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INFLATION EXPECTATIONS AND THE RECOVERY FROM THE GREAT DEPRESSION IN GERMANY^b

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Abstract

A regime shift toward increased inflation expectations is credited with jump-starting the recovery from the Great Depression in the United States. What role did inflation expectations play in Germany that experienced a similarly successful economic upturn in the 1930s? We study inflation expectations in the German recovery across several methods: we conduct a narrative study of media sources; we estimate inflation expectations from a factor-augmented vector autoregression model, real interest rate forecasts, and quantitative news series. Consistently across these approaches, we do not find a shift to increased expected inflation. This recovery was different, and its causes lie elsewhere.

JEL classification: E31; E32; E37; E12; N14; D84

Keywords: Inflation Expectations, Great Depression, Inflation Forecasting, Regime Change, Germany, Narrative Evidence

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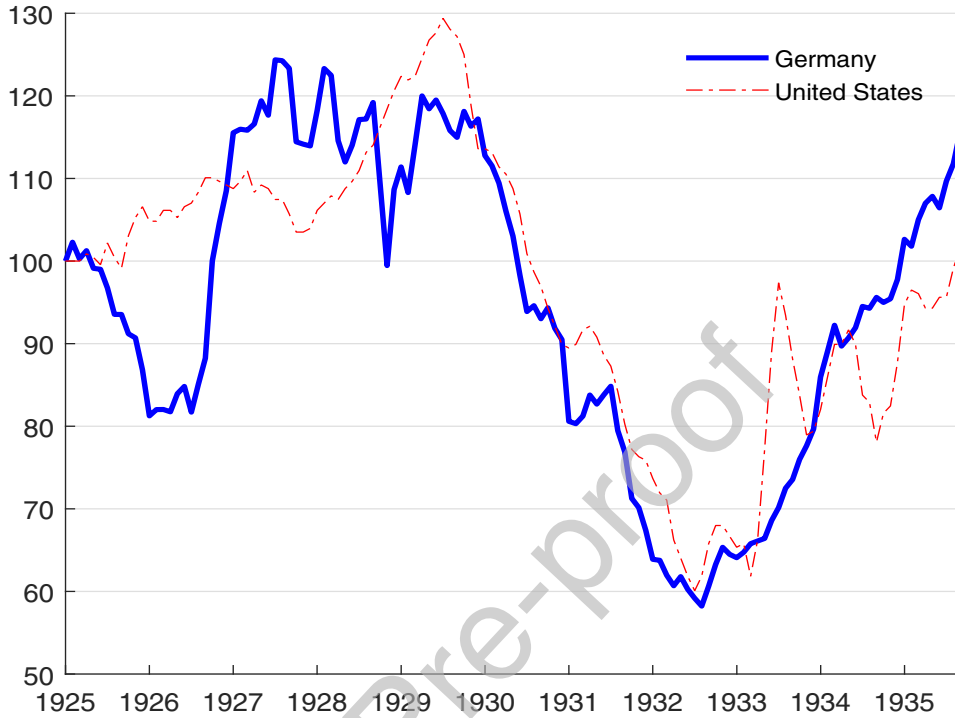
1 Introduction

Inflation expectations play a central role in explanations for the recovery from the Great Depression in the United States . Central bankers frequently refer to the historical precedent for this policy prescription: President Roosevelt made a credible commitment to inflate the economy in the Spring of 1933, which is regarded as a regime change that marks the beginning of the successful recovery of the U.S. economy (e.g. Eggertsson (2008)).¹

Figure 1 shows the recovery paths for the United States and Germany. U.S. industrial production increased dramatically following the Roosevelt regime shift in the second quarter of 1933. The recovery in Germany that started in 1932 proceeded at roughly the same rate, starting off slowly in the beginning, but at a higher and steady pace thereafter. We observe similar patterns for prices (Figure 2). Although the U.S. price index of industrial finished goods jumped upward along with industrial production, the German price index increased at a much slower pace.

