262-9; Fior, 'The financial instability', pp. 132-5; Kindleberger, *The world in depression*, pp. 145-7.

Central Europe's high levels of indebtedness, foreign creditors had been doubtful about the stability of Central European currencies even before the announcement of the CA's weak financials on 11 May 1931.⁸ When the largest Austrian bank's losses became known, foreign creditors started fleeing the financial system and the currency and maturity mismatches produced gaping holes in banks' balance sheets and brought about their demise. 'In Britain, Germany, Austria, and Hungary alike, the withdrawal of foreign deposits was the catalyst for the financial crisis that shattered the gold standard system.'⁹

The historiography also blames the fragility of Austrian financial institutions on a peculiar organizational structure, the universal bank, inherited from the period of the Austro-Hungarian Empire and familiar to researchers of the German financial system.¹⁰ Austria's largest financial institutions were universal in a sense that they combined commercial and investment banking activities as they were lenders as well as owners of industrial enterprises. Their links to industry had originated in the pre-1914 period and they all had their own Konzern: an industrial network into which the banks were invested either as shareholders or lenders, but in the majority of the cases, as both.¹¹ Most of Austrian industrial joint-stock corporations were under the majority ownership of one of the Austrian universal banks.¹² World War I and the subsequent years of hyperinflation further cemented the connections as banks converted much of their industrial loans into equity in order to preserve the value of their invested capital in the face of ever-rising prices.¹³ The strengthening tie between banks and industry, nevertheless, had serious repercussions. Authors argue that the stabilization arranged by the League of Nations brought about 'no real recovery after 1924',¹⁴ and hence Austrian universal banks were exposed to the

⁸ Eichengreen, *Golden fetters*, p. 261.

⁹ Eichengreen, *Golden fetters*, p. 262.

¹⁰ März, *Austrian banking*, pp. 347-66; Mosser and Teichova, 'Investment behaviour', pp. 122-57; Schubert, *The Credit-Anstalt*, pp. 38-9; Stiefel, 'The bankers' view', pp. 10-2; Teichova and Cottrell, 'Industrial structures', pp. 31-55; Weber, 'From imperial', pp. 344-50.

¹¹ Unfortunately, the definition of the Konzern is vague in the literature. It is not defined how long a universal bank needs to be financially connected to the industrial enterprise, how much financing it needs to provide to it, and in what form (equity or debt) before the latter 'officially' becomes the former's Konzern member. This paper defines Konzern members as those enterprises about which the universal bank made such a claim. The *Financial Compass*, 1926-35 has been consulted in order to identify the enterprises that the universal banks regarded as their own Konzern members.

¹² Rudolph, *Banking and industrialization*, p. 120.

¹³ Schubert, *The Credit-Anstalt*, pp. 33-5; Weber, 'From imperial', pp. 344-50.

¹⁴ Kindleberger, *The world in depression*, p. 144.

‘fitful performance’ of industry.¹⁵ This reduced banks’ profitability, and the loans provided to the Konzerns tied up financial institutions’ capital that otherwise could have sought more profitable enterprises.

Another explanation blames Austrian universal banks’ vulnerability on their excessive expansion to the non-Austrian geographies of the Austro-Hungarian Monarchy.¹⁶ Prior to World War I, Austrian universal banks were market leaders not only within Austria but across the whole territory of the former Austro-Hungarian Monarchy. The Peace Treaty of St. Germain, however, erected a wall across these connections in the form of new borders and, due to nostrification laws, the assets of the Austrian universal banks were exposed to the threat of confiscation. Despite the changes, Austrian universal banks sought to rebuild and maintain their former sphere of business influence. However, the pursuit of the ‘Danubian strategy’ had become increasingly burdensome for the large Viennese universal banks and required substantial investment. At the same time, it also promised low returns because Austrian banks’ affiliates could only compete in the ‘lemon’ segment abroad, which then increased the banks’ non-performing loan portfolio.¹⁷

Finally, some have pointed out that management and organizational problems at the CA, led to chaotic reporting and bad decision-making and this led to the bank’s collapse in 1931.¹⁸

The literature has extensively assessed the causes of this crisis but does not provide clear guidance on the relative importance of the various factors that played into Austrian banks’ distress. It is hence uncertain to what extent the crisis was due to the insolvency of the banking system resulting from domestic factors, rather than a liquidity crisis due to the flight of foreign capital. Schubert argues in connection with the CA’s distress that the departure of foreign creditors was the fundamental cause for the CA’s illiquidity, while the other factors explain the bank’s insolvency.¹⁹ The paper provides new data to re-assess these arguments not only in connection with the CA but also regarding the other universal banks that experienced distress in the 1920s, the VB, the UB, and the BCA.

My databases help me assess the impact of the universal banking structure and the flight of foreign creditors on these four banks’ insolvency and illiquidity. I will demonstrate that these

¹⁵ Weber, ‘Universal banking’, p. 19.

¹⁶ Eigner, ‘Die Konzentration’, pp. 481-4; Schubert, *The Credit-Anstalt*, pp. 35-6; Stiefel, ‘The reconstruction’, pp. 178-93; Weber, ‘Austrian banking’, pp. 76-98.

¹⁷ Schubert, *The Credit-Anstalt*, p. 37.

¹⁸ Schubert, *The Credit-Anstalt*, p. 40; Stiefel, ‘For better, for worse’, pp. 178-93; Weber, ‘From imperial’, p. 340.

¹⁹ Schubert, *The Credit-Anstalt*, pp. 33-9, 44-6.

four universal banks were insolvent as far back as 1925. The reason behind their insolvency was the weak performance of their industrial network, their Konzerns. My analyses also reveal that the CA's absorption of the weak assets of the other three universal banks directly contributed to the CA's demise. The three universal banks that disappeared through the years from 1926 to 1929 were not equally weak. There was one bad apple among them, the UB, whose Konzern had an unsustainably high debt level, was loss-making, and its performance was deteriorating from 1925. In comparison and in absolute terms as well, the Konzerns of the VB, the BCA, and the CA were in a much better condition and were on an improving trend. This suggests that if the CA had been spared of the UB's assets, it may have survived.

Evidence on the four banks' liquidity is less conclusive than on their insolvency due to data limitations. The available data confirm that no foreign creditor flight occurred before the announcement date of the four banks' distress. If the banks were illiquid before this date, it was due to a domestic creditor flight, resulting from the deterioration of their Konzern. Regarding the CA, it is unclear whether the bank was illiquid on 8 May 1931 when it turned to the ANB for help. It is, however, certain that after this date, the flight of both foreign and domestic creditors generated an enormous liquidity pressure on this bank.

OVERVIEW OF THE BANKING SYSTEM

I have collected the balance sheets and profit and loss statements of Austrian joint-stock financial institutions, bank-by-bank from 1925 until 1933.²⁰ The dataset is the product of primary research based on a contemporary statistical publication, the *Financial Compass*. The *Financial Compass* offers a description of the activities of financial institutions (similarly to an annual report) as well as their financial statements.

Table A1 in the Appendix shows that in the *Financial Compass* published in 1926, there were 398 individual financial institutions and of these, 284 reported their financial statements, while 114 only provided limited information on their operation. As the table makes clear, financial institutions' reporting behaviour improved towards the end of the period under observation and in the 1931 publication there were only 22 non-reporting entities. The institutions that did not report their financials were predominantly small operations which ended

²⁰ The database includes underwriting banks (Pfandbriefinstitute), banks limited by shares (Aktien-Kredit Banken), savings banks (Sparkassen), and significant credit associations (bedeutendere Kreditvereinigungen).

up falling into distress, were merged into competitors, or were liquidated. Table 1 provides an overview of the number of financial institutions that are in the final database. Table A2 in the Appendix assesses the representativeness of this database and demonstrates that this compilation improves on the comprehensiveness of previous data collections.

Table 1 The number of financial accounts in the bank database

	1925	1926	1927	1928	1929	1930	1931	1932	1933
Balance sheet	276	269	274	311	318	314	315	312	309
Universal bank	8	8	6	6	6	5	5	5	5
Other bank	44	40	37	36	32	30	30	29	25
Mortgage bank	8	8	8	8	8	8	9	10	10
Savings bank	216	213	223	261	272	271	271	268	269
Profit and loss statement	267	261	268	303	315	310	311	306	293
Universal bank	8	8	6	6	5	5	4	4	4
Other bank	39	37	35	33	31	29	29	27	18
Mortgage bank	8	8	7	8	8	8	9	10	9
Savings bank	212	208	220	256	271	268	269	265	262

Unquestionably, these financial statements were in some respect guilty of misrepresentation, but if we read them with attention to such risks, they can be effectively relied on to construct a comprehensive overview of the financial system. Schubert has pointed out that the misleading attribute of these accounts is that they represent non-performing loans as solid, profit-producing assets.²¹ This paper also finds and explains later that Viennese banks booked interest on loans even if they did not actually receive that interest. If the financial statements are analysed by taking into consideration these caveats, they can provide very useful information. This study draws conclusions only based on data that can be reasonably relied on and specifically points out when data should be handled with care.

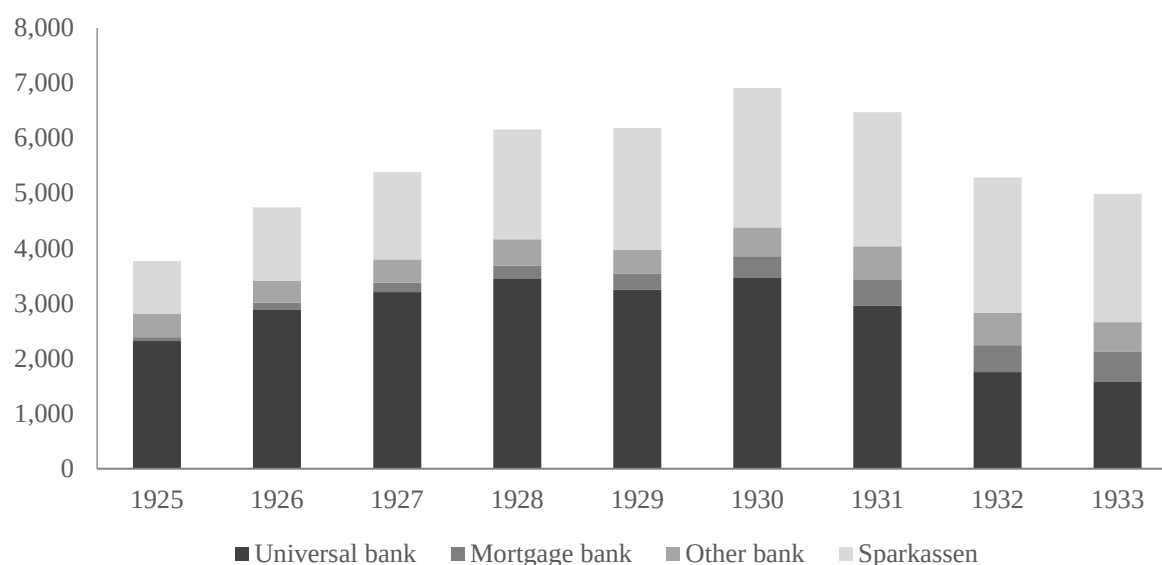
Table 1 shows that there were four main types of Austrian joint-stock financial institutions during the interwar period: universal banks, Sparkassen (savings banks), mortgage banks, and other banks. Figure 1 illustrates the growth of the sector's total assets by type of financial institution. In 1930, total assets were 83 per cent higher than in 1925. In 1925, they

²¹ Schubert, *The Credit-Anstalt*, p. 25.

amounted to 37 per cent of the nominal GDP, while the same ratio in 1930 was a whopping 60 per cent.²² These figures imply the financial system's dynamic growth following the stabilization.

Mortgage banks experienced the most vigorous advance during this period by expanding their assets almost five-fold. However, their overall share within the whole sector continued to remain minor, at around 6-10 per cent. On the contrary, other banks were the weakest performers. These institutions experienced a decline in 1926 and 1929 and the overall increase in their total assets from 1925 to 1930 was only 22 per cent. These players were also small at the aggregate level: they made up only 7-8 per cent of the sector's total assets.

Figure 1 The structure and growth of the Austrian financial system by total assets



Source: the author's calculations based on *Financial Compass*, 1925-32.

