

Currency vs. Banking in the German Debt Crisis of 1931

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Abstract

An old debate about whether currency or banking were the cause of the German crisis of 1931 has recently flared up again, with well-known views and new evidence being hotly exchanged. The question of where to place the responsibility for the crisis seems to be as relevant and as highly emotionalized as ever. The present paper aims to make two contributions. First, it argues that the recent debates do not help much in settling the big issue of determining the deeper responsibilities: both the banking and the currency problems of Germany were endogenous to the country's precarious external balance. High external debt, both commercial and on reparations account, made the economy highly susceptible to payments problems in a downturn. The paper's second contribution is to test for the relevance of the currency and banking hypotheses in a data-rich environment. We adopt a Bayesian dynamic factor model for the transmission of business cycle shocks between the U.S. and Germany, and attempt to trace the effects of nominal and real shocks in one economy on the other. While effects exist in both directions, they are generally too weak to substantiate the view that currency shocks or banking problems were a fundamental cause for the German slump.

JEL codes:

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Introduction

Between 1929 and 1932, Germany's national product declined by an estimated 25 percent, which is the second largest output decline among the large industrialized nations, right behind the U.S. and far ahead of Britain or France. While this catastrophic slump did little to undermine the political system in the U.S., it did so in Germany: the Weimar Republic submerged in political chaos, frequent but indecisive general elections, and bloody streetfighting between political extremists, until an exhausted political class handed power over to the Nazi regime.

Keynesian writers of the 1960s and 1970s laid the blame for the economic disaster at the feet of Chancellor Heinrich Brüning, head of an emergency cabinet between 1930 and 1932, whose policies of deflation and budget cuts were seen as having greatly aggravated the crisis. Under Keynesian assumptions, in a fixed exchange rate system such as the Gold Standard, fiscal policy would be the decisive tool for fighting a recession. Cutting budgets during a slump seemed rather counterproductive from this perspective, and could only be explained as the result of either misguided policy doctrines or sinister political intentions.

Fiscal policy as a tool for fighting the slump came under new scrutiny when Borchardt (1979) challenged conventional wisdom and argued that fiscal policy had been too lax in the 1920s, causing funding problems during the slump itself. Borchardt looked at both quantitative and archival evidence and concluded that beginning in 1931, the central government had severe difficulties obtaining even short-term credit, not to speak of long-term loans. He blamed this on large-scale

borrowing by public authorities on all levels after the currency stabilization of 1924, which he argued had exhausted the degrees of freedom of fiscal policy.

Followers of Borchardt, notably James (1984, 1986), have linked the problems of German public finance in the late 1920s to the banking and currency difficulties of the early 1930s, notably the July 1931 crisis. During that month, the Reichsbank, Germany's central bank, got into severe difficulties and reacted by curbing credit facilities to banks and businesses. This set off, in turn, a banking panic with a bank holiday, the foreclosure (and de-facto nationalization) of two of Germany's five largest universal banks, a rescheduling arrangement with Germany's foreign short-term creditors, the introduction of capital controls, the decrease in the gold cover from 40 percent to 25 percent, and a one-year moratorium on reparations. Its more long-term economic consequences were the end of reparations in 1932, the German foreign debt default of 1933, as well as the turn towards domestic credit expansion, autarky, and trade diversion away from its principal creditor countries (Ritschl, 2002).

James' (1984, 1986) main observation was that Germany's international position during the critical days of July 1931 deteriorated primarily through domestic capital flight. The more traditional position, maintained by Holtfrerich (1991) against Borchardt and James, was that Germany's public finance was not a problem, that foreign credit to avert the payments crisis would have been available but was refused, and that aggressive foreign policy statements by the German government triggered the crisis.

These debates have recently experienced a comeback. Employing micro data from the German banking sector, Schnabel (2004) and Adalet (2005) examine the financial frictions channel of the German depression and find evidence in favor of James' (1986) banking view of the German slump. According to their results, the German banking system had been structurally weak since the hyperinflation, and was heavily exposed internationally. Given the susceptibility of the German banking system to shocks to its foreign position, the banking channel seemed an obvious one.

Ferguson and Temin (2004) and Temin (2006) have taken the traditional currency position again, and argue just like their predecessors that the banking system was not unhealthy, that foreign credit was available, and that foreign policy games by Brüning precipitated an avoidable currency crisis. This view reflects one tradition in American historiography (as in Kindleberger, 1973, Temin, 1989, Eichengreen, 1992, Eichengreen, Temin, and Toniolo, 1998), which departs from the classical Friedman-Schwartz (1963) position in assigning a stronger role to international elements in the Great Depression, but which argues for failures of the international Gold Standard as the cause for the deepening of the slump.

The present paper aims to make two contributions. First, drawing on Ritschl (2002), it looks at the relevance of the currency vs. banking debate for the 1931 crisis by examining the precarious external debt position of the German economy at the time. We ask the question of whether a crisis was avoidable given the magnitude of Germany's external debt. As German foreign debt was split between commercial debt and reparations, the relative seniority of both portions of the German debt will play a certain role. We show that debt relief on reparations in the wake of the 1931 was

significant and helped to stabilize Germany's ratio of foreign commercial debt to GNP at a less than critical ratio. Second, the paper undertakes an indirect test of the currency and banking hypothesis for Germany. We employ a dynamic factor model for the U.S. and Germany to trace possible effects of nominal shocks on the German economy using a rich set of time series data for both economies. We argue that while nominal effects are present, they play only a minor role in explaining the German slump. The main thrust of Germany's output decline came neither from currency nor from banking problems.

In terms of the econometrics, an approach allowing for rich dynamics is called for in order to track the dynamic interconnections between the various economies. Traditional vector autoregression (VAR) analysis would not be adequate for including a wide set of country-specific time series. To reduce dimensionality, we adopt the dynamic factor analysis approach developed, *inter alia*, by Stock and Watson (1989, 1998) and Kose, Otrok and Whiteman (2003). We further use vector autoregressions to analyse the interdependencies of the estimated latent factors, which is similar to Bernanke, Boivin and Elias (2005).

Our approach to the dynamic factor models is a Bayesian one. We employ Monte Carlo Markov chain (MCMC) techniques to infer the posterior distributions. Our choice of a Bayesian framework is motivated by pragmatic considerations regarding computational convenience, following the lead of Otrok and Whiteman (1998). As is implicit in the MCMC methodology, our estimates are actually very robust to changes in the prior; hence our choice of the Bayesian framework can be regarded as a matter of computational convenience. However, there are also underlying principal

considerations. Our research question would not be easy to cast in the context of a sampling philosophy. The data we look at are not just random samples from an imaginary pool of international historical recessions (where we luckily happened upon the one we are actually interested in). Nor could the data in principle be improved by drawing larger and larger samples (which would involve sampling over many recessions and not just this one). Instead, we are interested in an optimal description of one particular dataset, attempting to choose between rivaling explanatory models. Thus, our dataset is clearly non-random non-sample, and our research question is very naturally spelled out as a Bayesian problem of model choice.

Business cycle transmission with recent international data has been analyzed by structural VARs as in Stock and Watson (2003) and by dynamic factor models as in Eickmeier (2004). To our knowledge, the present paper is the first study applying modern time series methodology to the international depression of the interwar period. Due to the limitations that existed so far in extending VARs to panel data, existing econometric work on the international Great Depression, as in Bernanke and James (1991) and Bernanke and Carey (1996), was confined to cross section methods.

Our approach to the problem is motivated by the idea of grouping the national time series into nominal and real series, and of extracting factors specific to these groups accordingly. Doing so, we reduce the dimensionality of the problem to essentially studying the dynamic relationships between these country-specific factors, as well as a paramount international factor designed to provide aggregate information on the international level. We find that the real factors we construct from the data coincide well with traditional business cycle dating schemes and historical national accounts

for the respective countries. This is well in line with the results of Stock and Watson (1998) on a factor approach towards business cycle dating.