In this paper, we investigate whether a shift in inflation expectations initiated the German recovery as occurred in the United States. The debate about the causes for this remarkable economic upturn remains unresolved. Inflation expectations could be a key factor in the recovery of Germany in the 1930s that has not yet been considered. From a theoretical perspective, changing expectations regarding future inflation rates is a crucial driver of production, consumption, and prices in many macro models. In the New Keynesian framework, an increase in expected inflation leads to increased production as consumers substitute consumption over time, and an increased demand for goods leads to an increase in inflation (Galí, 2015). To test whether this channel

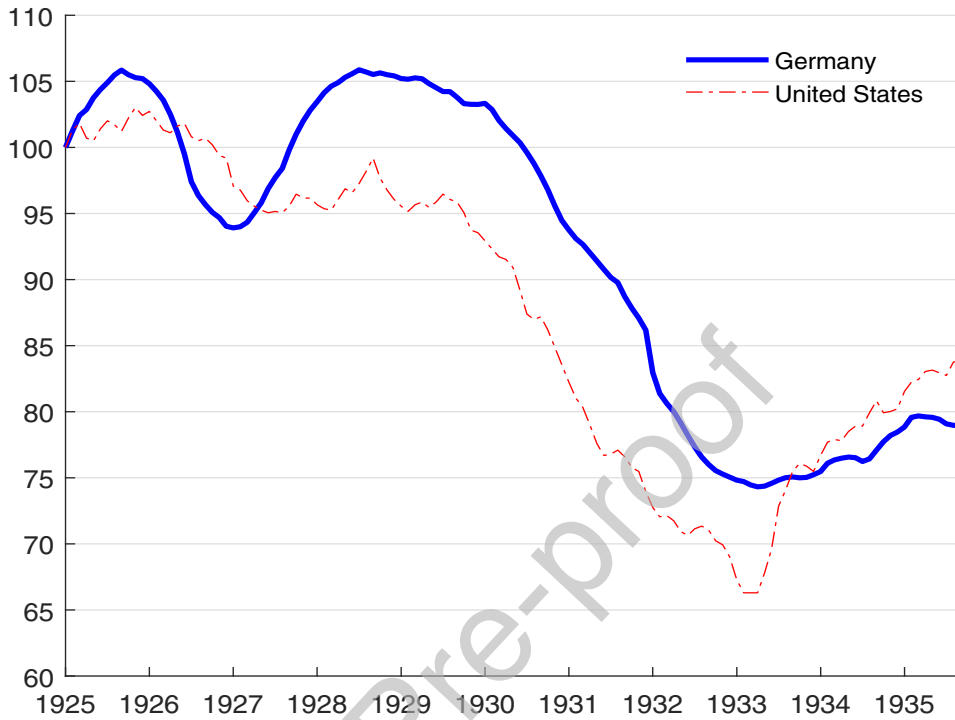
¹ As asserted by Jalil and Rua (2016), the regime change in the United States fueled by inflation expectations initiated the strongest increase in industrial output in a single quarter in U.S. history. Chouliarakis and Gwiazdowski (2016) and Shibamoto and Shizume (2014) showed that inflation expectations also played a pivotal role in Great Britain and Japan escaping the Great Depression, respectively.

Figure 1: *Industrial production in Germany and the United States 1925 to 1935*

Notes: Industrial production in Germany and the United States, monthly, Jan 1925 = 100. Both series are seasonally adjusted. *Sources:* Wagemann (1935), series III.B.11; Governors of the Federal Reserve Board, Statistical Release G. 17 (INDPRO), (2013).

was operative during the initial phases of the German recovery, we construct inflation expectations using various approaches. First, we conduct a narrative identification of inflation expectations from media articles, following Jalil and Rua (2016). The narrative account is then supplemented with a factor-augmented vector autoregression (FAVAR) model, real interest rate forecasts, and forecasts from inflation news series.

Our central finding is that there is no sustained shift in inflation expectations in Germany at the start of the recovery from the Great Depression in 1932. Although the narrative study identifies occasional fears of inflation on a number of specific dates and events, newspaper articles reveal no sustained regime shift of inflation expectations.

Figure 2: *Prices in Germany and the United States 1925 to 1935*

Notes: Monthly prices of industrial finished goods in Germany and U.S. index of wholesale prices of finished products, Jan 1925 = 100. Both series are seasonally adjusted. *Sources:* Wagemann (1935), series IX.B.23; NBER Macrohistory database (1997), series 04169.

Starting with the British exit from the gold standard in September 1931, German newspapers regularly mentioned currency devaluation and inflationary policies as viable policy options. Fears of inflation appeared during discussions about an extensive expansionary policy in January 1932, after the formation of the Papen government in June 1932 and as a response to Adolf Hitler's seizure of power in 1933. However, according to the news account, none of the events caused a sustained change in inflation expectations. Each time the general public thought about inflation, the government and Reichsbank were eager to rule out any price-increasing policies. This finding is in line with what Straumann (2009) argues was the case for several European countries at that time. One explanation for

the emergence of fears of inflation among Germans during the Great Depression is their experience with hyperinflation in 1923, a point noted by Borchardt (1985) and Eichengreen (1992), which likely prevented politicians from undertaking inflationary programs similar to those in the U.S.