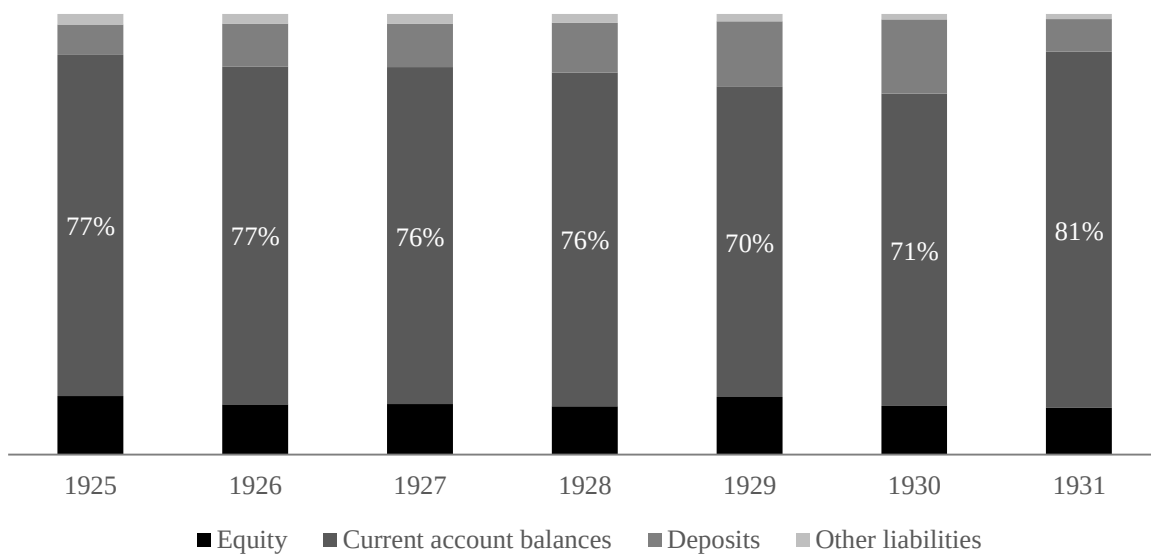
Of the two large players, universal banks and Sparkassen, the latter grew more dynamically during the period. Sparkassen increased their total assets by over 160 per cent from 1925 to 1930, whereas the same figure for the universal banks was only 49 per cent. As a result, Sparkassen were continuously increasing their share within the sector as well, from 25 per cent in 1925 to 37 per cent in 1930. While in the years preceding the crisis universal banks were still the dominant players of the sector, this changed from 1932. In this year, universal banks and Sparkassen contributed 33 and 46 per cent to the total assets of the whole sector, respectively.

²² Kausel, Németh, and Seidel, 'Österreichs Volkseinkommen'.

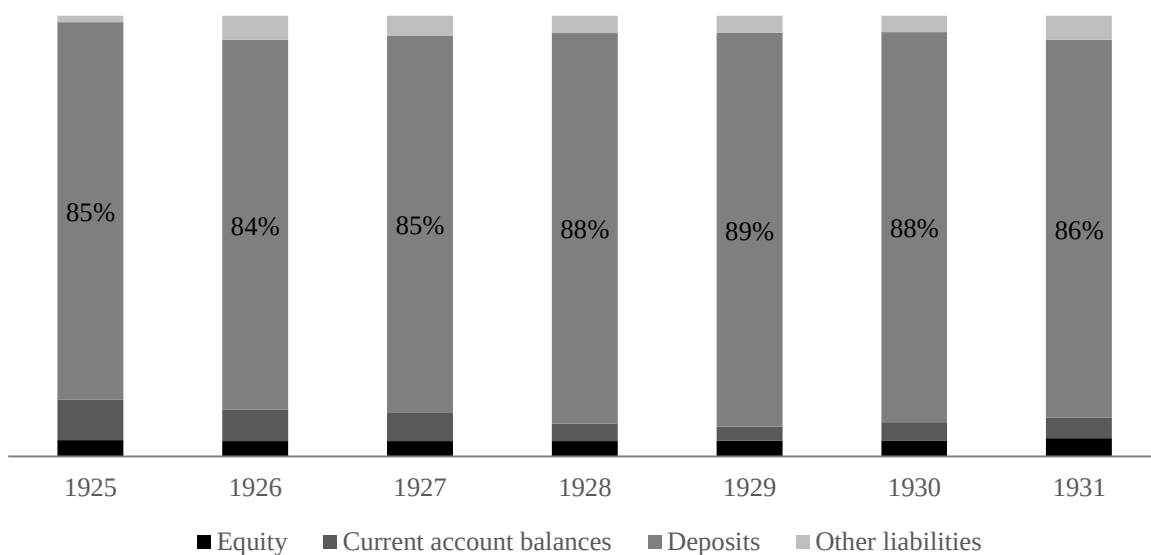
This was a significant deterioration in universal banks' position, whose total assets in 1925 made up 60 per cent of those of the whole sector. Nonetheless, it is also notable that while the number of universal banks declined from eight to five during the period, the number of Sparkassen increased from 216 to approximately 270 (Table 1). Therefore, despite their dynamic expansion over the years at the aggregate level, individual Sparkassen remained small vis-a-vis the enormous universal banks.

Figure 2 The equity and liability side of universal banks' and Sparkassen's aggregate balance sheet

Universal banks



Sparkassen



Source: the author's calculations based on *Financial Compass*, 1925-32.

Universal banks and Sparkassen differed in other respects as well. Figure 2 compares the equity and liability side of the aggregate balance sheet of these two players. The diagrams illustrate that universal banks and Sparkassen raised their financing from different sources. Sparkassen relied almost exclusively on depositors. Universal banks, on the other hand, raised only a minor part, 4-12 per cent of their financing from depositors and relied instead on current account balances. Depositors were predominantly private individuals who placed their savings at the bank and were not transacting with those monies. They were simply collecting their savings at the bank. Current account balances, on the other hand, were predominantly the bank accounts of businesses, were deposited via money transfers, not cash, and were heavily transacted.²³ Figure 2 thus confirms that Sparkassen were retail banks, whereas universal banks were essentially commercial banks.

FOREIGN CREDITORS

The literature argues that foreign creditors played a critical role in the 1931 crisis.²⁴ Therefore, the importance of foreign creditors in the financing of the banking system will now be reviewed.

The first diagram of Figure 3 illustrates the share of foreign creditors within the aggregate balance sheet of the banking system. At the height of the financial system's foreign exposure in 1927, financing provided by foreign creditors amounted to AS 836 million and its share in Austrian banks' total financing was 16 per cent. This figure declined to nine per cent in 1929 and remained at that level in 1930. This suggests that the predominant portion of the banking system's financing, 82 per cent in 1930, originated from domestic sources.

Unfortunately, the data source does not disclose which type of financial institutions and to what extent was exposed to foreign creditors. However, it can be safely assumed that the predominant portion, if not all, of foreign creditors can be assigned to the universal banks. Since

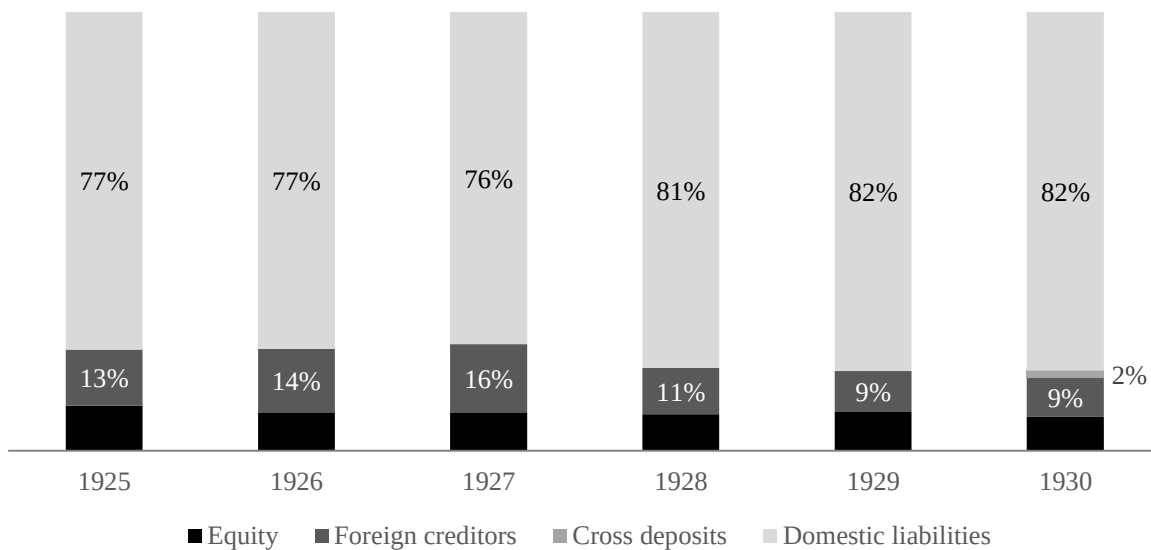
²³ Whale, *Joint-stock banking*.

²⁴ Eichengreen, *Golden fetters*, pp. 262-9; Fior, 'The financial instability', pp. 132-5; Kindleberger, *The world in depression*, pp. 145-7; Schubert, *The Credit-Anstalt*, pp. 33-9, 44-6.

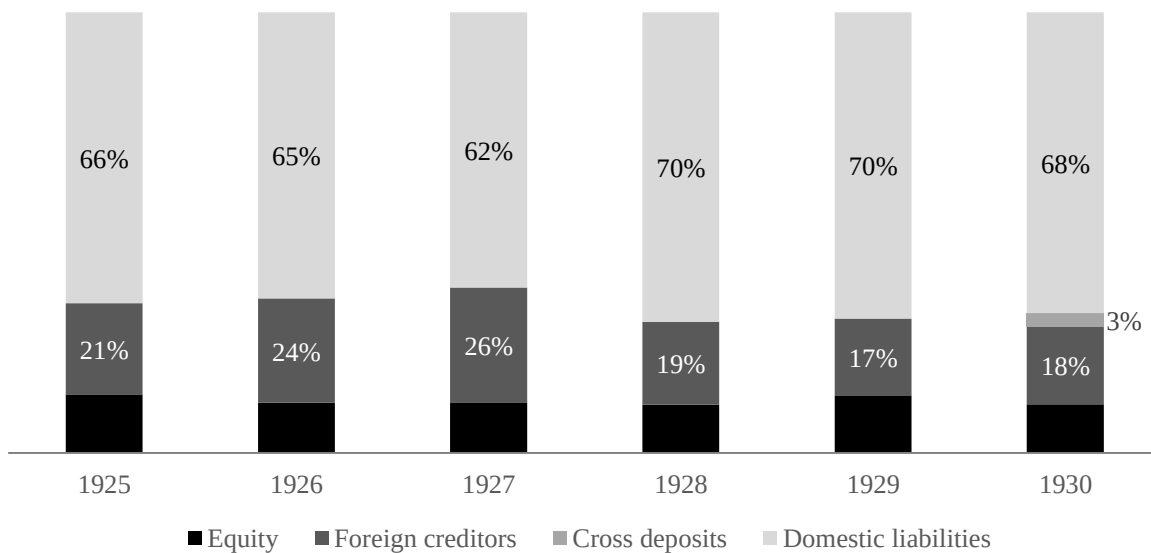
individual mortgage banks and other banks were small and focused on local lending, they were probably not recipients of foreign credits. Further, as Figure 2 has shown, Sparkassen's financing was built mainly of deposits, which were the cash savings of private individuals, and were, therefore, in all likelihood, domestic in origin. The remaining 4-5 per cent of other liabilities on Sparkassen's balance sheet could theoretically have been foreign creditors. However, since Sparkassen were local financiers, for the sake of this investigation it is assumed that these liabilities were also domestic in origin. That is, subsequent analyses allocate all foreign creditors to the universal banks.

Figure 3 Foreign and domestic liabilities

Total banking system



Universal banks



Note: Data on foreign creditors unavailable for 1931.

Source: the author's calculations based on *Financial Compass*; *Financial Compass*, 1928, p. 375; *Financial Compass*, 1929, p. 374; *Financial Compass*, 1930, p. 354; *Financial Compass*, 1931, p. 146-7, 274; *ANB Mitteilungen*, 1926-33; BoEA, file OV28/75, Cross deposits, 18 April 1932; Aguado, 'The Creditanstalt crisis', pp. 204-5; Weber, *Vor dem großen Krach*, pp. 325-6, 342, 479.

Following this assumption, the second diagram of Figure 3 shows the share of foreign creditors in the universal banks' aggregate balance sheet. At the highest exposure in 1927, over a quarter of the universal banks' financing came from foreign sources. In subsequent years, this ratio declined to approximately 17-8 per cent. That is, domestic liabilities constituted the dominant portion of universal banks' external financing sources, approximately 70 per cent of the total from 1928.

As the literature has pointed out, exposure to foreign creditors raises the risk of currency mismatch. If the universal banks were lending more in foreign currency than the volume of foreign currency financing sources made available to them, they incurred exchange rate risk. Table 2 examines this risk. It reports the volume of foreign creditors and the volume of foreign lending, and from these two, it calculates the foreign currency mismatch. In 1926 and 1927, institutions had more foreign currency liquidity than what they eventually extended as loans. From 1928, however, banks were granting more foreign currency loans than the volume of financing received from foreign creditors. In 1930, the mismatch amounted to AS 147 million.