The rest of this paper is structured as follows. The next section briefly looks into Germany's foreign debt and reparations problem and argues the obvious: that Germany's 1931 crisis was first and foremost a foreign debt and reparations crisis. Compared to its magnitude, the currency and banking problems discussed in the recent literature are mere second-order effects. Section 3 characterizes the dynamic factor model we employ. Section 4 provides the data. Section 5 obtains the factors and turns to a test of the currency and banking hypothesis on the German crisis. Section 6 concludes.

II. Foreign Debt in the German Currency and Banking Crisis

In 1929, Germany owed about 25 to 31 bn reichsmarks in commercial debt abroad (see Deutsche Bundesbank, 1976). To this added about 35 bn reichsmarks of reparations debt, capitalizing the Young Plan reparations at the going interest rate. Calculating this into German GNP at the time, which Ritschl (2002) estimates at 88.4 bn reichsmarks, Germany's ratio of foreign debt to GNP in 1929 was somewhere between 68 and 75 percent. By mid-1931, commercial debt had slightly increased, while nominal GNP had fallen to some 70 bn reichsmarks. The resulting ratio of foreign debt to GNP for 1931 was somewhere between 90 and 98 percent.

(Table 1 about here)

In 1930, nominal debt service, including reparation annuities, amounted to 3.1 bn reichsmarks, down from a slightly higher amount the year before.¹ This is shown in Table 2. In relative terms, debt service including reparations in 1930 amounted to 23 percent of Germany's total export revenues, and to 174 percent of her commercial trade surplus (Table 3). This was not a one-time problem, as Germany's foreign trade revenues continued to fall as the depression deepened. Given the collapse of international trade and Germany's high initial debt burden, the occurrence of a German debt crisis during the depression is almost a foregone conclusion. Other countries in history have defaulted at far lower foreign debt burdens.

(Tables 2 and 3 about here)

In 1931, the foreign debt crisis did indeed arrive. The central bank suffered an attack, as did commercial banks, and in the process, Germany's foreign debt was rescheduled to cut debt service in half. The 1931 figures in Tables 2 and 3 reflect less than 50 percent of this reduction, as the changes went into effect only between July and September of that year. The figures for 1932 show the full amount of Germany's debt relief: annual debt service was now less than half the 1930 figure, and the same is true of the debt/income ratio.

Debtors in international capital markets are sovereign to the jurisdiction of creditors, so that these markets are highly imperfect. A thorny issue for theory is to explain why excessive lending occurs in the first place, and why previous defaulters obtain new

¹ This decline reflects the reduction in reparation annuities under the Young Plan over the steady-state annuity of the Dawes Plan.

credit. Interwar Germany was no exception to this. Between 1919 and 1923, Germany was constantly in arrears with her reparation obligations, and the reparation conflict is one aspect of the German hyperinflation. The Dawes Plan of 1924 established a new payments scheme for reparations, put Germany back on the Gold Standard, and provided protection for commercial creditors to Germany against reparation claims in case of a central bank run. Ritschl (2002) has argued that this amounted to a seniority reversal in the structure of German foreign debt, as it allowed Germany to issue senior commercial debt on top of its reparations burden.

As a consequence, reparations were paid smoothly, however they were fully recycled through – mostly American – credits.² Transfer protection for commercial credits was revoked in the Young Plan of 1929, leaving the status of existing commercial credits to Germany in doubt and making any further outlays junior to all existing claims, including reparations. Hence, prospective lenders of fresh money faced fundamentally different risks under the Young Plan than under the Dawes Plan. This made international support in a currency crisis far less likely than under the Dawes Plan.

As Table 1 bears out, Germany's foreign debt burden was about evenly split between commercial debt and reparations. Had one part of the debt been absent, the other would likely have been less than critical. This comes out in the figures for 1932, after reparations had been forgiven. In that year, the remaining debt/income ratio was around 45 percent, which would nowadays be considered high but not excessively risky. The same effect also becomes visible in the debt/income ratios for 1928 and 1929, which are high (at 75 percent) if both commercial and political debt is included,

² Schuker (1988) referred to this recycling as American reparations to Germany.

but low (around 35 percent) if reparations are excluded. It was the combination of the two elements of debt that made a debt crisis a likely event in any recession after 1929.

Germany's high commercial borrowing in the 1920s had left also its marks on the banking sector, as pointed out by Schnabel (2004) and especially by Adalet (2005). Deprived of deposits in domestic currency, German commercial banks eagerly took in foreign deposits, which financed large parts of German capital imports during the 1920s. Oftentimes, the term structure of banks' balances was inverted, though: short-term foreign liabilities were matched with illiquid, long-term domestic assets, making the banks highly vulnerable in case of a foreign shock.

When Germany's crisis finally broke out in 1931, it was neither just a currency nor a banking crisis, nor was it just a twin crisis combining the two. Instead, it began as a debt crisis, with an announcement by Brüning that Germany might face difficulties in paying the mid-year reparations installment under the Young Plan.³ It continued as a twin crisis of currency and banking, and ended with debt realignment, with capital controls, and with the suspension of precisely the reparation installment that Brüning had announced Germany would have difficulty paying.

The traditional criticism of Brüning has maintained that he deliberately ran a balanced budget in order to deflate the economy and provoke a transfer crisis, which would eventually bring down reparations.⁴ In an interesting twist to this traditional viewpoint, Ferguson and Temin (2003) and Temin (2006) turn the argument on its

³ See Heyde (1998) or Ritschl (2002) for a chronicle of events.

⁴ This hypothesis and the discussion are reviewed in the contributions to Von Kruegener (1991).

head. They argue that Brüning's announcement cut Germany off from international credit supplies and triggered a currency crisis that could otherwise have been avoided. The evidence discussed in the above tables suggests that the underlying assumption of German credit being in good standing in early 1931 would be difficult to defend. Research by Borchardt (1979) and James (1985) has shown that in early 1931, the central government faced considerable difficulties obtaining even short-term bank credits to cover its (modest) quarterly deficits. Banks with which the government negotiated obtained far-reaching political concessions, including paycuts in public service and cuts in social security. As shown by Balderston (1993), bond issues in international markets had dried up in 1930, with the Young Loan the major exception. Medium or long-term credit for the German government was not to be had in financial markets, be it domestic or abroad.

The argument also seems problematic for another reason. If German credit on the eve of the 1931 crisis was good, and if, as Temin (2006) maintains, the international exposure of the German banks was not a fundamental problem, funding Germany's government debt in international capital markets should have been easy, whatever the political debates between Brüning and his political antipodes in Paris. In fact, and contrary to what much of the literature following James (1984) seems to assume, German public finance was more solid than has been assumed. As Table 4 bears out, deficits in the central government budget were minimal. Even aggregating over the whole public sector including social security, the ratios of public deficits to GNP were unexciting and fell to minimal levels as the slump deepened.

(Table 4 about here)

This presents a problem for explaining the 1931 crisis from bad fiscal policy. If deficits and debt levels are low, fiscal policy is itself not a problem. But then there is no way of explaining the 1931 crisis from credit problems caused by government announcements. In the Mundell-Fleming model of fixed exchange rates, full capital mobility, and absent borrowing constraints (which Temin (2006) cites as his frame of reference), the transfer problem applies, and any monetary transfer between governments is counteracted by commercial credit transactions. Hence, a credit crunch faced by the German government can only be argued outside of the Mundell-Fleming framework, and credit constraints have to be introduced.⁵

Thus, Temin's (2006) credit crunch hypothesis of the 1931 crisis implicitly requires credit constraints on the public budget, of precisely the kind that Borchardt (1979) had argued for explicitly. Credit constraints in 1931 are indeed plausible, as shown in Tables 1 to 3. However, they did not come into existence just because of Brüning's public statements in 1931. Their true origin was instead that in 1931, Germany was hopelessly overindebted abroad by any modern standards. In this situation, currency problems could be hardly more than the transmission channel of more fundamental imbalances.