Our time series estimates also show no indication of a sudden regime shift as an explanation for the recovery. Uniformly across approaches, we observe that during 1932 expected inflation rates remained negative and largely unchanged relative to 1931. Although we do observe occasional evidence that inflation expectations changed from deflation to inflation during the summer of 1932, consistent with the narrative evidence, these expectations did not last. A historical decomposition of industrial production further shows that although changes in inflation expectations were important for explaining the economic decline, they did not provide the initial impetus for the following upswing.²

2 Literature

The debate about the causes of the remarkable German recovery remains unresolved. Although some scholars have argued for a unique economic upturn under the Nazis initiated by vast investment programs in highways and rearmament (Abelshauser (1999), Overy (1975)), others have emphasized that the starting point occurred before the Hitler dictatorship in 1932 (Buchheim (2003), also Ritschl (2003)). According to this narrative,

² Many macro models imply that changes in expected inflation rather than the level are relevant for growth. It is, however, empirically plausible that the level of inflation is also important insofar, for instance, as a shift from mild deflation to mild inflation might have outsized effects on the public's economic outlook. Thus, we proceed by examining both changes in inflation and the level of inflation while remaining agnostic regarding which one is more relevant in the interwar German context. Because we find that inflation expectations were little changed, our argument that inflation expectations did not contribute to the recovery holds regardless of whether changes or levels of inflation were relevant. Moreover, changes in expected inflation should have triggered changes in the real rate of interest as a crucial driver of saving and investment decisions. The real rate of interest in Germany remained at very high levels during this period and did not decline at the start of the recovery as it was the case, for instance, in the U.S. in the spring of 1933. We thank the referees for emphasizing this point.

the Nazi expansionary policies were deemed unnecessary because previous government interventions and the recovery had already begun before the Nazis could specify their economic stance in 1933. Tooze (2006) highlighted the important agreement at the conference of Lausanne in July 1932, which substantially reduced the German debt burden and provided the necessary room to combat the economic slump (also James (1986)). Temin (1990) noted the freezing of wages after 1931 as a monetary explanation for the German recovery. Both arguments resonate the dilemma emphasized by Borchardt (1982): high wages and debt burdens prevented German governments before 1932 from implementing alternatives to the devastating deflation. This brings us to our question: during this heavily deflationary episode, could inflationary expectations have served as a kick starter for the depressed economy? The experience with hyperinflation in the 1920s could have made Germans overly sensitive to news and shocks regarding expected inflation. Inflation expectations may therefore have been a crucial but not yet investigated part of Germany's recovery.

Our paper is closely related to the literature describing narrative evidence for the Great Depression in the U.S., for example, by Jalil and Rua (2016), Nelson (1991) and Romer and Romer (2013). Quantitative forecasting methods usually have a backward-looking perspective and depend on the choice of variables, whereas narrative evidence incorporates ideas and considerations at any time point that may be independent of reflections on the past and an available set of data. For this reason, they detect a regime shift that time series approaches fail to identify (see Romer (2013), Sargent (1982), Temin and Wigmore (1990)). The narrative approach can identify the current knowledge of the general public and which information could be considered relevant to changes in inflation expectations. Identifying the actual sources is crucial, because a shift toward inflation expectations should not be a purely statistical outcome; it should be experienced by contemporaries due to an abrupt policy change, an event, or a shock to be identified as

a regime change (Jalil and Rua, 2016).

The use of direct time series forecasts using factor models has gained considerable popularity for forecasting economic time series. Boivin and Ng (2005) and Eickmeier and Ziegler (2008) evaluated forecasting methods and found that factor-based forecasts perform well in practice and tended to perform better than simpler small-scale models. Therefore, a factor model is a natural candidate for our research question. A key advantage of factor models is that they allow us to incorporate much information into the analysis while keeping the estimation procedure tractable. Furthermore, because factor models are estimated on the basis of the comovement between the time series in the dataset, a significant expansionary shift visible in many time series would be picked up by the factors, and this should provide information regarding future inflation rates if the underlying cause of such an expansionary shift was because of changes in expected inflation rates. One limitation with time series approaches similar to the one used in this study is that they do not identify the correct expectations in the event of a sudden regime shift. Therefore, we carefully discuss possible shifts in expectations in the narrative account.

One prominent method to estimate inflation expectations, which uses the Fisher equation that relates expected real interest rates to nominal interest rates and expected inflation, was first proposed by Mishkin (1981). He showed that rational expectations imply that inflation expectations can be inferred from realized real interest rates. For the Great Depression in the U.S., Cecchetti (1992) and Romer (1992) applied this approach and found a shift in inflation expectations in 1933 at the beginning of the recovery, at the same time that Temin and Wigmore (1990) detected a regime change toward a more expansionary macroeconomic policy. For Germany, Voth (1999) applied the Mishkin method during the interwar period and detected inflation uncertainty and fears of inflation in 1931 and 1932, but his results did not indicate a shift in inflation expectations.