Should this be considered a high figure? Table 2 calculates how much of the central bank's foreign reserves would have been needed to finance the banking system's foreign currency mismatch. Table 2 also shows the gold cover²⁵ in the extreme scenario when the ANB had had to be called on to finance the entire currency mismatch from its own reserves. In 1930, the gap in foreign lending and borrowing amounted to 15.8 per cent of the ANB's reserves. Had the ANB had to fill in this gap from its reserves, the central bank's coverage ratio would have

²⁵ The coverage ratio or the gold cover is the ratio of the central bank's gold and foreign currency reserves and the total banknotes in circulation.

declined to 72.4 per cent in 1930. This figure is well above the legal minimum coverage ratio of 33 1/3 per cent.²⁶

Nonetheless, to establish a precise picture of the foreign currency exposure of the banking system and the ANB's ability to provide lender of last resort support, one more matter needs to be taken into consideration: cross-deposits. The cross-deposit scheme was designed by the ANB to provide support to the CA after its merger with the BCA, without hurting the central bank's reserve backing. Through this mechanism, the CA received foreign currency credits from international banks while the latter obtained the same amount of credits from the ANB. Through this channel, the ANB indirectly provided foreign currency credits to the CA through the international banks.²⁷ Since the ANB did not report the impact of these foreign currency credits on its books, presumably, neither did the CA.²⁸

Table 2 Foreign currency mismatch (million Austrian Schilling)

	1926	1927	1928	1929	1930
Foreign creditors	685	836	649	566	611
Foreign borrowers	535	662	728	741	758
Foreign currency mismatch	150	174	-79	-174	-147
Foreign currency mismatch/ANB reserves	22.1%	23.6%	-9.9%	-23.5%	-15.8%
ANB gold cover - adjusted for mismatch					72.4%
Cross-deposits					107
Mismatch with cross-deposits/ANB reserves without cross-deposits ^{a)}					-30.8%
ANB gold cover - adjusted for mismatch and cross-deposits					62.6%

Note: The Financial Compass identifies these creditors and borrowers as financial institutions' 'ausländische Kreditoren' and 'ausländische Debitoren'. This stands for foreign creditors and borrowers but says nothing about the currency in which they were lending and borrowing. The analyses rest on the assumption that the transactions with these parties were carried out in foreign currency. a) Cross-deposits increase the foreign currency mismatch and also reduce the ANB's reserves. Their overall effect on the gold cover is hence double of their absolute value. Source: *Financial Compass*, 1928, p. 375; *Financial Compass*, 1929, p. 374; *Financial Compass*, 1930, p. 354; *Financial Compass*, 1931, p. 146-7, 274; *ANB Mitteilungen*, 1926-33; BoEA, file OV28/75, Cross deposits, 18 April 1932; Aguado, 'The Creditanstalt crisis', pp. 204-5; Weber, *Vor dem großen Krach*, pp. 325-6, 342, 479.

²⁶ BoEA, file OV28/32, Statutes of the Austrian National Bank. Based on the statutes, the ANB's gold cover was to be 20 per cent in the first five years of its operation, 24 per cent in the next five years, 28 per cent in the following five years, and 33 1/3 per cent afterwards. That is, the 33 1/3 per cent is the absolute conservative scenario.

²⁷ BoEA, file OV28/75, Cross deposits.

²⁸ Aguado, 'The Creditanstalt crisis', pp. 202-4

That is, Figure 3 and the calculations in Table 2 must be adjusted with the volume of cross-deposits. The total volume of cross-deposits is estimated around 15 million US dollars, which was AS 107 million.²⁹ Figure 3 indicates that cross-deposits made up three per cent of the total assets of the universal banks in 1930. Table 2 calculates the foreign currency exposure arising from cross-deposits. The worst case scenario is when the full value of cross-deposits increases the foreign currency mismatch and, at the same time and to the same extent, it reduces the ANB's reserves. If the ANB had had to support the universal banks in such a scenario, it would have lost 30.8 per cent of its reserves, and its coverage ratio would have declined to 62.6 per cent, still well above the legal minimum.

To further investigate the significance of foreign creditors, Figure 4 turns to the analysis of the annual change in the foreign creditors of the banking system. Universal banks - as long as the assumption holds that all foreign creditors can be allocated to them - received a capital inflow from abroad amounting to 7.1 per cent and 4.7 per cent of their total assets in 1926 and 1927, respectively. However, from 1928, the volume of foreign creditors declined sharply. The biggest drop of AS 187 million, or 5.4 per cent of the universal banks' total assets, occurred in 1928. 1929 continued with a fall of AS 83 million, 2.6 per cent of assets. The year before the crisis again saw an increase in foreign creditors of AS 45 million, 1.3 per cent of total assets.

Figure 4 The annual change in the foreign creditors of the banking system



²⁹ BoEA, file OV28/75, Cross deposits, 18 April 1932; Aguado, 'The Creditanstalt crisis', pp. 204-5; Weber, *Vor dem großen Krach*, p. 479.

Source: *Financial Compass*, 1928, p. 375; *Financial Compass*, 1929, p. 374; *Financial Compass*, 1930, p. 354; *Financial Compass*, 1931, p. 146-7, 274; *ANB Mitteilungen*, 1926-33; BoEA, file OV28/75, Cross deposits, 18 April 1932; Aguado, 'The Creditanstalt crisis', pp. 204-5; Weber, 'Vor dem großen Krach', pp. 325-6, 342, 479.

These figures should again be adjusted with the impact of cross-deposits. Cross-deposits amounted to AS 107 million at the end of 1929. Afterwards they gradually declined by 1931 by approximately one-third. Since the exact timing of their departure is uncertain, it is assumed here that their volume did not change in 1930.³⁰ If Figure 4 is adjusted accordingly, then the net change in foreign creditors is an AS 24 million increase in 1929. That is, cross-deposits turned the 1929 foreign currency outflow into a net inflow in 1929 which was followed by another AS 45 million inflow in 1930.

What do these analyses reveal about the foreign currency exposure of the banking system, and in particular, that of the universal banks, which, arguably, suffered from it? The figures lead to two findings. First, the ANB's reserve backing was very strong. The central bank's coverage ratio was around 90 per cent in the years preceding the crisis.³¹ The analyses demonstrate that in the absolute extreme scenario of all foreign creditors departing from the banking system, the ANB's gold cover would have still been at the legal minimum. While in the middle of a crisis even such a strong reserve backing may prove insufficient, prior to the crisis it should give no concern to investors. Further, even if the banks did not offer an honest representation of their foreign currency mismatch and the figures were in fact higher than reported, these figures would have had to be three times higher to reduce the ANB's coverage to below the legal minimum. This detail can explain why the Austrian crisis was a banking crisis at first, and became a currency crisis only afterwards. It can also account for the fact that Austria was the last among the three Central European countries to introduce capital controls in 1931. While Hungary and Germany stepped on this road in mid-July, Austria waited until 8 October.³²

Second, the figures also show that the fluctuations in foreign creditors were not significant when viewed as a ratio of the universal banks' total assets, especially in the two years

³⁰ RAL, III/488 (a-c) Austria; BoEA, file OV28/75, Cross deposits; Assumption based on the author's discussions with Dr. Nathan Marcus.

³¹ The author's calculations based on *ANB Mitteilungen*, 1926-33.

³² Ellis, 'Exchange control', pp. 30-7, 88-92.

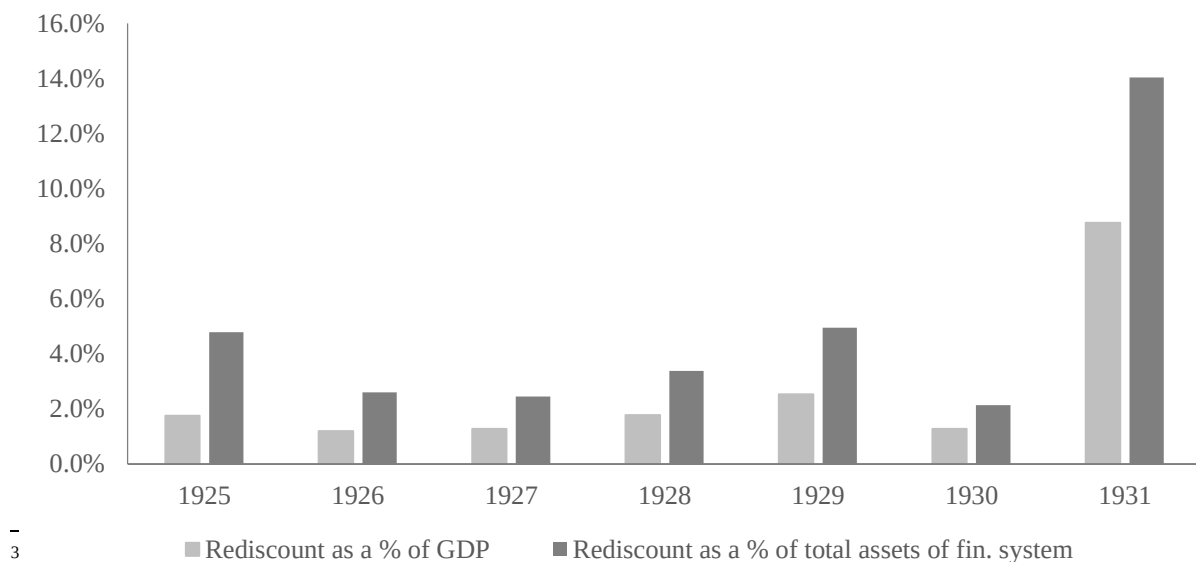
preceding the crisis. Unfortunately, these annual figures may hide extreme volatility occurring during the year. Nonetheless, when these low annual fluctuations are considered together with the high reserve backing of the ANB, the two together suggest that had the universal banks been strong and healthy, they would have been able to survive the volatility of foreign creditors. The fact that, despite this background, four universal banks reported distress during this period, suggests that these banks were weak. The next sections thus explore whether this was the case.

DOMESTIC CREDITORS

Figure 3 has demonstrated the primary importance of universal banks' domestic liabilities. These contributed approximately 70 per cent to universal banks' capital sources from 1928. If depositors are removed from this aggregate, then the remaining 55-60 per cent remaining are the universal banks' domestic current account balances. These will henceforth be referred to as universal banks' domestic creditors.

Who were these domestic creditors? There is only a limited number of players who could qualify for this category: the state (including any public authority), the ANB, other financial institutions, or the corporate sector, that is, the universal banks' Konzerns. The state can be immediately excluded since it could not act as a direct lender to financial institutions.³³ This leaves only three relevant options: the ANB, other financial institutions, and the Konzern.

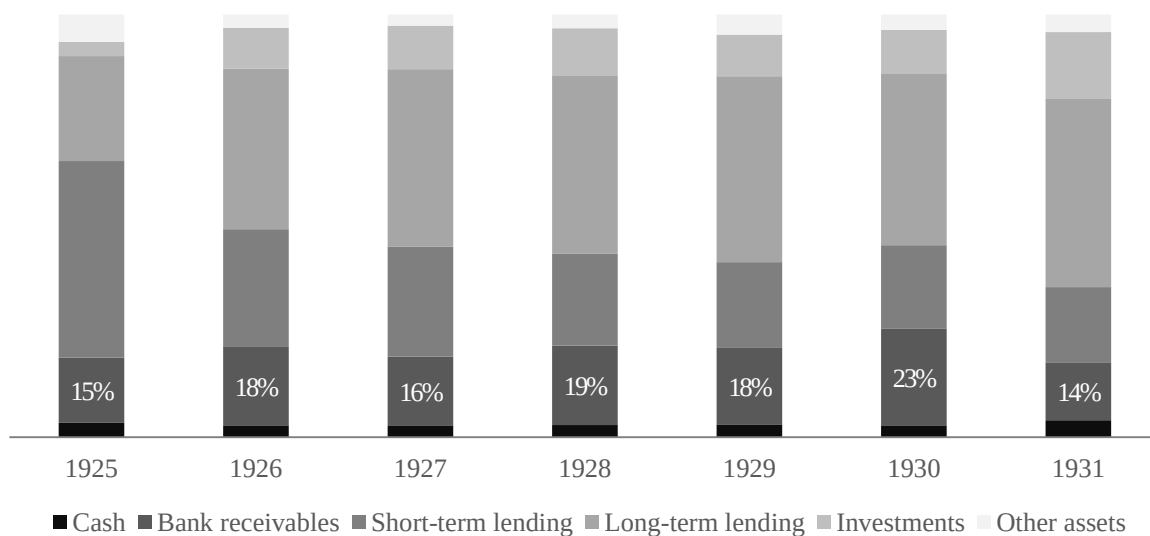
Figure 5 Rediscount from the central bank to the banking system



Source: for the rediscount: *ANB Mitteilungen*, 1926-33; for the GDP: Kausel, Németh, and Seidel, 'Österreichs Volkseinkommen', p. 5; for the total assets of the financial system: the author's calculations based on *Financial Compass*, 1926-35.

The ANB supported the financial sector by providing rediscount. Figure 5 shows the annual rediscount of the ANB. The data illustrate that in periods of tranquillity, the ANB's rediscount was around 2-3 per cent of the financial sector's total assets which translated to less than two per cent of the GDP. By way of comparison, the same figures for the Hungarian National Bank were around 6-10 per cent of the banking system's total assets and 5-6 per cent of the national income.³⁴ This suggests that the ANB did not excessively support the banking system and stepped up its intervention only in times of crisis. The ANB's rediscount increased in 1929 when the BCA collapsed, and in 1931 when the failure of the CA occurred and the whole of the financial system sank into distress.