For the same reasons, the international exposure of Germany's commercial banking system, which Schnabel (2004) identifies as the main ingredient of the German banking crisis, is not itself a sufficient explanation. Recent explanations of twin crises in currency and banking by Kaminsky and Reinhart (1999), as well as of sudden

⁵ This point has been argued for the 1931 crisis by Ritschl (1998).

balance-of-payments reversals by Calvo and Reinhart (2000), have argued for herd behavior of investors triggering off crises when national banking systems are highly exposed. The herd itself is seen as irrational, as the situation would be sustainable if a collective action problem among investors could be solved. The evidence on Germany's high foreign debt suggests that sustainability was an actual problem in the German case: the conflict over reparations made it rational for international investors to pull out, and for domestic investors to seek safe havens as soon as it became likely that the Young Plan was in jeopardy.

Still, there is the question of how much currency and banking difficulties contributed to a deepening of the German crisis. That is to say, we are interested in finding out what role these two factors played in the German slump, even if they were merely transmission mechanisms of a more fundamental foreign debt problem.

III. A FAVAR Model of Currency and Banking in the German Slump

In this section we test the power of the currency vs. banking channels of crisis transmission directly. Our interest is in assembling a large variety of data series representing the real, monetary and financial condition of the German economy during the relevant period. As both hypotheses strongly rely on the international exposure of the German economy, we also include matching data for the U.S. economy. This enables us to find out whether the international transmission of the crisis from the U.S. indeed played a major role.

To go about our issue in an informative way, we need to assemble more information than could be processed by a standard Vector Autoregression (VAR), the workhorse model of empirical macroeconomic analysis. We follow recent developments in dynamic factor analysis that have augmented VARs with information gathered from a large cross section of time series. The idea of this procedure is to aggregate the common components of large time series panels into synthetic series or factors, which are then used as inputs into a standard VAR. These factors can be given a structural interpretation by aggregating the information over a specific set of series, e.g. monetary, financial, or real. This is also what we do here.

Next we introduce our structural dynamic factor model, which is similar to Kose, Otrok and Whiteman (2003). We collected data for a cross section of $i = 1, \dots, N$ variables from two countries, Germany and the U.S. Each of the time series is of length T , which we write as y_{it} . The series are expressed by:

$$y_{i,t} = \lambda_i^r f_t^r + \lambda_i^n f_t^n + u_{i,t}$$

with

$$u_{i,t} = \theta_1 u_{i,t-1} + \dots + \theta_p u_{i,t-p} + \psi_{i,t}$$

where the superscripts r and n represent real and nominal factors, respectively. λ_i represents the factor loadings and u_{it} is defined as the idiosyncratic (variable specific) component, with θ as the autoregressive parameter and $\psi_{i,t} \sim N(0, \sigma_{i,u}^2)$. For our specification we choose the idiosyncratic components to be independent across

variables, leads to an exact dynamic factor model.⁶ The law of motion for the factors is defined as:

$$f_t^k = \varphi_1^k f_{t-1}^k + \dots + \varphi_q^k f_{t-q}^k + v_t^k \text{ for } k = 0, \dots, K$$

with $v_t^k \sim N(0,1)$.

The factors in this model are identified up to a scaling constant and a sign restriction. The scale indeterminacy can be tackled by fixing the variance of the factor innovations v_t^k to be equal to a constant (see e.g. Sargent and Sims, 1977). We deal with the sign indeterminacy of the factor loadings λ_i and the factors f_t^k by restricting one of the factor loadings to be positive (see Geweke and Zhou, 1996). Neither of these two identification assumptions restricts the information content of the factor model.

We estimate the model in Bayesian fashion via the Gibbs sampling approach. This procedure enables the researcher to draw from nonstandard distributions by splitting them up into several blocks of standard conditional distributions. In our case, the estimation procedure is subdivided into two blocks: First, the parameters of the model $\{\varphi_s, \theta_r, \lambda_i\}$ for $s = 1, \dots, q$ and $r = 1, \dots, p$ are calculated applying equation-by-equation OLS, where we truncated the φ_s and θ_r to the stationary region. Second, conditional on the estimated values of the first block, the factor f_t is computed applying the Kim and Nelson (1999) approach, which uses the Carter and Kohn (1994) algorithm. After the estimation of the second block, we start the next iteration step again at the first block by conditioning on the last iteration step. If the number of

⁶ In the case of weak cross correlation between the idiosyncratic shocks, one obtains an approximate dynamic factor model.

iteration steps goes to infinity, then it can be shown that the conditional posterior distributions of the parameters and the factor will converge to their marginal posterior distributions at an exponential rate (see Geman and Geman, 1984). Finally, we set a prior on the parameters of the model similar to Kose, Otrok and Whiteman (2003).

IV. Data

Data are at a monthly frequency for September 1925 to November 1932. The U.S. series are taken from the NBER's macroeconomic history database, while the German data we draw from Wagemann (1935). The U.S. data include consumer and wholesale price indices, total and non-borrowed reserves held in the banking system, M1, gold reserves, discount rates, yields on long term bonds, steel production, machinery prices, orders of machinery, as well as an index of industrial production and trade. The German series are gold and foreign exchange reserves, short- and long term deposits, wholesale and consumer price indices, currency in circulation, discount rates, domestic orders of machinery, steel production, industrial production, and employment in the metal trades.

V. Results

a. Real and Nominal Factors

To add structure to the factor approach, we restrict the data space on which factors are allowed to load. For the U.S., we identify two nominal factors, which are designed to

capture the monetary side of the U.S. economy. The “real” side is represented by one factor, shown in Figure 1.⁷

(Figure 1 about here)

This factor loads on the real side of the U.S. economy. It is essentially a reflection of traditional business cycle chronologies, and is highly correlated with the most commonly used indices of industrial production. It confirms the observation by Stock and Watson (1998) that one-factor models describe the real state of the economy quite well.

(Figure 2 about here)

We exert caution in interpreting the nominal factors, as we have not imposed any further identifying restrictions. The first nominal factor (Fig. 2) appears to represent the traditional account of monetary tightening in 1928 and 1929, and would suggest a second wave of monetary tightening after the shockwaves of the July 1931 crisis – a phenomenon which we have found to be robust across many different specifications with which we experimented.

(Figure 3 about here)

⁷ The nominal factors are orthogonal to each other. We experimented with more than one real factor but obtained little change in the principal results.

The second nominal factor (Fig. 3) seems harder to interpret, as it signals a cumulative process that begins already in 1927 and ends in 1932.

For Germany, we have imposed further identifying restrictions on the nominal factors, as we are specifically interested in monetary vs. financial channels of business cycle transmission. The banking factor (Figure 4), loading on the banking series in our dataset, seems to us rather similar to series generated by Schnabel (2004) and Adalet (2005). It shows what appear to be several regime shifts, expansion with a setback in 1927, renewed growth in 1928, followed by a sharp reduction between early 1929 and 1930, and recovery through the third quarter of that year. After that, the banking factor begins a precipitous decline, which develops into a collapse around the mid-1931 crisis. There is no recovery to speak of until early 1933.

(Figure 4 about here)

The German currency factor (Figure 5) peaks, not in 1929 but in 1930, and collapses in mid-1931. Again, there is no recovery in that factor before 1933. Germany's two nominal factors, which are supposed to aggregate the information about the monetary and financial variables of the economy, thus both show a major, sudden decline in mid-1931. Eyeballing the evidence from the factors, one may conclude that both a currency and a banking crisis were at work.