One potential problem with the German interwar financial market data is that the nominal rate or bond yield series reflect liquidity and default risk. This makes disentangling expected inflation from risk or liquidity premia difficult, a point that Voth (1999) similarly recognized in his work.³ We, therefore, also adopt the approach by Binder (2016), who proposed to regress future inflation rates on a narrative news measure. This measure included scaled counts of articles containing inflationary and deflationary terms. The idea is that the degree of news coverage about inflation should be positively correlated to inflation expectations, which allows us to directly map our narrative evidence into inflation expectations.

3 Narrative Account

To discover a possible shift in inflation expectations in Germany at the start of the recovery from the Great Depression, we follow Jalil and Rua (2016) and first provide a general overview of newspaper coverage regarding inflation through a word search of newspaper articles. Next, we conduct a detailed narrative study of media sources over a two-year period.

3.1 General overview of inflationary news coverage 1930 to 1933

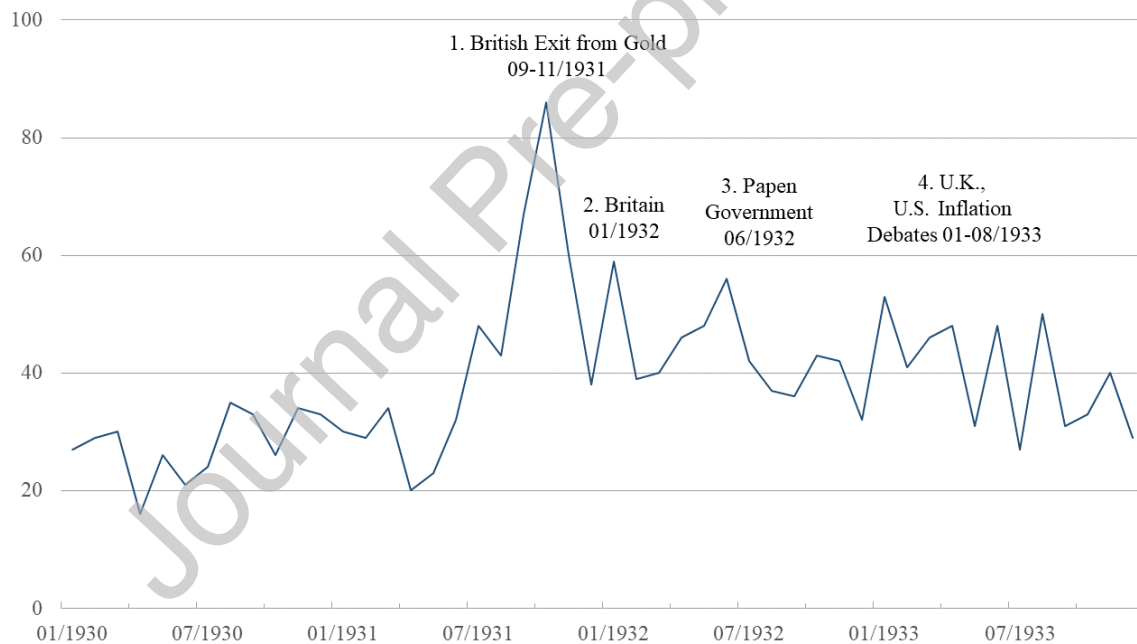
As our main source of media coverage, we study *Vossische Zeitung*, one of Germany's national newspapers of record during the Weimar Republic. *Vossische Zeitung* had a daily circulation of approximately 68,000 in 1931 and covered the main events and debates of that time (Binkowski and Schottenloher (1985), Deutsches Institut für Zeitungskunde

³ Another reason for a likely distortion was that interest rates and many prices at the time were controlled by effective cartels and government regulations. We thank Carsten Burhop, Werner Plumpe, Mark Spoerer and Jochen Streb for this very important indication.

(1932)).

In the online database provided by the De Gruyter publishing house (De Gruyter, 2010), we searched all issues of the newspaper from 1930 to 1933 and counted the number of articles that contained the German terms for “inflation”. Specifically, we used a combination of the terms, word stems, and abbreviations of the German words “Inflation” (inflation), “Teuerung” (price increase), and “Reflation” (reflation).⁴ If there had been a sudden shift in inflation expectations, there should have been an increased public interest likely reflected by an increased number of articles on inflation in one of the most relevant newspapers at that time.