Figure 6 The asset side of Sparkassen's aggregate balance sheet



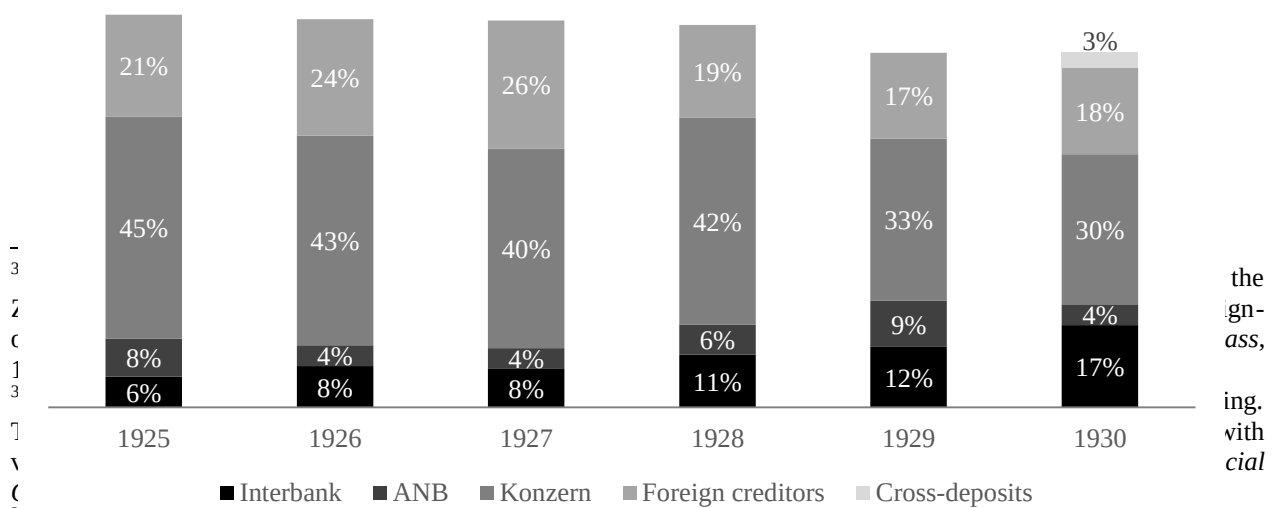
Source: the author's calculations based on *Financial Compass*, 1925-32.

³⁴ The author's own calculations based on Eckstein, *National income*, Table 1, p. 14; HNA, file Z12, bonds 60, 128-9; *Hungarian Compass*, 1925/6-1934/5.

Another domestic creditor to the universal banks may have been other financial institutions. Among these only Sparkassen were substantially sizeable players to be able to act as a meaningfully large creditor to the even bigger universal banks. Figure 6 examines the asset side of Sparkassen's balance sheet to pinpoint asset classes which were potentially placed at the universal banks. The analysis identifies an item called 'bank receivables' (Bankguthaben) which made up 14-23 per cent of Sparkassen's assets.³⁵ These receivables could be Sparkassen's lending to the universal banks or other players of the financial system. This analysis makes the conservative assumption that all of Sparkassen's bank receivables went to the universal banks.³⁶

The diagram of Figure 7 decomposes universal banks' creditors into the main categories. Central bank rediscount accounted for four per cent of the universal banks' total financing resources in periods of tranquillity and the figure seems to increase only in years of crisis.³⁷ Interbank lending generated some 6-17 per cent, while foreign creditors and cross-deposits were in the magnitude discussed earlier. The remaining portion, making up the largest part, 30-45 per cent of universal banks' total assets, came from the corporate sector. Given that the universal banks owned a large portion of Austrian industry, this could not be any other source than their own industrial base. That is, universal banks' most significant financier was these financial institutions' very own Konzern.

Figure 7 Universal banks' foreign and domestic creditors by creditor type



This analysis, therefore, assumes that all of the central bank's rediscount went to the universal banks. What makes this assumption conservative is that it reduces the significance of the Konzern as a source of funding.

Notes: Figures are calculated as a percentage of universal banks' total assets. Deposits and equity are not shown. Data for 1931 cannot be disaggregated and hence not shown.
Source: the author's calculations based on *Financial Compass*, 1925-32; *Financial Compass*, 1931, p. 375; *Financial Compass*, 1929, p. 374; *Financial Compass*, 1930, p. 354; *Financial Compass*, 1931, p. 146-7, 274; *ANB Mitteilungen*, 1926-33; BoEA, file OV28/75, Cross deposits, 18 April 1932; Aguado, 'The Creditanstalt crisis', pp. 204-5; Weber, 'Vor dem großen Krach', pp. 325-6, 342, 479.

This phenomenon also explains an apparent oddity about the universal banks. They appear thinly capitalized throughout the period under observation with their equity at only 11-13 per cent of their total assets which raises doubts about their ability to absorb the unreported losses that the literature claims they had to endure in the 1920s. However, if one views Konzern member accounts as quasi-equity, the universal banks were in fact very well capitalized and had enough funds to sustain several years of losses. To translate this mystery of solvency into an even bigger mystery of liquidity: if, as universally believed, these banks failed to collect interest on much of the loans they extended, how were they able to pay interest on their liabilities? In light of the finding that much of their funding came from their Konzern, the most likely interpretation is that even if universal banks had to book interest expenses on this Konzern funding, they did not actually have to make the payments on those payables. That is, the Konzern was standing on both sides of the universal banks' balance sheets: the Konzern was receiving the loans on which interest was booked but not received and the Konzern was providing the dominant portion of the financing for the bank on which interest was booked but not paid. That is, the bank acted as a channel for its Konzern and Konzern financing acted as a source of cheap, or even free funding for the universal banks.

KONZERN AND BANK SOLVENCY

Previous paragraphs have analysed the financing resources of the universal banks, that is, the equity and liability side of their balance sheet, and have discussed the relative importance of their

foreign and domestic creditors. The following sections will now zoom in on the asset side of these banks' balance sheet.

There were eight universal banks in 1925 but by the end of the decade, only five remained (Table 1). Prior to 1931, three universal banks experienced distress. In 1927, the UB and the VB, and in 1930, the BCA disappeared.³⁸ The first two were merged into the third, while three years later the BCA was absorbed by the largest universal bank, the CA. Finally, in 1931 the CA also collapsed. What happened to these banks?

The analysis of universal banks' assets and insolvency has so far been inhibited by the lack of data. Austrian universal banks misrepresented the assets on their balance sheets.³⁹ They perpetuated the non-performing loans to their Konzerns and represented defaulted loans as healthy ones on their balance sheets. Further, the assets of the three universal banks that were merged during the 1920s, the VB, the UB, and the BCA, continued to be falsified after their absorption into another bank's balance sheet. At none of these mergers were bad assets, that is, the delinquent loans of the failed banks' Konzerns, fully written off. The predominant portion of bad loans were accepted at face value, as if they had been healthy, performing assets.⁴⁰ There is thus no information on the volume of these banks' non-performing loans. As explained above, it is also very likely that universal banks continued to book interest on their non-performing loans even when the interest was not received. They thereby falsified their net interest margin and thus made their profit and loss accounts unreliable regarding interest income and expenses. Thus a net interest margin based approach for the estimation of non-performing loans cannot be adopted here. Universal banks' financial statements are, therefore, not useful for the analysis of their insolvency.

Since the banks' financial statements prevent a reliable assessment of their solvency, the investigation must reach out to the ultimate source: the financial accounts of the Konzerns themselves. The idea is to use the information on the performance of Konzern corporations as a basis, and from that make an inference on the quality of the universal banks' assets. Since it can be safely assumed that the predominant portion of the universal banks' assets were lent to or were

³⁸ The UB and the VB announced their merger with the BCA in 1926 and the effective date of these mergers was 25 March 1927. The BCA announced its merger with the CA in 1929 and the effective date of this merger was 1 January 1930.

³⁹ Schubert, *The Credit-Anstalt*, p. 25.

⁴⁰ At the UB-BCA merger 14.1 per cent of the total assets of the UB was written off as bad assets. The same figure for the VB-BCA and CA-BCA mergers was even lower, 5.7 per cent and 5.8 per cent, respectively.

invested into their Konzerns, the health of their Konzerns should be a reflection on the health of these banks' assets. Indeed, the Konzern debt of the sample made up approximately 68 per cent per cent of the CA's total lending in 1930.⁴¹

I have hence built another micro-level database by collecting the balance sheets and the profit and loss statements for the period of 1925-30 of the Konzern corporations of the four universal banks that failed. The source was the *Compass Kommerzielle Jahrbuch (Commercial Compass)*. The four Konzerns are that of the VB, UB, BCA, and the CA. Konzern members were identified based on the banks' reporting in the *Financial Compass*.⁴² Table 3 provides an overview of this second micro-level database.

⁴¹ The author's calculation based on *Commercial Compass*, 1925-32.

⁴² As previously noted, the definition of the Konzern is vague and this paper adopts the assumption that Konzern members were those corporations for which the universal bank made such a claim. The companies of the four Konzerns were identified with the help of the following sources. For the CA: *Financial Compass*, 1927, pp. 371-5 and 1931, pp. 278-81; For the BCA: *Financial Compass*, 1927, pp. 261, 263-8 and, 1931, pp. 270-1; For the UB: *Financial Compass*, 1927, pp. 421-2, 424-5; For the VB: *Financial Compass*, 1927, pp. 429-30.

Table 3 The number of financial accounts in the Konzern database

	1925			1926			1927			1928			1929			1930		
No. of years reported	2-6	1	Total	2-6	1	Total	2-6	1	Total	2-6	1	Total	2-6	1	Total	2-6	1	Total
Coal, steel, machine	48	2	50	43	0	43	44	0	44	43	0	43	48	0	48	39	0	39
Construction	7	0	7	8	0	8	8	0	8	7	0	7	7	0	7	6	1	7
Chemical	7	1	8	7	0	7	7	0	7	6	0	6	7	0	7	7	0	7
Diverse	21	0	21	19	1	20	24	0	24	23	0	23	23	0	23	22	0	22
Electricity, water, gas	15	1	16	14	0	14	15	0	15	13	0	13	14	0	14	14	0	14
Beverage	9	0	9	10	0	10	9	0	9	10	0	10	10	0	10	9	0	9
Timber	8	0	8	8	0	8	9	1	10	8	0	8	8	0	8	7	0	7
Shoe and leather	7	0	7	7	0	7	7	0	7	6	0	6	5	0	5	5	0	5
Oil	3	1	4	2	0	2	2	0	2	3	0	3	2	0	2	1	0	1
Paper	14	0	14	14	0	14	14	0	14	13	0	13	13	0	13	12	0	12
Textile	17	3	20	20	0	20	20	0	20	17	0	17	17	1	18	13	0	13
Transport	15	0	15	14	0	14	13	0	13	13	0	13	17	1	18	16	0	16
Sugar	1	0	1	1	0	1	1	0	1	1	0	1	1	1	2	1	0	1
Total	172	8	180	167	1	168	173	1	174	163	0	163	172	3	175	152	1	153

Table 4 Theoretical calculations for insolvency thresholds

	Healthy	Tier-1				Tier-2			
Debt	100	100	100	100	100	100	100	100	100
Debt-to-profit ratio	5.0x	6.0x	7.0x	8.0x	9.0x	10.0x	11.0x	12.0x	13.0x
Profit before financial expenses	20.0	16.7	14.3	12.5	11.1	10.0	9.1	8.3	7.7
Interest	8%	8%	8%	8%	8%	8%	8%	8%	8%
Average term (years)	10	10	10	10	10	10	10	10	10
Debt, beginning of period	100	100	100	100	100	100	100	100	100
Interest payment	8	8	8	8	8	8	8	8	8
Principal repayment	10	10	10	10	10	10	10	10	10
Debt, end of period	90	90	90	90	90	90	90	90	90
Profit before financial expenses	20.0	16.7	14.3	12.5	11.1	10.0	9.1	8.3	7.7
Interest expense	8	8	8	8	8	8	8	8	8
Cash remaining for principal payment and distribution	12.0	8.7	6.3	4.5	3.1	2.0	1.1	0.3	-0.3
Principal payment	10	10	10	10	10	10	10	10	10
Cash remaining for distribution	2.0	-1.3	-3.7	-5.5	-6.9	-8.0	-8.9	-9.7	-10.3

A total of approximately 400 Konzern companies have been identified based on the four universal banks' reporting. However, only approximately 160-180 companies actually reported a financial statement in any of the years between 1925 and 1930 in the *Commercial Compass*, on an annual basis. Those that did not report were presumably experiencing financial difficulties. Hiding financial distress through non-reporting was a common practice among banks as well as companies, and the authorities' enforcement of regular reporting was ineffective. I also applied a restriction to the sample and included only those companies which supplied at least two financial statements for the six years under review. This excluded 14 companies. The purpose of this restriction was to gain some sense of dynamics for each company. Based on this, there are approximately 160-180 Konzern enterprises in the database for each year and, after all exclusions, these were most likely the best-performing Konzern members of the four universal banks.

Levels of insolvency

The abundant theoretical literature on banking crises provides guidance on the forthcoming analysis.⁴³ Most of this literature analyses the liability side of banks in crisis, but this paper focuses on the deterioration of the asset side. In this regard, the analyses here are not concerned with 'random withdrawals' or the 'asymmetric information' between the bank and its depositors.⁴⁴ Rather, the analyses investigate when the performance of underlying assets may make a bank insolvent and illiquid. The approach of this paper is hence closest to the theoretical model of Diamond and Rajan.⁴⁵

The paper distinguishes between three levels of bank insolvency based on the performance of the bank's assets: (i) when bank borrowers stop servicing the principal on the loan from the bank (tier-1); (ii) when borrowers stop servicing part of the interest of the loan as well (tier-2); (iii) when borrowers stop generating sufficient interest and cash income to cover the bank's most basic expenditures (tier-3). The bank is insolvent in all three cases but can remain liquid under tier-1 and tier-2 by restructuring, even effectively evergreening the existing loan, or by offering a new loan to the defaulter. A bank failure, however, becomes a tangible possibility

⁴³ E.g. Calomiris and Gorton, 'The origins of banking panics'; Diamond and Dybvig, 'Bank runs'.

⁴⁴ Calomiris and Gorton, 'The origins of banking panics', p. 111.