(Figure 5 about here)

The real factor for the German economy is, just like its American counterpart, mostly a reflection of traditional business cycle accounts (Figure 6). It peaks in mid-1929 and declines at fast rates beginning in early 1930. This decline comes to an end in mid-1932, when a recovery began that lasted through 1937.

(Figure 6)

b. VAR Analysis: Currency vs. Banking in the German 1931 Crisis

We now relate the above factors to each other in a traditional VAR analysis. As we have given a structural interpretation to the factors, the interrelation between these factors itself is the object of our interest. The price we pay for the structure we have given to our factors is that information is not highly enough aggregated yet: there are still eight factors in the model, and running these in a sufficiently richly specified VAR would exceed the degrees of freedom provided by the data. Thus, we run out model twice, once with the first (and more informative) U.S. nominal factor, a second time with the second (less informative) U.S. nominal factor.⁸

The principal philosophy behind our identification strategy is as follows: U.S. monetary policy, represented by the U.S. nominal factor, is assumed to react to domestic but not international real conditions. German monetary policy is assumed endogenous to U.S. factors but exogenous to German conditions. We furthermore

⁸ The results presented in this section are a small but representative sample of a larger set of different specifications. Results turned out to be very robust to the permutations we tried. An extended survey of our results can be obtained upon request.

assume that German banks responded simultaneously to currency shocks, and that real conditions in Germany were endogenous to all other factors.⁹

(Figures 7 and 8 about here)

Figure 7 shows the impulse response functions and the error bands for the system including the first nominal factor for the U.S. The graphs in the first row show the responses to an adverse shock to real conditions in the U.S. The signs of these effects are mostly in line with expectations: adverse real shocks to the U.S. tend to have some persistence (Var1). They lead to some expansion in the nominal factor for the U.S. (Var 2), which would suggest that the Federal Reserve System reacted to an adverse real shock by easing monetary policy according to a Taylor rule. However, as the respective impulse response function bears out, this effect is weak and mostly insignificant. The effects of a real shock to the U.S. economy on the German banking (Var 3) and currency (Var. 4) factors are, again, mostly insignificant. There is some near-significant response of Germany's real economy to adverse U.S. shocks. However, as the variance decompositions in Figure 8 show, the explanatory power of real U.S. shocks on developments both in the U.s. and in Germany is minimal, except for the induced expansion in U.S. nominal conditions.

The second row in Figure 7 is of key interest, as it shows the effects of a nominal contraction in the U.S. economy, measured by the first nominal factor. The effects on the real factor for the U.S. (Var 1) have the expected negative sign, however they

⁹ We thus used the following ordering of variables: US Real (1); US Nominal 1 or 2 (2); German Currency (3); German Banking (4); German Real (5).

peter out very soon and remain insignificant thereafter. A glance at the variance decompositions in the second row of Figure 8 reveals that the explanatory power of nominal tightening for the U.S. economy (Var 1) is minimal, with a maximum of 10 percent of the forecast error variance in the real factor. This confirms results of Sims (1998) in a longitudinal study of U.S. monetary policy in the 20th century, as well as of Ritschl and Woitek (2004) for the Great Depression: there seems to be very little empirical support for the strong effects of monetary policy that Friedman and Schwartz (1963) suggested for the Great Depression.

The effects of U.S. monetary conditions on the German factor are even weaker. The graphs in the second line of Figure 7 show mostly insignificant effects on German banking (Var.3) and German currency (Var. 4). No significant effect on Germany's real economy is visible (Var. 5). The effects on Germany's nominal factors have the expected negative sign: both banking and currency in Germany tightened in reaction to a negative impulse from the U.S. As Figure 8 shows, the explained variance in German banking is small but significant, while the variance explanation in currency and the real economy is miniscule. On the whole, the influence of U.S. factors – nominal or real – on the German real economy is below ten percent of its forecast error variance. This result is at variance with traditional accounts of the Great Depression, which saw a transmission of the depression from the U.S. to Europe via the Gold Standard as the primary mechanism (see e.g. Temin, 1989, Eichengreen, 1992). Our results suggest that the impact of these transmission mechanisms may have been overrated.

Nominal tightening in Germany, more precisely a deterioration of conditions in the German banking and currency factors, underlies the impulse responses in the third and fourth rows. We find evidence of effects of Germany's nominal conditions on real conditions in the U.S. (Var. 1). This feedback effect from Germany on the U.S. has hardly been studied so far; we found it to be robust and stronger than in Figure 7 under a variety of alternative specifications. If confirmed by further research, this result would lend support to the hypothesis of James (2001) that the deepening of the U.S. recession was triggered, not by domestic monetary policy but rather by the international repercussions of the 1931 crisis in Austria and Germany. A look at the variance decompositions in Fig. 8 shows that the combined contribution of Germany's nominal factors to the forecast error variance of the real U.S. factor is modest but still higher than for the U.S. nominal factor itself.

We also find some effect of German nominal variables on the American nominal factor, which is positive but remains insignificant. This would be consistent with the idea that the U.S. played the role of a shock absorber to the international monetary system, very much like Britain prior to World War I.

The effects of banking and currency in Germany on each other (Var 3-> Var 4 and Var 4 -> Var 3) are partly significant and subject to short-term fluctuations, which we suspect are spurious. While the influence of banking explains about 12 per cent of the variation in the currency factor, the reverse effect is hardly noticeable.

In contrast to their international effects, the domestic real effects (on Var 5) of Germany's nominal factors (third and fourth row in Figures 7 and 8) are insignificant

and contribute virtually nothing to explaining the variance of the real factor. Both banking and currency seem to have very little power in explaining the German slump. Again, we subjected this result to a variety of minor changes in the specification, without any major change in results. The surprising characteristics of these nominal factors for Germany lie in their feedback on real and monetary activity in the United States, not in their impact on the German economy, which is basically absent.

Drawing the results of this section together, our application of a dynamic factor model finds little evidence for the traditional view that currency or banking problems were key in explaining the German depression. We aggregate a large amount of panel information into synthetic, country-specific factors and thus model the fact that political actors and central banks found themselves in a data rich environment. In spite of the large amount of information they include, the banking and currency factors we obtain for Germany fail miserably in explaining the German recession. This suggests that whatever the role of currency vs. banking in the 1931 crisis, the contribution of either factor was not central to the German depression.

Very much the same is true for the traditional Gold Standard hypothesis as a mechanism of crisis transmission from the U.S. to Germany. According to our results, neither real nor nominal factors for the U.S. have much impact on the German economy. The two U.S. factors combined explain less than 10 percent of the forecast error variance in Germany's real factor, and the impulse responses are mostly insignificant. This implies that we find no support for the traditional view of the Great Depression as a U.S. crisis transmitted to Europe by the fixed exchange rate mechanism of the Gold Standard (as e.g. in Temin, 1989, or Eichengreen, 1992).

Nominal shocks to the U.S. economy also play a rather minor role; we find they hardly explain 10 percent of the variance in the real factor for the U.S.

Conversely, we do find some effects of Germany's nominal shocks on real activity in the U.S. economy. Adding up the effects of German banking, currency, and real activity, about 20-25 percent of the forecast error variance in U.S. real activity is explained by business cycle transmission from Germany.¹⁰ These effects are strongest at a lag of 3-6 months and quickly peter out afterwards.

While we find that nominal factors under the Gold Standard, as well as banking distress, seem to have played a minor role in the German recession, the overall role of nominal factors in the U.S. recession seems markedly stronger. While there are only mild effects of U.S. monetary policy on U.S. real activity, the combined effects of both domestic and international nominal shocks on the U.S. economy are stronger. Together they may explain 20-30 percent of the variance in U.S. real activity at a 3-6 months lag.¹¹ Therefore, if there was a significance of banking and currency problems in the German crisis of 1931, it probably lay more in their repercussions on the United States than in their effects on the domestic economy.

VI. Conclusions

This paper employed descriptive and econometric evidence to assess the relative importance of currency vs. banking in the German crisis of 1931. We examined

¹⁰ In a companion paper, we find similar effects on the U.S. economy in a four-country model that besides the U.S. and Germany also includes France and Britain.

¹¹ The respective figure for Germany is around 10 percent.

Germany's external position to argue that the underlying problem of the 1931 crisis was foreign debt, to which the currency and banking problems at the time were arguably endogenous. We ran a Bayesian dynamic factor model of the interactions between the U.S. and the German economy between 1925 and 1932 to obtain results on the relative force of currency and banking variables in the German economy.

We restricted the factor model such as to obtain structural factors on the nominal part of the German economy. This allows us to identify shocks to banking and monetary conditions separately. We also included two (unidentified) nominal shocks for the U.S., as well as one real factor each for both economies. Our real factors appear to trace established business cycle chronologies very well. Our nominal factors for Germany suggest that both monetary and banking conditions in Germany deteriorated severely and persistently in the 1931 crisis.

One of the main results of this paper is that the overall transmission of U.S. shocks to the German economy was insignificant and quantitatively negligible. We find only very weak evidence of the traditional view of the international depression as having been transmitted abroad from the U.S. The results are equally weak for the transmission of real and nominal shocks. In spite of our use of a broad database, we do not detect the U.S. causation of the depression that has been taken for granted in much of the traditional literature. Conversely, we find evidence that Germany's business cycle exerted feedback effects on the U.S. economy: shocks to the German banking and currency factors had larger effects on the U.S. economy than at home.

The main result of this study is that the domestic influence of the German currency and banking factors was very weak. While there was an evident collapse in both factors around mid-1931, our factor model does not detect systematic effects on the real factor. We read this as saying that the effects of the 1931 crisis on the course of the German depression have been overstated in much of the literature. The German slump was fully under way when the crisis arrived, and we see its occurrence as endogenous to the more fundamental forces that drove the German crisis, notably the very high ratio of foreign debt to national product.

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Table 1: *German Foreign Debt and GNP (bn reichsmarks)*

Year	<i>Commercial</i>	<i>Reparations</i>	<i>GNP</i>	<i>Debt/GNP</i>
1928	27	40	88.5	76
1929	31	40	88.4	75
1930	32.6	35	81.9	93
1931(mid-year)	33.6	35	71.2	96
1931(end)	26.6	35	67.9	91
1932	25.9	--	55.5	47

Source: Deutsche Bundesbank (1976), Ritschl (2002)

Table 2: *Commercial Debt Service and Reparations (bn reichsmarks)*

Year	<i>Commercial</i>	<i>Reparations</i>	<i>Total</i>
1927	0.68	1.58	2.26
1928	0.94	1.99	2.94
1929	1.2	2.34	3.54
1930	1.4	1.71	3.11
1931	1.5	0.99	2.49
1932	1.1	0.16	1.26

Source: Ritschl (2002)

Table 3: *Exports (bn reichsmarks) and the Burden of Debt Service*

Year	<i>Exports</i>	<i>DS/Exports</i>	<i>DS/Trade Surplus</i>
1927	12.21	0.19	-0.82
1928	13.81	0.21	-2.68
1929	15.28	0.23	57.98
1930	13.71	0.23	1.74
1931	11.16	0.22	0.79
1932	7.19	0.18	0.83

Source: Ritschl (2002)

Table 4: *Public Deficits (mill. reichsmarks) and their Ratio to GNP*

Year	<i>Central Gov't</i>	<i>Public Sector</i>	<i>Deficit/GNP (percent)</i>
1927	+ 11.1	935	-1.13
1928	+150.0	641	-0.73
1929	- 768.2	-2230	-2.52
1930	- 160.9	-2358	-2.79
1931	+335.7	-1071	-1.58
1932	+134.2	- 605	-1.09
1933	- 795.7	- 780	-1.37

Source: Ritschl (2002)