⁴⁵ Diamond and Rajan, 'Liquidity shortages'.

under tier-2 and a virtually inevitable event under tier-3. This three-tier insolvency will be examined for the Austrian universal banks.

Table 4 offers a simple calculation for the theoretical thresholds for the three-tier insolvency analysis. The table analyses various cases which only differ in the borrower's level of indebtedness, as measured by the debt-to-profit ratio. The debt-to-profit ratio indicates how many years' earnings are necessary for a company to fully repay its liabilities. If the ratio is high, the company has too much debt and/or insufficient profits to service the debt. Since the model assumes a constant debt level of 100, the various scenarios only differ in the underlying company's profit generating potential.

Assuming an eight per cent interest rate, a company enters tier-1 at 6x debt-to-profit.⁴⁶ At 5x debt-to-profit, the company has sufficient earnings to pay the interest and the principal due on the loan and, subsequently, it still has some money left to distribute to its own shareholders. At 6x debt-to-profit, however, the company's distributable earnings are negative, suggesting that it will stop servicing the principal of the loan. Between 6x and 12x debt-to-profit, the company is in tier-1, having less and less profits to service the principal but still having enough to make interest payments. At 13x debt-to-profit, however, the company enters tier-2 as it can no longer pay the interest due on the loan. That is, companies with a debt-to-profit ratio at or below 5x are healthy, those between 6-12x debt-to profit can still make interest but not principal payments, and from 13x they default on the principal as well as on the interest of the loan.⁴⁷

What do these figures tell us about the solvency of the bank? From the perspective of the bank, a tier-1 corporate default is manageable, tier-2, however, threatens the existence of the bank itself. At tier-1 the bank is still earning the full interest of the loan and it is only the loan principal, that is, the bank's capital, which is immobilized by the company's non-payment. In this phase, the bank is already insolvent but it can still sustain its own operations from the interest payment. At tier-2, however, the bank is earning less interest than contractually determined, its net interest spread is lower than planned, and thus it faces the threat that its declining income may gradually prove insufficient to cover its own operational expenses.

⁴⁶ Based on the Statistische Nachrichten, the interest rate on short-term loans was around eight per cent in the period between 1926 and 1930. This is a conservative approach because long-term rates were probably higher.

⁴⁷ The interest rate has been assumed based on the sources listed in Table 5. The limited principal payment (10-year loan) has been assumed because Konzern companies were very likely wholly or partially owned by the universal banks.

Table 5 Liquidity and solvency measures for the four Konzerns (million Austrian Schilling)

Panel 1 - The aggregate debt-to-profit ratio						
	1925	1926	1927	1928	1929	1930
Actual debt-to-profit - aggregate for four Konzerns	18.5x	16.5x	13.4x	13.0x	11.9x	15.1x
Panel 2 - Theoretically necessary cash income (4 banks)						
	1925	1926	1927	1928	1929	1930
Interest payment	61	61	58	60	68	60
Securities ^{a)}	1	1	1	1	1	1
Special loans ^{b)}	0	0	0	0	0	0
Other liabilities ^{b)}	2	2	1	1	1	0
Creditors - foreign ^{b)}	29	31	31	24	22	19
Sparkassen ^{c)}	11	13	11	16	18	22
ANB ^{d)}	11	6	5	8	12	5
Deposits - domestic ^{d)}	5	6	6	7	8	9
Deposits - foreign ^{e)}	2	2	2	2	5	4
Operational expenses ^{f)}	54	58	57	56	38	44
Dividends paid ^{f)}	11	10	16	17	7	0
Theoretically necessary cash income (4 banks)	126	129	131	133	113	104
Actual reported cash income of the 4 Konzerns	74	73	99	100	103	76
Panel 3 - Actual debt-to-profit ratios						
	1925	1926	1927	1928	1929	1930
CA	10.9x	8.3x	6.7x	7.4x	8.7x	8.2x
BCA	12.6x	10.8x	10.2x	9.3x	6.1x	9.0x
UB	-20.3x	-18.4x	-29.2x	-42.6x	-89.5x	-13.0x
VB	9.4x	9.5x	10.1x	11.1x	7.2x	4.6x
BCA combined			21.6x	17.8x	15.1x	25.5x

Note: a) Financial Compass, 1931, pp. 275-6; 1930, pp. 265-6, 1929-30 based on ANB benchmark rate; b) Same as Sparkassen rate; c) Statistische Nachrichten, 1925-32; d) ANB Mitteilungen, 1926-33; e) Same as Deposit - domestic rate; f) Financial Compass, 1926-35, actual data for each universal bank.

Source: the author's calculations based on *Financial Compass*, 1926-35 and *Commercial Compass*, 1925-32.

Aggregate Konzern performance

Panel 1 of Table 5 applies the three-tier method to the database of the Austrian Konzern corporations and shows the actual debt-to-profit ratios.⁴⁸ The four Konzerns had their combined debt-to-profit ratios at or above the 12x critical threshold in all years under observation. This suggests that they needed their banks' active cooperation to avoid bankruptcy, as they had defaulted not only on principal payments, but also on interest payments. As these companies' loans in all likelihood comprised the overwhelming majority of the four universal banks' assets, their default must have made the banks insolvent.

When do banks go bankrupt? They can avoid it by remaining liquid even when they are insolvent. When the borrower no longer services the principal and the interest on the loan but it still generates positive cash which is deposited at the bank (tier-2), then this fresh money can be a source of liquidity for the bank. As Table 4 depicts, at 13x debt-to-profit, the company has a profit before financial expenses of 7.7. Even if this is insufficient for interest payment and the company does not pay the interest from this profit, the money still sits on the bank's balance sheet. Banks become both insolvent and illiquid when the new cash generated by their borrowers is lower than their cash expenses. This is when they enter tier-3 and their bankruptcy becomes inevitable.

What was the extent of the universal banks' illiquidity? Panel 2 of Table 5 assesses the conditions under which the four universal banks should have become illiquid. The calculation assumes that the banks were already tier-2 insolvent as they received no interest or principal payments on their Konzern loans. However, the banks could still remain liquid, as long as their Konzerns produced sufficient cash earnings which were deposited on the companies' checking account held at the bank. That is, the table calculates the minimum theoretical cash income that was necessary for the four banks to stay afloat without outside liquidity injection.

The calculation assumes that the cash income had to cover three types of expenses. First, as illustrated previously on Figure 7, 30-45 per cent of the universal banks' total assets was financed through the Konzern prior to 1931. It is assumed here that the banks paid no interest on these current account balances. The remaining 42-59 per cent (excluding equity) of their assets

⁴⁸ Debt includes all of the long-term liabilities of the company. Profit is calculated as income plus amortization and depreciation to arrive at what can be most reasonably assumed to be cash profit, not accounting profit.

was, nonetheless, financed through sources on which the banks had to pay interest because, presumably, the relationship with those financing parties was at arm's length.⁴⁹ These interest expenses were one item for which the banks needed liquidity. Diamond and Rajan's theoretical model only takes into consideration this expense category but disregards the following two, which are equally important in the assessment of banks' liquidity. One of these is banks' own operational expenses such as salaries, rent, taxes, etc.⁵⁰ The other is dividends: each of the four universal banks paid dividends during the period which was also a cash outflow that had to be financed.⁵¹

Panel 2 of Table 5 shows the actual figures for these three expense items. Taking all these expenses into consideration, the four banks required approximately AS 130 million between 1925 and 1928 and some AS 110 million in 1929 and 1930 in order to remain liquid and survive. This is how much in cash profit the four Konzerns had to be able to generate at a minimum to keep the four banks afloat, assuming there was no Konzern interest payment.

Strikingly, the actual cash profit produced by the Konzerns was much lower than this. As Panel 2 of Table 5 shows, the actual reported cash income of the four Konzerns was in the range of AS 70-100 million during the period and in each year it was lower than the theoretically necessary cash income. The challenge with the interpretation of these figures is that each year there were a few companies which did not supply their financials for the given year. Therefore, hypothetically, earnings could have been significantly higher. But only hypothetically. A deeper dig into the data reveals that those companies that only intermittently provided their financial statements were those that were struggling to produce earnings at all. In 1927 for example, there were 17 companies which did not report their balance sheet for the given year. Nine of these stopped reporting in earlier years and never continued, implying that they had gone bankrupt. Two of the 17 experienced a significant drop in their profit levels in earlier years, suggesting that financial distress was behind their non-reporting in 1927. The remaining six experienced some level of growth in their earnings in previous years and it is unclear why they chose to disclose no information on their performance in 1927. Only two of these were able to continue the growth

⁴⁹ The calculation assumes that universal banks had to pay interest on the financing received from these parties but they had to make no principal payments. The volume of the various liability items has been collected from the *Financial Compass*, 1926-35. Interest rates are based on the sources indicated in the table.

⁵⁰ Actual data collected from the *Financial Compass*, 1926-35 for the four banks.

⁵¹ Ibid.

trend after 1927. If these two had reported their earnings in 1927 at the future increased level, that would have added less than AS 1 million to the actually reported income. This would have been an approximately 2.5 per cent adjustment to the actually reported earnings of the four Konzerns. This confirms that the whole sample of reporting companies is biased towards well-performing enterprises. Based on this sample, the four Konzerns produced less income than what would have been necessary for the four universal banks to avoid liquidity problems during the period.

Individual Konzern performance

The four universal banks were insolvent and illiquid at the aggregate level already in 1925. It is thus no surprise that they all failed. However, they did not each fail in 1925. The actual debt-to-profit figures for the individual Konzerns in Panel 3 of Table 5 indicate that the four Konzerns were not equally close to the bankruptcy threshold.⁵²

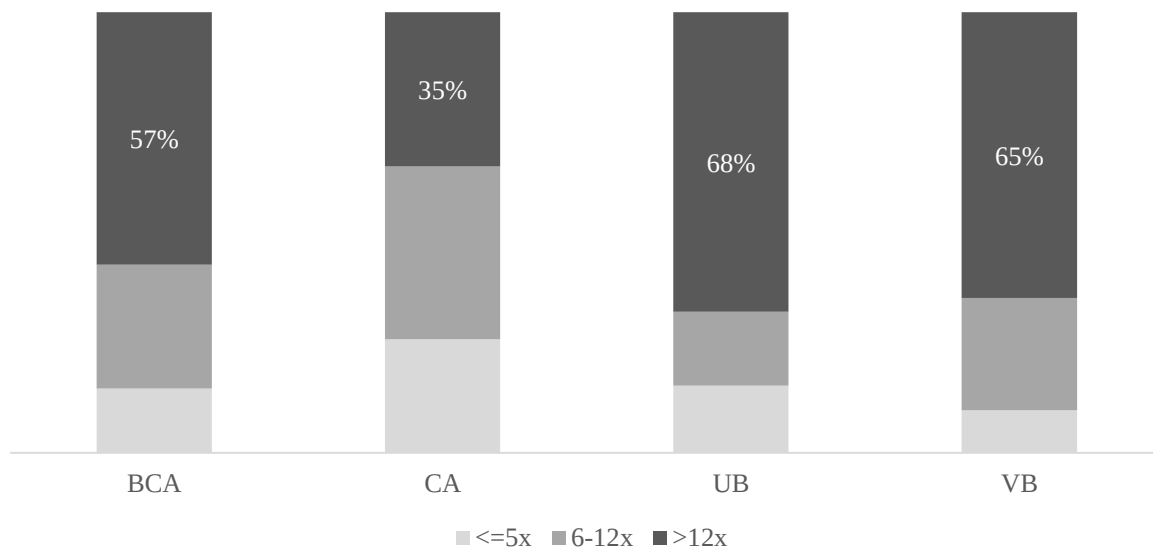
The figures reveal that the Konzerns were far from the healthy, sub-6x debt-to-profit category. The only exception was the VB's Konzern which in 1930 reached 4.6x. The worst-performing industrial network was that of the UB with ratios in the range of negative 13-90x. This bank had unprofitable and highly indebted companies. Compared to that, the VB's industrial network was a superstar, showing improvement between 1928 and 1930 and becoming healthy by the end. The BCA's Konzern followed a positive trend until 1929 but it could not reach the sub-6x range and by 1930 its situation worsened. The CA had a consistently performing industrial base whose debt-to-profit ratios were somewhere between those of the VB and the BCA.

Figure 8 takes an even closer look at individual Konzern performance and assesses the extent to which the four banks were exposed to good and bad companies. Company performance is defined by the debt-to-profit ratio: those Konzern members which had a 5x ratio or less are considered good performers; those between 6-12x are acceptable because they could still pay at least the interest, but those above 12x are the worst companies. Figure 8 then assigns the total debt (unweighted) of the Konzern companies into these performance categories and shows that the CA Konzern's debt was the 'cleanest'. Most of the companies that the CA owned and

⁵² The analysis reviews Konzern companies separately. That is, even if the UB and the VB were merged into the BCA in 1927 and the BCA was merged into the CA in 1930, the Konzern companies have been kept separate in their original Konzerns for the analysis. Where a combined Konzern's performance is analysed, it is specifically indicated in the text.

financed were in the good or acceptably performing category. ‘Only’ 35 per cent of the bank’s portfolio was comprised of bad enterprises. While this is not a low figure at all, it is dwarfed by the 68 per cent ‘achieved’ by the UB. The BCA’s and the VB’s Konzerns were somewhere in between the two but closer to the performance of the UB’s companies.