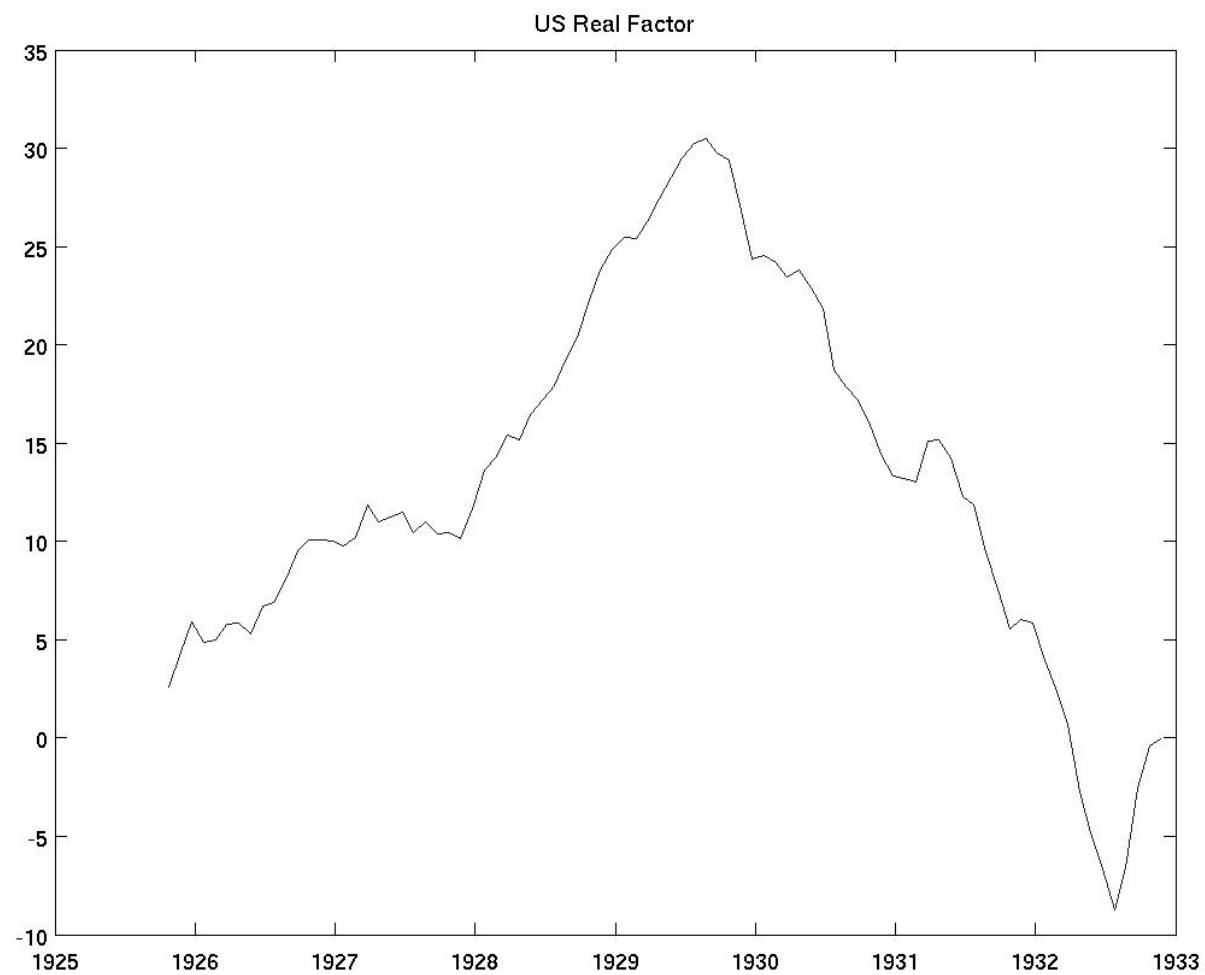


Figure 1: U.S. Real Activity Factor



Figure 2: U.S. Nominal Factor 1

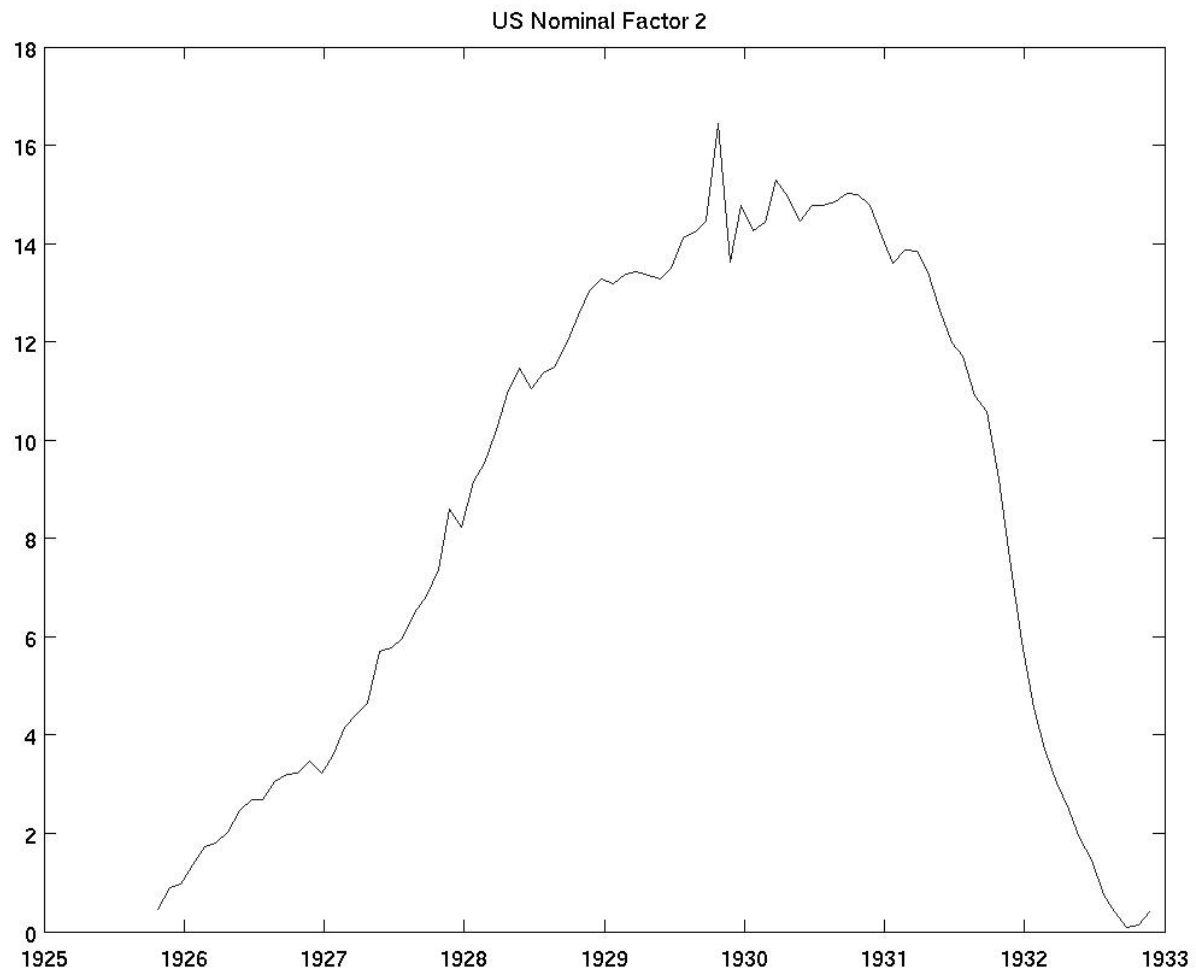


Figure 3: U.S. Nominal Factor 2 (orthogonal to Nominal Factor 1)