Figure 8 The exposure of the four banks to good and bad Konzern companies in 1927 based on companies’ debt



Source: the author's calculations based on *Commercial Compass*, 1925-32.

Figure 9 reviews the universal banks’ exposure to bad and good performers by industry. Electricity was a large industrial sector, with approximately 22 per cent of the aggregate Konzern debt coming from here, and it included several weakly performing companies. Whereas the aggregate debt-to-profit ratio for the whole of the four Konzerns was around 12-19x, for electricity companies it was in the range of 13-25x. That is, Konzern enterprises of the electricity sector were more indebted and/or less profitable than the aggregate Konzern. The coal, steel and machine-manufacturing sector was the opposite. While this was a similarly large sector, the companies it included had a debt-to-profit ratio of around 5-8x.

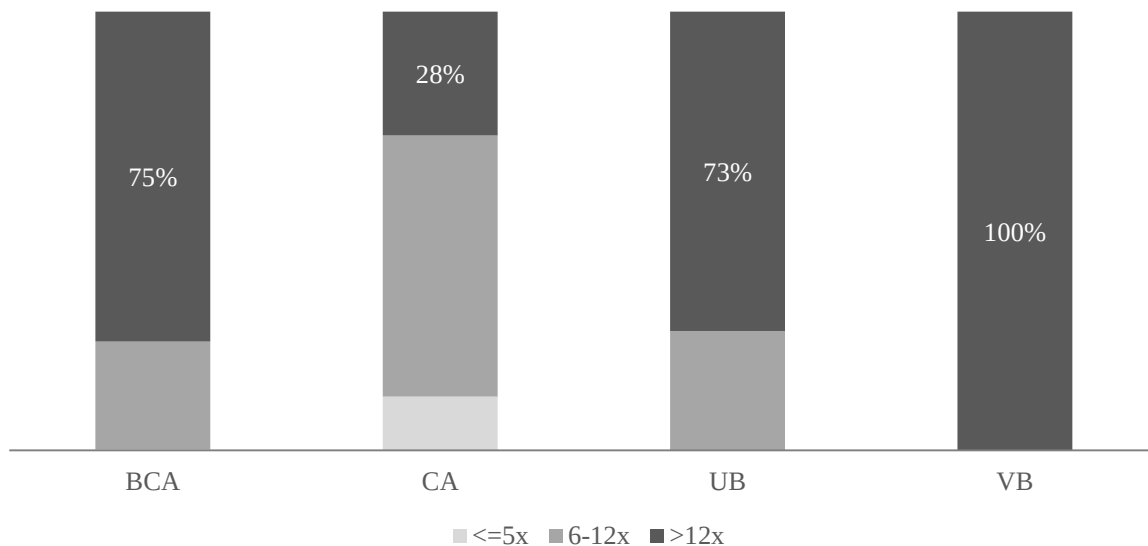
Figure 9 shows the four universal banks’ exposure to the companies of the weak electricity sector and the strong coal, steel, machine sector. The CA again emerges as the poster child of the Konzerns: it had the smallest exposure to weak enterprises in both sectors and in the

coal, steel, and machine sector, the majority of its companies had a 5x or lower debt-to-profit ratio.

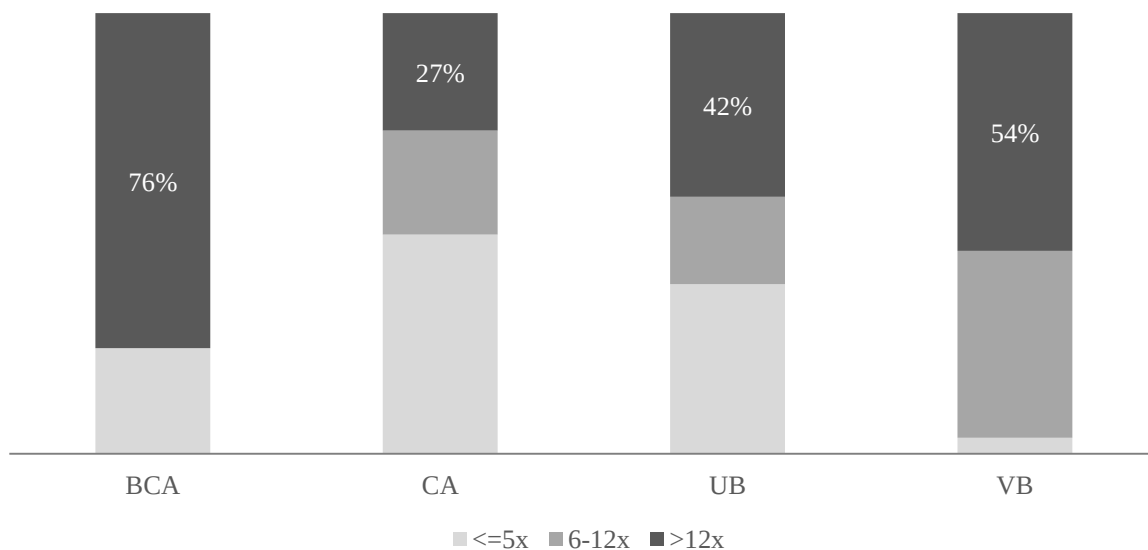
On the contrary, the other three banks had weakly performing Konzerns. The VB only had bad enterprises in the electricity sector and even in the good coal, steel, machine sector, the majority of its companies were badly performing. The UB and the BCA were similarly exposed to weak enterprises in the electricity sector. In the coal, steel, and machine sector the BCA had the weakest portfolio while the UB's Konzern was better in relative terms but still behind that of the CA.

Figure 9 Exposure of the four banks to good and bad industries based on companies' debt in 1927

Electricity, water, gas



Coal, steel, machine



Source: the author's calculations based on *Commercial Compass*, 1925-32.

CAUSES AND TRIGGERS

What was then the cause of the four universal banks' distress? The previous analyses provide an obvious explanation to the failure of the UB. This bank's Konzern was in the worst shape among the four with close to 50 per cent of its companies and 75 per cent of their total debt in the badly performing category. Since the aggregate debt level of this industrial network exceeded even the total assets of the bank, this structure was simply unsustainable.⁵³ It is not surprising, therefore, that it became distressed in 1926.

The debt-to-profit figures of the UB's Konzern can also account for the debacle of the BCA. In fact, the BCA signed its own death sentence when it decided to merge with the UB. The critical insight here is that the bad loans of the weak UB Konzern were not written off at the amalgamation or afterwards, and hence they continued to burden the BCA after the two banks' merger.⁵⁴ Whereas the BCA Konzern in itself had a 6.1x debt-to-profit ratio in 1929 - very close to the healthy ratio - the combined BCA (BCA, UB, VB) Konzern's same ratio was 15.1x (and that was its best-performing year). The discrepancy between the independent and the combined BCA Konzern's performance can be fully ascribed to the UB because the VB, which was also merged into the BCA in 1927, had a relatively good Konzern. In fact, the VB's industrial enterprises improved on the overall performance of the combined BCA Konzern. Had there been no VB merger in 1927, the debt-to-profit ratio of the BCA-UB Konzern would have had an 18.5x debt-to-profit ratio in 1929, not the relatively better 15.1x. Further, if the BCA had acquired only the VB, the BCA-VB Konzern would have had a 6.4x debt-to-profit ratio in the same year, close to the healthy performance level. Viewed from this standpoint, the decision of the BCA's management on the pursuit of the merger with the UB seems foolhardy.⁵⁵

⁵³ The explanation to this is that the UB Konzern was indebted towards other parties as well, not only the UB.

⁵⁴ The author's own calculations based on the various banks' reports in the *Financial Compass*, 1926-35.

⁵⁵ BoEA, file OV28/32, Letter from Kay to Siepmann, 10 May 1926.

The figures raise the intriguing question. What was behind the VB's distress and why was it necessary to merge the VB into the BCA? Lacking sufficiently reliable information on this matter, I can only develop two hypotheses. As Panel 3 of Table 5 shows, the VB's industrial base had a debt-to-profit ratio of 9.5x in 1926, which worsened to 11.1x by 1928. Presumably, at the time of the merger, only the threat of the VB Konzern's weak and potentially deteriorating performance was perceived, and the post-1928 improving performance could not yet be foreseen. Based on this information, the merger of the VB and the BCA was necessary to save the seemingly failing VB. An alternative explanation may be that the VB, a healthy bank in relative terms, was granted to the BCA for agreeing to acquire the much weaker UB. The UB was ravaged not only by its bad assets but also by the French franc scandal.⁵⁶ The scandal involved a number of politicians, and the merger of the UB into the BCA was identified as a solution to hush up the matter.⁵⁷ Based on this line of argument, the VB may have been the sugar-coat which helped the BCA swallow the merger with the UB.

The UB's weak Konzern can not only explain the collapse of the BCA but also that of the CA. In 1929, when the BCA could no longer sustain the UB's Konzern, it failed and was merged into the CA. In that year, the CA's independent Konzern had a debt-to-profit ratio of 8.7x which declined to 8.2x in the following year, suggesting an improving industrial base. However, at the merger, when the CA swallowed the combined BCA Konzern, bad assets were again not acknowledged and written off. The weakly performing companies that the CA had acquired at the merger thus meant a continuing burden for the bank. If only the VB's and the BCA's Konzern had been amalgamated with the industrial base of the CA, the combined three-bank-network would have had a debt-to-profit ratio of 8.1x in 1930. That is, the BCA and VB's Konzerns would have improved on the solvency of the CA and would have strengthened the bank's tier-1 structure that had issues with collecting principal repayments from its borrowers, but no problems with receiving interest payments. Such a structure could have existed for a very long time, in theory, even in perpetuity. The problem hence resided in the UB Konzern. If only the UB's Konzern had been merged into the CA, the debt-to-profit indicator of the two-bank-Konzern would have been a whopping 33.4x. Viewed from this perspective, it is clear why the

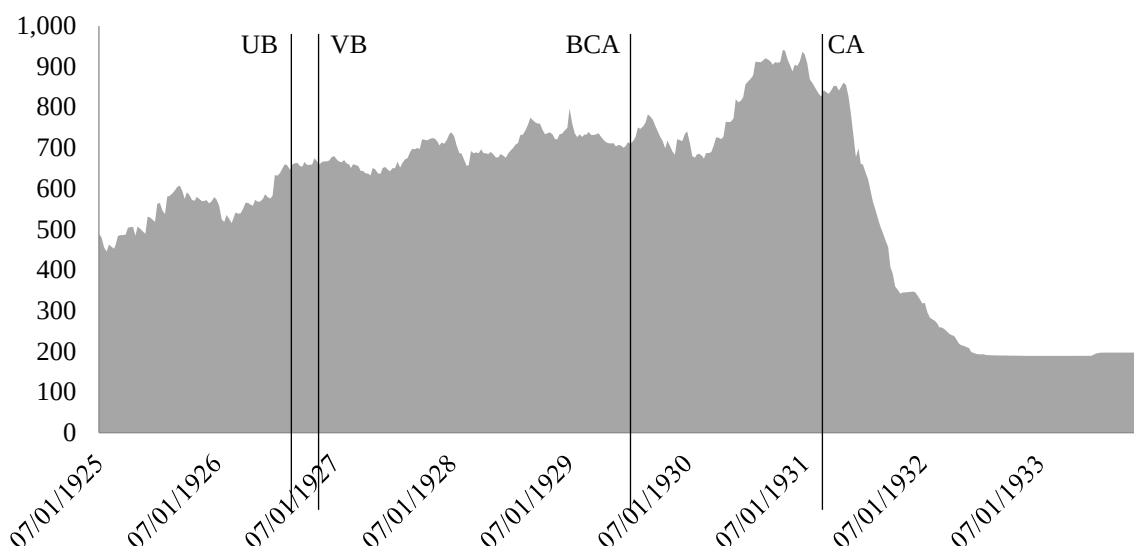
⁵⁶ BoEA, file OV28/1, Letter from the Foreign Office and Board of Trade to Norman, 9 Dec. 1926.

⁵⁷ Ausch, *Als die Banken fielen*; Jobst and Kernbauer, *The quest*; the author's discussions with Dr. Nathan Marcus.

management of the CA resisted the merger with the BCA which was forced on the bank by the Austrian authorities.⁵⁸

The final question to address is: who eventually pulled the trigger on the four insolvent banks? The following analysis distinguishes between two time periods: one before the date of the announcement of each bank's distress and the other afterwards. None of the four banks actually failed: they all decided to seek a bailout. Information on whether they were only insolvent or also illiquid when they sought the bailout may reveal important details about their motivations. Differentiating across domestic and foreign creditors is also essential to this investigation.⁵⁹

Figure 10 The reserves of the Austrian National Bank (million Austrian Schilling)



Source: ANB Mitteilungen, 1926-32.