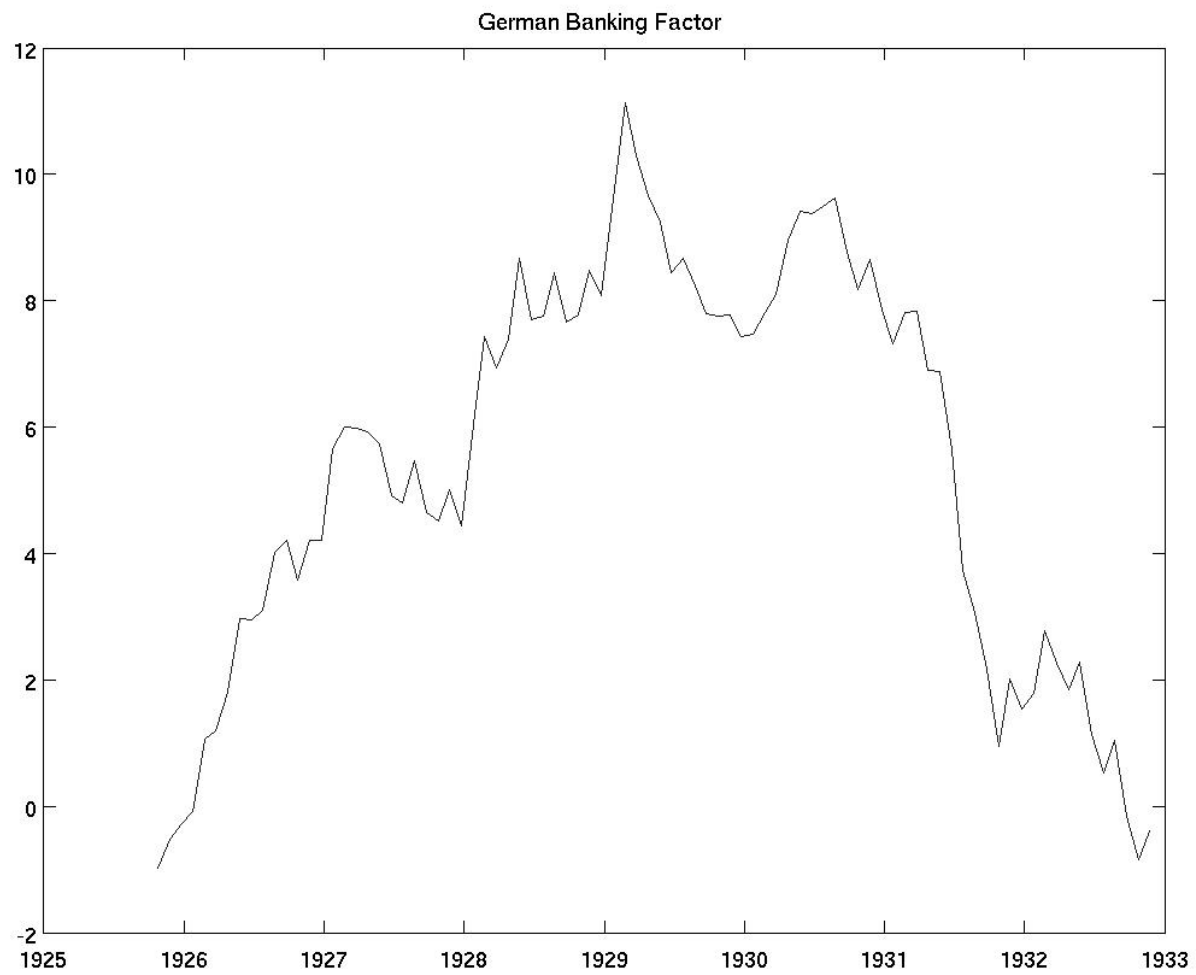


Figure 4: German Banking Factor

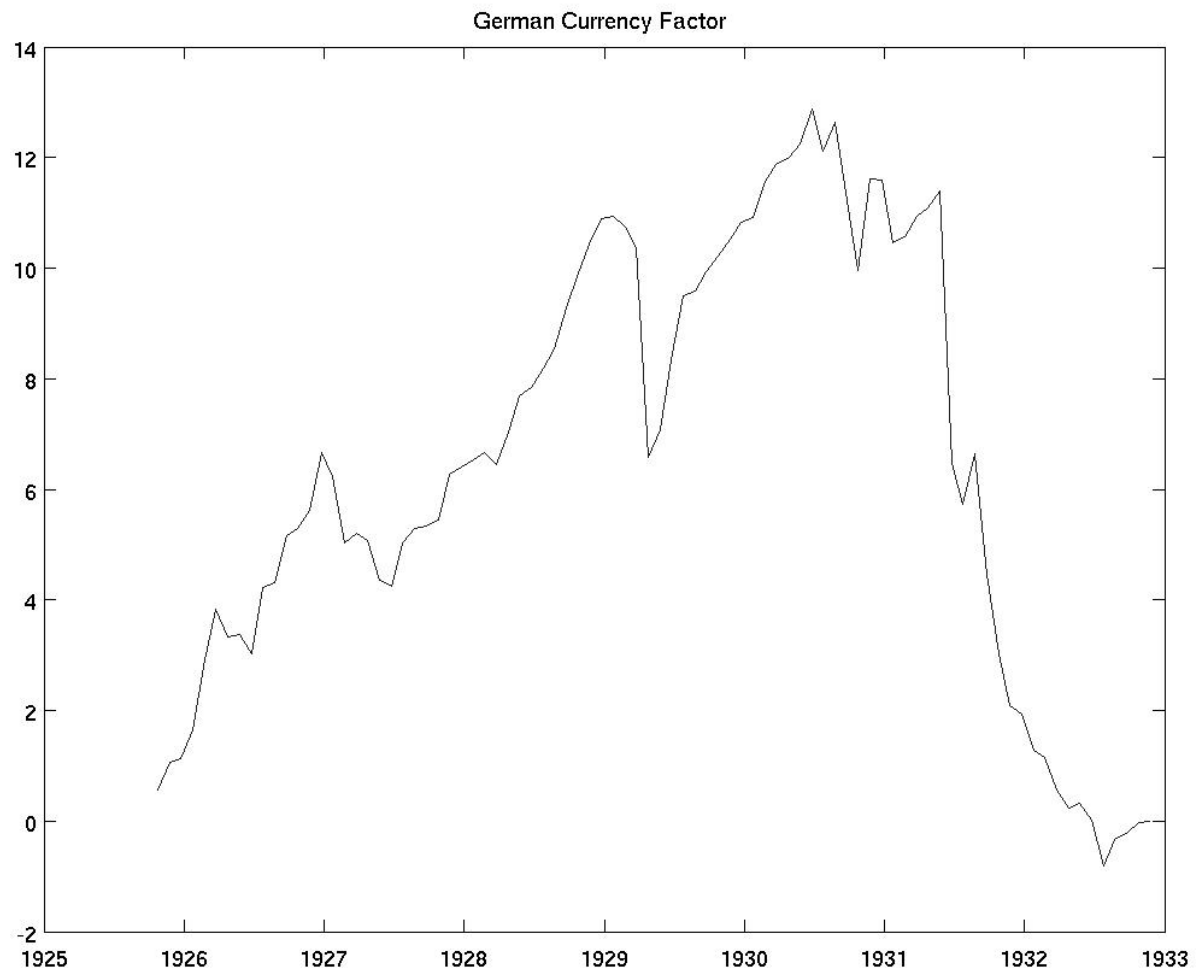


Figure 5: German Currency Factor

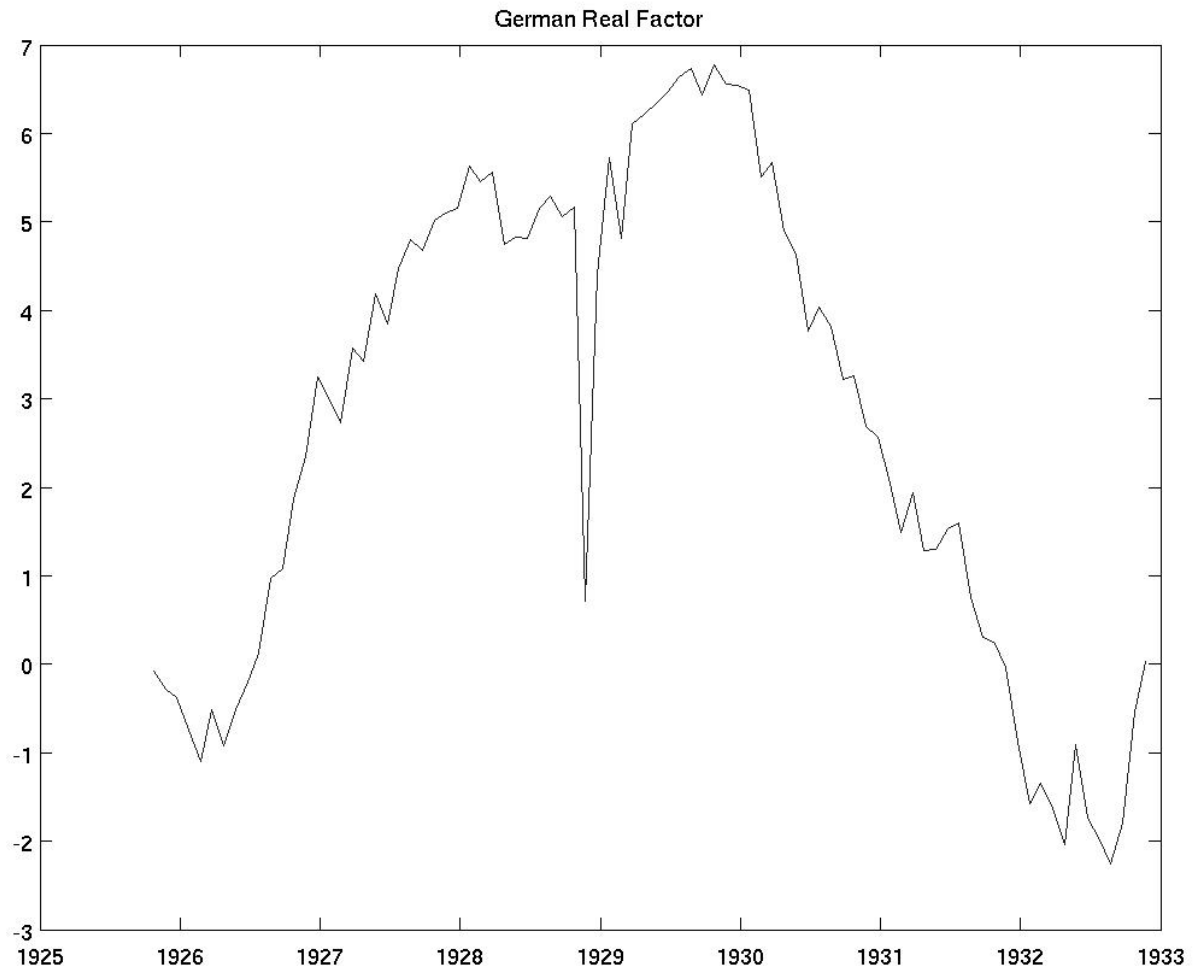


Figure 6: German Real Activity Factor

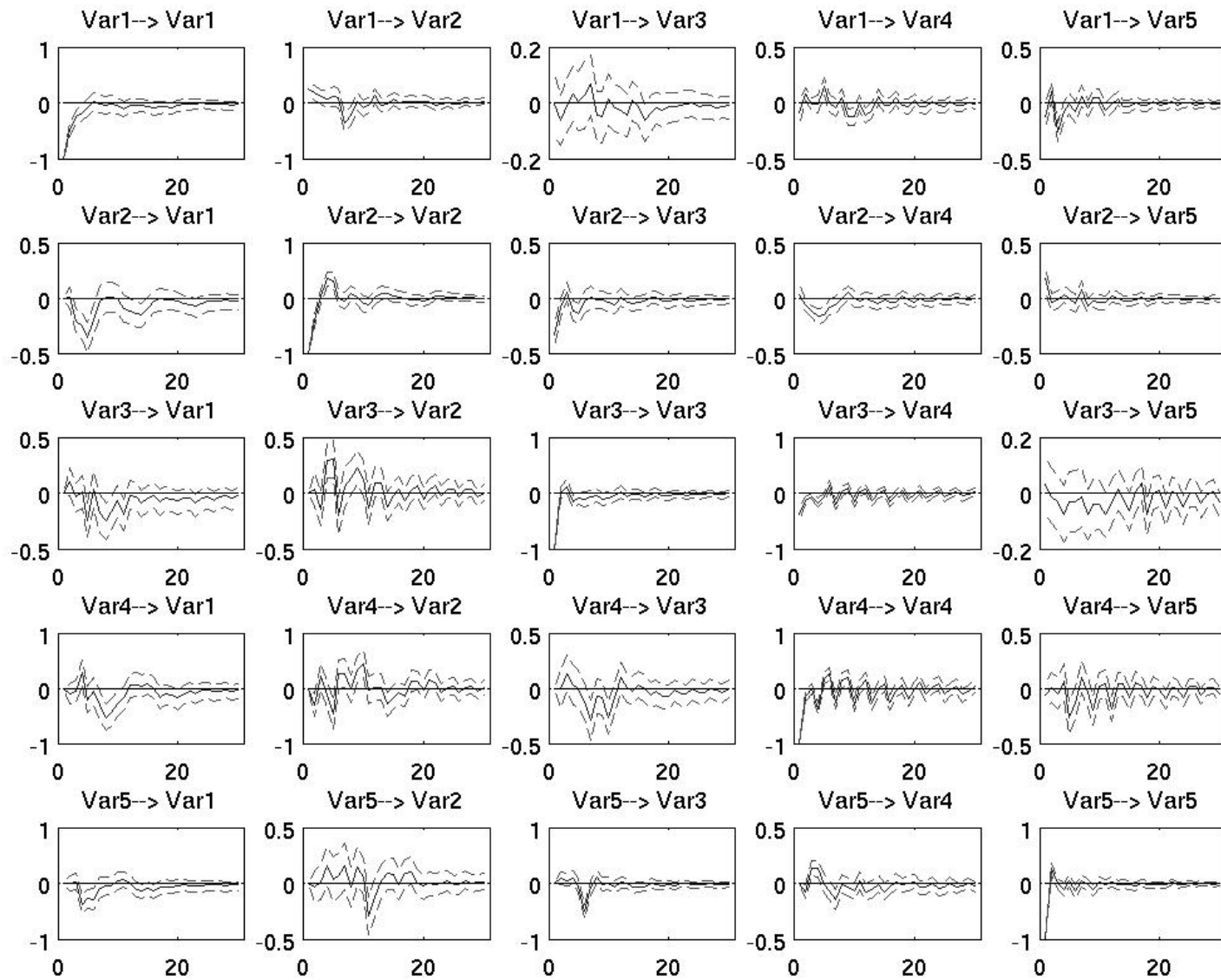


Figure 7: Impulse response functions for U.S./German factors
Var 1: U.S. Real Activity; Var 2: U.S. Nominal 1; Var 3: German banking
Var 4: German currency; Var 5: German Real Activity

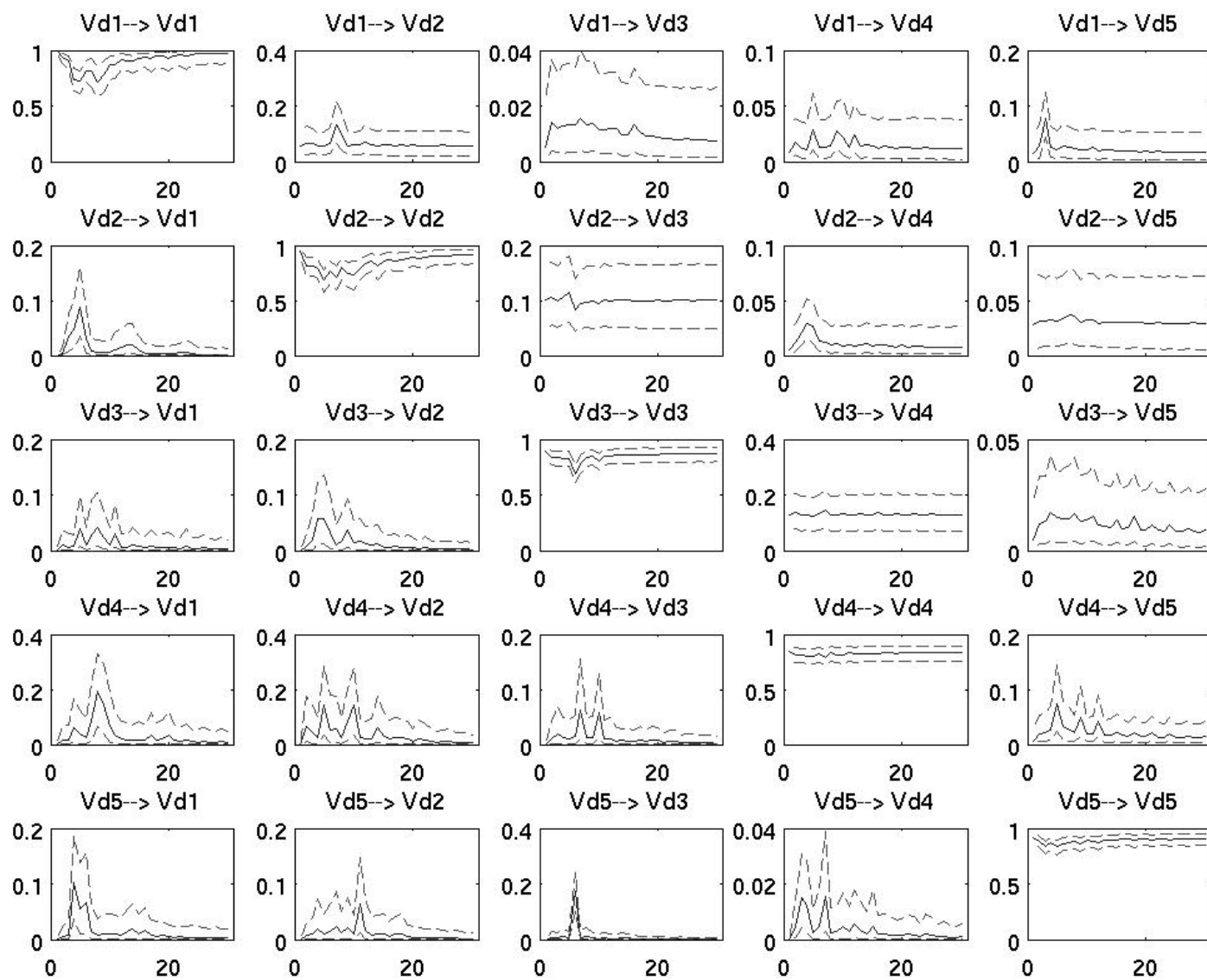


Figure 8: Variance decompositions for U.S./German factors.
Var 1: U.S. Real Activity; Var 2: U.S. Nominal 1; Var 3: German banking
Var 4: German currency; Var 5: German Real Activity