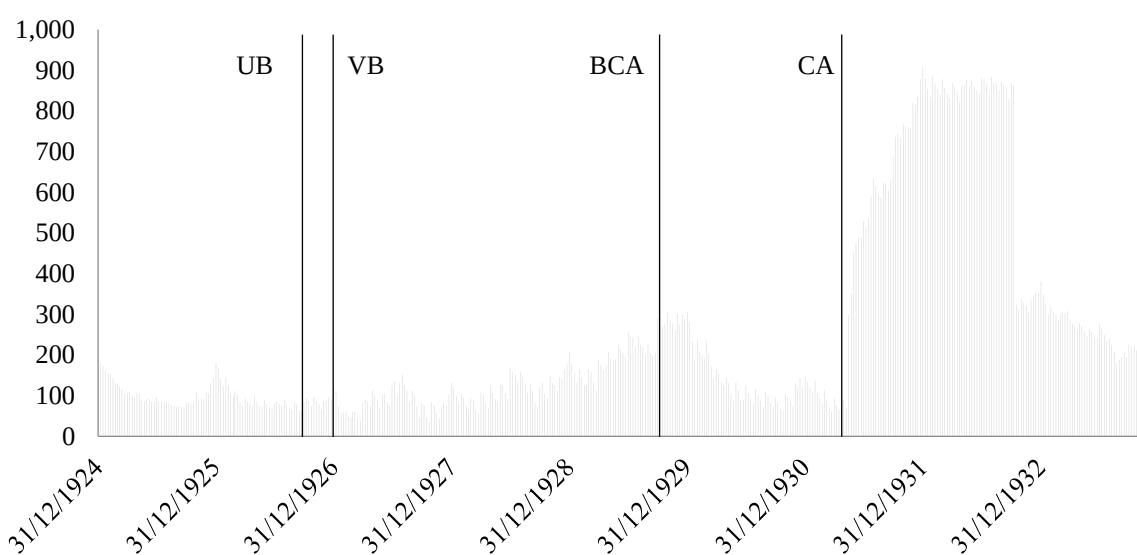
Figure 10 presents the weekly change in the ANB's reserves, and for each of the four banks, it indicates the date when the bank's distress was announced. If foreign creditors start a flight, banks turn to the central bank to purchase foreign currency, and this reduces the central

⁵⁸ Schubert, *The Credit-Anstalt*, pp. 42-3.

⁵⁹ The analyses review the domestic creditors discussed under the earlier section of the paper. The only domestic creditor not analysed here is interbank lending. Unfortunately, there are data limitations for this financing source: interbank lending data are annual and are not disaggregated to bank. Available data points show a decline in interbank lending from 1930 to 1931, but it is unclear whether this happened before or after early May 1931, and it is unclear to what extent it affected the CA. For other years, the changes in interbank lending are not significant or show and increase. Due to data limitations, the paper, therefore, draws conclusions without these data points. Nonetheless, since interbank lending made up a small portion of domestic creditors, they probably would not affect the conclusions.

bank's reserves. This did not occur in the days before the announcement of any of the four debacles. Further, in the case of the UB, the VB, and the BCA, there was also no significant decline in reserves following the announcement. The CA's case is different in this regard: here the announcement on 11 May 1931 triggered an enormous and continuous decline in ANB reserves. After this date, the flight of foreign creditors definitely contributed to the CA's illiquidity.

Figure 11 The rediscount of the Austrian National Bank (million Austrian Schilling)



Source: *ANB Mitteilungen*, 1926-33.

The question hence still remains: in the days preceding the announcement of their distress, were these banks illiquid - if not due to a foreign creditor flight then due to a domestic creditor flight? For domestic financiers, high frequency data are only available for depositors (monthly)⁶⁰ and the ANB's rediscount (weekly, depicted on Figure 11), which together made up approximately a quarter of the universal banks' financing sources. As Figure 11 shows, the ANB's rediscount did increase before the BCA's collapse, suggesting that the central bank was providing liquidity to the BCA. The bank also experienced a depositor flight immediately after the announcement of its distress. The VB's deposits were continuously increasing right until its

⁶⁰ *ANB Mitteilungen*, 1926-33.

merger with the BCA, and, based on Figure 11, there seems to be no increase in the ANB's rediscount before the announcement of the VB's merger with the BCA. This implies that this bank was not illiquid. The announcement of the UB's troubles also did not trigger significant changes to the ANB's rediscount (Figure 11). This bank's deposits did decline in the weeks before its merger with the BCA, but by that time the bank's distress had been publicly known for more than five months. This suggests that the bank's merger with the BCA was decided when the UB was insolvent but not yet illiquid. The CA's deposits were increasing prior to 11 May 1931, and before this date there was no change in the ANB's rediscount (Figure 11). These imply that the CA turned to the ANB for help when it was insolvent but not yet illiquid. Following 11 May, however, within just a few days, the ANB's rediscount increased many-fold, suggesting an enormous domestic flight.

Panel 3 of Table 5 provides some clues about another important domestic creditor, the Konzern, which covered over a third of the universal banks' financing sources. Unfortunately, these data are annual and can thus only indirectly indicate the likely impact of Konzern creditors on bank liquidity. The data reveal that the UB Konzern in 1926 and the BCA combined Konzern in 1929 had a debt-to-profit ratio which very likely made their mother banks not only insolvent but also illiquid. The same does not apply to the VB. The VB Konzern was in tier-1 insolvency, implying that the bank was insolvent but very likely it was still liquid before its merger into the BCA.

Panel 1 of Table 5 shows the figures for the CA combined Konzern which in 1930 is equivalent to the aggregate debt-to-profit figures. In 1930, the bank's debt-to-profit ratio was in the illiquid, above 12x category. Panel 2 also shows that the actual reported cash income of the four Konzerns dropped from AS 103 million in 1929 to AS 76 million in 1930. Since in 1930 all four Konzerns were already owned by the CA, this drop in earnings directly affected only this bank. This suggests that the CA became illiquid by early 1931 because 30 per cent of its Konzern's cash income evaporated.

High frequency data about the flight of domestic creditors thus provide conclusive evidence for the BCA and the VB. The data reveal that the former was illiquid before as well as after its distress was announced, while the latter was liquid right until its merger with the BCA. This supports the hypothesis that the VB did not actually fail but was a gift to the BCA for swallowing the UB. Evidence is, however, conflicting regarding the CA and the UB. It is unclear

whether domestic creditors were fleeing these banks prior to the announcement of their distress. What is certain is that after this date, the UB experienced some, the CA an enormous domestic creditor flight.

Qualitative evidence for the CA may, however, bring a bit more clarity. The events on 8 May were preceded by an internal decision within the CA which involved Zoltán Hajdu, a director of the CA, refusing to sign the CA's financial accounts for 1930. His claim was that the books contained misrepresentations and he would not put his name underneath 'until the usual method of drawing it up was changed'.⁶¹ Hajdu's pivotal decision then had led to the next decision: to seek a bailout from the ANB. Why did Hajdu decide to break with the past at that very moment? James has posited that he may have developed moral reservations and simply could not continue with the cheating.⁶² However, since by that time Hajdu had been a director of the CA for five years and had most likely been aware for years of the 'usual method' of preparing the accounts, it is unclear why his conversion happened in connection with the books of 1930. Why not a year earlier or a year later? Based on the evidence presented in this paper, a possible explanation is that by the end of the financial year of 1930, the performance of the CA's Konzern deteriorated to such a significant extent that it threatened not only the solvency but also the liquidity of the bank.

It thus appears that at least three of these four universal banks could no longer continue with masking their insolvency behind liquidity and they decided to seek a bailout. Chapter 3 argues that the universal banks enjoyed the implicit, and the CA the explicit, guarantee of the Austrian authorities that they would be supported in times of trouble. They thus turned to the ANB knowing they would be supported.

What made the CA's situation more complex than its predecessors' was that after its amalgamation with the BCA, there was simply no bigger fish in the tank that could have supplied it with sufficient liquidity. As a result of acquiring the three other universal banks, the CA became a 'super bank' carrying 27 per cent of the financial system's total assets under one roof, with all this amounting to 150 per cent of the total annual revenues of the state budget and 16 per

⁶¹ James, *The end of globalization*, p. 53.

⁶² James, *The creation and destruction*, p. 77.

cent of the GDP.⁶³ While the three banks that failed before the CA could find fellow financiers who were able to bail them out, the CA was simply too big and there was no other bank sufficiently large to supply it with liquidity to mask the massive tier-3 insolvency it had inherited. As this behemoth was struggling under illiquidity, it had no one to turn to but the state.

ONE BAD APPLE

This paper has emphasized the importance of a domestic cause behind the Austrian banking crisis in 1931. The universal banking structure heavily exposed the largest banks to Austrian industry through their Konzerns. When Konzern corporations performed badly, as they did during the second half of the 1920s, so did the universal banks. The four banks that came under distress in 1925-31 were all insolvent from 1925 due to the weak performance of their Konzern. The paper has also shown that one bad apple, the UB's Konzern, spoiled the performance of a whole bunch of other universal banks and caused a systemic crisis in 1931. This finding suggests that the crisis may have been avoidable had the UB's troubles been adequately managed. Finally, while it remains unresolved whether the CA was illiquid before it decided to seek a bailout, it is certain that after 11 May 1931, the flight of both domestic and foreign creditors contributed to the banks' illiquidity.

Could this have been avoided? One option would have been allowing the UB to fail. The CA's, the BCA's, and the VB's Konzerns were performing much better in relative terms. Had these banks not been poisoned with the UB's Konzern, they may have survived. Their absorption of the UB's failing corporations and their avoidance to acknowledge and write off non-performing assets were what caused them to fail. At the same time, since the universal banks were closely interconnected through their Konzerns, they were reluctant to let one member go under who might then have undermined the stability of the rest as well. Not choosing this, however, eventually buried them all.

Another option would have been a state bailout of the UB. Had this bank been provided sufficient state support to write off its non-performing assets, it would not have gone bankrupt and would not have had to be merged into other stronger banks whom it would gradually weaken and cause to fail. What made this impossible was that the state was bound by restrictions set by

⁶³ The author's own calculations based on Kausel, Németh, and Seidel, 'Österreichs Volkseinkommen' and *Statistisches Handbuch*, 1923-35.

financial markets and the League of Nations, which considered bank bailouts anathema to the orthodox fiscal and monetary principals of the time.

APPENDIX

The number of financial accounts in the bank database

Table A1 The number of financial accounts in the bank database - detailed

	Compass 1926			Compass 1927			Compass 1928		
	Total	Reporting	Non-reporting	Total	Reporting	Non-reporting	Total	Reporting	Non-reporting
Total	398	284	114	382	264	118	364	274	90
Universal bank	8	8	0	8	8	0	8	8	0
Other bank	87	49	38	75	34	41	62	44	18
Mortgage bank	9	9	0	9	8	1	8	8	0
Savings bank	294	218	76	290	214	76	286	214	72
	Compass 1929			Compass 1930			Compass 1931		
	Total	Reporting	Non-reporting	Total	Reporting	Non-reporting	Total	Reporting	Non-reporting
Total	352	272	80	342	311	31	340	318	22
Universal bank	8	6	2	6	6	0	6	5	1
Other bank	48	37	11	40	36	4	39	34	5
Mortgage bank	9	8	1	10	8	2	9	8	1
Savings bank	287	221	66	286	261	25	286	271	15
	Compass 1932			Compass 1933			Compass 1934		
	Total	Reporting	Non-reporting	Total	Reporting	Non-reporting	Total	Reporting	Non-reporting
Total	334	315	19	329	313	16	321	312	9
Universal bank	5	5	0	5	5	0	5	5	0
Other bank	36	31	5	34	31	3	31	29	2
Mortgage bank	10	8	2	10	9	1	10	10	0
Savings bank	283	271	12	280	268	12	275	268	7

The representativeness of the bank database

Table A2 The representativeness of the bank database, 1929 (million Austrian Schilling)

Category	Source	Value
Total assets		
Total assets for the whole financial sector	This database	6,184
Total assets for Sparkassen	This database	2,213
Total assets for joint-stock banks	This database	3,971
Total assets for joint-stock banks	Weber, 'Vor dem großen Krach', p. 488.	3,800
Total assets for the whole financial sector	<i>Statistisches Handbuch</i> , 1931, pp. 134, 139.	4,873
Total assets for Sparkassen	<i>Statistisches Handbuch</i> , 1931, p. 139.	1,524
Total assets for joint-stock banks	<i>Statistisches Handbuch</i> , 1931, p. 134.	3,366
Deposits		
Deposits for the whole financial sector	This database	2,606
Deposits for the whole financial sector	Weber, 'Vor dem großen Krach', p. 308.	1,435
Deposits for the whole financial sector	<i>Statistisches Handbuch</i> , various issues.	1,945
Creditors		
Creditors for the whole financial sector	This database	2,693
Creditors for the whole financial sector	<i>Statistisches Handbuch</i> , 1931, pp. 136, 140.	2,210
Short-term borrowers		
Short-term borrowers (Debitoren) of the whole financial sector	This database	2,858
Short-term borrowers (Debitoren) of the whole financial sector	Weber, 'Vor dem großen Krach', p. 319.	2,731
Short-term borrowers (Debitoren) of the whole financial sector	<i>Statistisches Handbuch</i> , 1931, pp. 136, 139.	2,275

PRIMARY SOURCES

- Bankhistorisches Archiv Österreichische Nationalbank. (The Archive of the Austrian National Bank) Mitteilungen des Direktoriums der Österreichischen Nationalbank (abbreviation: *ANB Mitteilungen*), reviewed for 1926-33.
- Bank of England Archive (abbreviation: BoEA), files OV28/1, 32, 75.
- Compass-Verlag, *Compass Finanzielles Jahrbuch*. (abbreviation: *Financial Compass*) Vienna, Austria: Compass-Verlag, reviewed for 1926-35.
- Compass-Verlag, *Compass Kommerzielle Jahrbuch*. (abbreviation: *Commercial Compass*) Vienna, Austria: Compass-Verlag, reviewed for 1925-32.
- Der Österreichische Volkswirt (in English: The Austrian Economist) (abbreviation: ÖVW), publisher: Walther Federn, place: Vienna, Austria, reviewed for 1928-31.
- Kausel, A., Németh, N., and H. Seidel, Österreichs Volkseinkommen 1913 bis 1963. Monatsberichte des Österreichischen Instituts für Wirtschaftsforschung, Sonderheft, No. 14 (Vienna, 1965).
- Magyar Országos Levéltár (Hungarian National Archive, abbreviation: HNA), file Z12, bonds (in Hungarian: csomó) 60, 128, 129.
- Nagy Magyar Compass – Pénzügyi és kereskedelmi évkönyv (in English: Big Hungarian Compass – Financial and Commercial Yearbook, abbreviation: *Hungarian Compass*), (ed.), Mihály Della Vendella, (Budapest), reviewed for 1925/6 – 1934/5.
- Rothschild Archive London, (abbreviation: RAL), file III/488 (a-c) Austria.
- Statistisches Handbuch für die Republik Österreich (in English: Statistical Handbook for the Austrian Republic), publisher: Bundesamt für Statistik, place: Vienna, Austria, reviewed for 1923-35.
- Statistische Nachrichten (in English: Statistical News), publisher: Bundesamt für Statistik, place: Vienna, Austria, reviewed for 1925-32.

BIBLIOGRAPHY

- Accominotti, O. and Eichengreen, B., 'The mother of all sudden stops: capital flows and reversals in Europe, 1919-32', *Economic History Review*, Volume 69, Issue 2, (2016), pp. 469–492.
- Aguado, I.G., 'The Creditanstalt crisis of 1931 and the failure of the Austro-German customs union project', *The Historical Journal*, vol. 44, no. 1, (2001), pp. 199–221.
- Albers, T. and Uebele, M., 'The global impact of the Great Depression', LSE Economic History Working Paper 218, The London School of Economics and Political Science, (2015).
- Ausch, K., *Als die Banken fielen - zur Soziologie der politischen Korruption*, (Wien, 1968).
- Bruckmüller, E. and Sandgruber, R., 'Concepts of economic integration in Austria during the twentieth century', in A. Teichova and H. Matis, eds., *Nation, state and the economy in history*, (Cambridge, 2003), pp. 159-81.
- Butschek, F., 'External shocks and long-term patterns of economic growth in Central and Eastern Europe', in D.F. Good, ed., *Economic transformations in Eastern Europe: legacies from the past and policies for the future*, (London-New York, 1994), pp. 27-42.
- Butschek, F., *Österreichische Wirtschaftsgeschichte: von der Antike bis zur Gegenwart*, (Wien, 2011).
- Calomiris, C.W. and Gorton, G., 'The origins of banking panics: models, facts, and bank regulation', in R.G. Hubbard, ed., *Financial markets and financial crises*, (Chicago, 1991), pp. 109-74.
- Clavin, P., *The Great Depression in Europe, 1929-1939*, (European history in perspective), (Basingstoke, 2000).
- Cottrell, P.L., "'Mushrooms and dinosaurs': Sieghart and the Boden-Credit-Anstalt during the 1920s', in A. Teichova, T.R. Gourvish, Á. Pogány, and P.L. Cottrell, eds., *Universal banking in the twentieth century, finance, industry and the state in North and Central Europe*, (Aldershot, 1994), pp. 155-77.
- Diamond, D.W. and Dybvig, P., 'Bank runs, deposit insurance, and liquidity', *The Journal of Political Economy*, Vol. 91, No. 3, (1983), pp. 401-19.
- Diamond, D.W. and Rajan, R.G., 'Liquidity shortages and banking crises', *The Journal of Finance*, 60 (2), (2005), pp. 615-47.
- Eckstein, A., *National income and capital formation in Hungary, 1900-1950*, (Cambridge, 1956).
- Eichengreen, B.J., *Golden fetters: The gold standard and the Great Depression, 1919-1939*, (New York-Oxford, 1992).
- Eichengreen, B.J., *Hall of mirrors: The Great Depression, the Great Recession, and the uses-and misuses-of history*, (Oxford, 2015).
- Eigner, P., 'Interlocking directorships between commercial banks and industry in interwar Vienna' in A. Teichova, T.R. Gourvish, Á. Pogány, and P.L. Cottrell, eds., *Universal banking in the twentieth century: Finance, industry and the state in North and Central Europe*, (Aldershot, 1994), pp. 260-93.

- Eigner, P., 'Bank-industry networks: the Austrian experience, 1895-1940' in P.L. Cottrell, ed., *Rebuilding the financial system in Central and Eastern Europe, 1918-1994*, (Aldershot, 1997), pp. 91-114.
- Eigner, P., 'Die Konzentration der Entscheidungsmacht: die personelle Verflechtungen zwischen den wiener Grossbanken und Industriaaktiengesellschaften, 1895-1940', (unpub. Ph.D. thesis, Universität Wien, 1997).
- Eigner, P., 'In the center of Europe: Vienna as a financial hub, 1873-1913', in G.D. Feldman and P. Hertner, eds., *Finance and modernization: a transnational and transcontinental perspective for the nineteenth and twentieth centuries*, (Aldershot-Burlington, 2008), pp. 29-50.
- Eigner, P., 'Personal networks in the Austrian corporate economy: function, structure and development, 1900 – 1938' http://www.marshallplan.at/images/papers_berkeley/EIGNER.pdf (accessed on 1 October 2016).
- Ellis, H.S., 'Exchange control in Austria and Hungary', *The Quarterly Journal of Economics*, 54, no. 1, (1939), pp. 1-185.
- Enderle-Burcel, G., 'The failure of crisis management: banking laws in interwar Austria', in A. Teichova, T.R. Gourvish, Á. Pogány and P.L. Cottrell, eds., *Universal banking in the twentieth century: finance, industry and the state in North and Central Europe*, (Aldershot-Brookfield, 1994), pp. 116-30.
- Federn, W., 'Der Zusammenbruch der österreichischen Creditanstalt', *Archiv für sozialwissenschaft und sozialpolitik*, (1932), pp. 403-465.
- Feinstein, C.H., Temin, P., and Toniolo, G., 'International economic organization: banking, finance and trade in Europe between the wars', in C.H. Feinstein, ed., *Banking, currency, and finance in Europe between the wars*, (Oxford: Clarendon, 1995), pp. 9-76.
- Feinstein, C.H., Temin, P., and Toniolo, G., *The world economy between the world wars*, (Oxford and New York, 2008).
- Fior, M., 'The financial instability of transition economies during the 1920s: the European reconstruction and Credit-Anstalt insolvency.' in *XIV International Economic History Congress*, (Helsinki, 2006), pp. 119-42.
- Hertz, F., 'The economic chaos in Central Europe', *The Contemporary Review*, 143, (1933), pp. 326-34.
- James, H., 'The causes of the German banking crisis of 1931', *Economic History Review*, 2nd Ser., XXXVII, (1984), pp. 68-87.
- James, H., *The Reichsbank and public finance in Germany 1924-1933 : a study of the politics of economics during the great depression*, (Frankfurt Am Main, 1985).
- James, H., *The German slump: Politics and economics 1924-1936*, (Oxford, 1986).
- James, H., 'Financial flows across frontiers during the interwar depression', *Economic History Review*, XLV, (1992), pp. 594-613.
- James, H., *The end of globalization: lessons from the Great Depression*, (Cambridge-London, 2002).
- James, H., *The creation and destruction of value: the globalization cycle*, (Cambridge, Mass., 2009).

- Jobst, C. and Kernbauer, H., *The quest for stable money*, (Wien, 2016)
- Kernbauer, H. and Weber, F., 'Multinationales Banking im Donauraum: die Geschäftspolitik der wiener Großbanken, 1918-1929', *Österreichische Zeitschrift für Geschichtswissenschaften*, vol. 4. (1994), pp. 585-616.
- Kindleberger, C.P., *The World in Depression, 1929-1939*, (Berkeley, 1986).
- Lewis, C., *America's stake in international investments*, (Washington, 1938).
- Marcus, N., *Credibility, confidence and capital: Austrian reconstruction and the collapse of global finance, 1921-31*, (Cambridge, forthcoming).
- März, E., *Austrian banking and financial policy*, (London, 1984).
- März, E., 'Die große Depression in Österreich, 1930-1933' *Wirtschaft und Gesellschaft*, 16, 3, (1990), pp. 409-438.
- Matis, H., 'Disintegration and multi-national enterprises in Central Europe during the post-war years, 1918-1923', in A. Teichova and P.L. Cottrell, eds., *International business and Central Europe, 1918-1939*, (Leicester-New York, 1983), pp. 73-96.
- Matis, H., 'An economic background to Berchtesgaden: business and economic policy in Austria in the 1930s', in T. Gourvish, ed., *Business and politics in Europe, 1900-1970. Essays in honour of Alice Teichova*, (Cambridge, 2003), pp. 42-62.
- Mosser, A. and Teichova A., 'Investment behaviour of industrial joint-stock companies and industrial shareholding by the österreichische Credit-Anstalt: inducement or obstacle to renewal and change in interwar Austria' in H. James, H. Lindgren, and A. Teichova, eds., *The role of banks in the interwar economy*, (Cambridge, 1991), pp. 122-57.
- Obstfeld, M. and Taylor, A.M., 'The Great Depression as a watershed: international capital mobility over the long run', NBER Working paper no. 5960, (1997).
- Postel-Vinay, N., 'What caused Chicago bank failures in the Great Depression? A look at the 1920s', *The Journal of Economic History*, 76.02, (2016), pp. 478-519.
- Rathkolb, O., 'The Austrian voter in historical perspective', in G. Bischof and F. Plasser, eds., *The changing Austrian voter*, Contemporary Austrian Studies, Vol. 16, (New Brunswick, 2008), pp. 12-51.
- Rudolph, R.L., *Banking and industrialization in Austria-Hungary: the role of banks in the industrialization of the Czech Crownlands, 1873-1914*, (Cambridge, 1976).
- Schubert, A., *The Credit-Anstalt crisis of 1931*, (Cambridge-New York, 1991).
- Stiefel, D., 'The reconstruction of the Credit-Anstalt', in A. Teichova and P.L. Cottrell, eds., *International business in Central Europe, 1918-1939*, (Leicester, 1983), pp. 178-93.
- Stiefel, D., '"For better, for worse...": the Credit-Anstalt and its customers in 1931', in A. Teichova, T.R. Gourvish, Á. Pogány, and P.L. Cottrell, eds., *Universal banking in the twentieth century, finance, industry and the state in North and Central Europe*, (Aldershot, 1994), pp. 178-93.
- Stiefel, D., 'The bankers' view: Austria's economic and political development and the role of banks', in G.D. Feldman and P. Hertner, eds., *Finance and modernization: a transnational and transcontinental perspective for the nineteenth and twentieth centuries*, (Aldershot-Burlington, 2008), pp. 3-28.
- Teichova, A., 'Industry' in M.C. Kaser and E.A. Radice, eds., *The economic history of Eastern Europe, 1919-1975, Vol.1: Economic structure and performance between the*

- two wars (Oxford, 1985), pp. 222-322.
- Teichova, A., 'Continuity and discontinuity' in D.F. Good, ed., *Economic transformations in Eastern Europe: legacies from the past and policies for the future*, (London-New York, 1994), pp. 63-74.
- Teichova, A. and Cottrell P.L., 'Industrial structures in west and east Central Europe during the interwar period.' in A. Teichova and P.L. Cottrell, eds., *International business in Central Europe, 1918-1939*, (Leicester, 1983), pp. 31-56.
- Teichova, A. and Matis, H., *Österreich und die Tschechoslowakei 1918-1938: die wirtschaftliche Neuordnung in Zentraleuropa in der Zwischenkriegszeit*, (Wien: 1996).
- Temin, P., *Lessons from the Great Depression*, Lionel Robbins Lectures, (Cambridge, Mass., 1989).
- Temin, P., 'The German crisis of 1931: evidence and tradition', *Cliometrica* 2, no. 1, (2008), pp. 5-17.
- Wärmer, *Das österreichische Kreditwesen*, (Wien, 1936).
- Weber, F., 'Universal banking in interwar Central Europe', in A. Teichova, H. Lindgren, and H. James, eds., *The role of banks in the interwar economy*, (Cambridge, 1991), pp. 19-25.
- Weber, F., 'Vor dem großen Krach: die Krise des österreichischen Bankwesens in den zwanziger Jahren', (unpub. Ph.D. thesis, Universität Salzburg, 1991).
- Weber, F., 'The permanent crisis: the Austrian banking system, 1918–38', Paper presented to the Workshop on banking, currency and finance, European Science Foundation. Network on the economic history of Europe between the Wars, (Venice, 1992).
- Weber, F., 'From imperial to regional banking: the Austrian banking system, 1918-1938' in C.H. Feinstein, ed., *Banking, Currency, and Finance in Europe between the Wars*, (Oxford, 1995), pp. 338-56.
- Weber, F., 'Austrian banking between two Great Depressions: the Creditanstalt from the 1870s to the 1930s', in G.D. Feldman and P. Hertner, eds., *Finance and modernization: a transnational and transcontinental perspective for the nineteenth and twentieth centuries*, (Aldershot-Burlington, 2008), pp. 76-98.
- Whale, P., *Joint stock banking in Germany: A study of the German credit banks before and after the war*, (London, 1930).