Figure 3: *Inflation mentions in Vossische Zeitung 1930-1934*



Notes: The monthly frequency of articles that contain terms related to inflation in *Vossische Zeitung*. We also indicate prevalent topics in the news in four periods of increased news coverage.

We depict the resulting series in Figure 3. Before the summer of 1931, fewer than

⁴ We also considered terms like “Geldentwertung” (debasement), “Preissteigerung” (price increase), “Preisanhebung” (price lift), “Preiserhöhung” (price increase), and “Preisheraufsetzung” (price increase, markup).

30 articles per month on average mentioned inflation; in September and October, the mentioning of inflationary terms increased threefold to 86 articles. This result signifies that more than two articles per day on average mentioned inflation. After the fall of 1931, inflation coverage occurred to a lesser extent in *Vossische Zeitung*, although appearances remained at a higher average than before, with some months clearly above the number of articles per month before fall 1931. This was the case for November 1931 and for January and June 1932. In 1933, inflation coverage was lower but still had spikes above the average in January, April, June, and August.

We compared our article counts for Germany to the United States by using articles from *The New York Times*. In Figure A.6 of Appendix A.3.1, the word counts from *Vossische Zeitung* in each month on a daily basis reveal that no spike was comparable to the case of the U.S. in April 1933, where article counts regarding the term inflation in U.S. newspapers increased approximately tenfold. Although this indication suggests that news coverage in Germany did not address the topic of inflation as much as the regime shift occurring under the new Roosevelt administration, it is possible that Figure A.6 in the Appendix conceals sudden changes in the German news account. Accordingly, in Figure 3, we identify four spikes (or periods of spikes) of increased inflation mention: one outstanding increase in fall 1931 and further spikes in January 1932, June 1932, and January to August 1933. Each spike could indicate a shift in inflation expectations in the news and we therefore discuss them in greater detail in Table 1.⁵

To investigate whether any of these spikes corresponded to an inflationary shock, we checked all articles containing inflation during the four mentioned time periods. Table 1 indicates the events or topics that corresponded to inflationary words ordered chronologically by the four spikes (column 1) and months of occurrence (column 2). In each

⁵ As a robustness check, we collected other available newspaper data from searchable databases of newspapers from the 1930s. The remarkable spike in October 1931 is persistent across newspapers from different political backgrounds and locations, and we illustrate this phenomenon in an additional plot of five newspaper series in Appendix A.3.2.

Table 1: *Months and events with increased inflation mentions in Vossische Zeitung*

Spike	Month	# Articles	Event/Topic 1	Event/Topic 2
1	September 1931	68	Hyperinflation in retrospect (24)	British exit from gold (20)
	October 1931	86	Germany's economic policy (37)	British exit from gold debate (20)
	November 1931	63	Exit from gold policy debate (24)	Hyperinflation in retrospect (20)
2	January 1932	59	Hyperinflation in retrospect (30)	Exit from gold policy debate (15, in part Wagemann's Plan)
3	June 1932	56	Papen government (21)	Hyperinflation in retrospect (17)
4	January 1933	53	Inflation debate globally (24, in part Hitler)	Hyperinflation in retrospect (19)
	April 1933	49	Inflation debate U.S (37)	Hyperinflation in retrospect (9)
	June 1933	50	Inflation debate U.S (20)	Hyperinflation in retrospect (18)
	August 1933	50	Inflation debate globally (20)	Hyperinflation in retrospect (18)

Notes: The first column indicates the assignment of each month to one of the four spikes indicated in Figure 3. Columns 2 and 3 indicate the selected months and the number of articles per month that mention inflation. The last two columns show the two main events / topics involving inflation. Numbers in brackets indicate the number of articles per topic, and in some cases a certain aspect of the event or debate.

month, we examined the context in which inflationary terms were mentioned by reading the relevant articles. We classified articles with reference to a specific current event as dealing with such event (columns 3 and 4). In many cases, inflation was exclusively mentioned in reference to the hyperinflation of 1923 with no relation to the present. In that case, we classified it as “Hyperinflation in retrospect”. If an article compared actual events with past periods, we classified the article as referring to the actual event. The few articles not counted as part of either an actual event or the hyperinflation of 1923 referred to a wide range of topics from literature, culture, and sports and were irrelevant to our research question. In columns 4 and 5, we further indicate in brackets the number of articles that we related to the two relevant topics. These two inflationary topics or events were prevalent in many articles that mentioned inflation in the desig-

nated months. Notably, more than two-thirds of the articles in our sample each month (comparing the numbers in brackets with column 3) referred to these two subjects. In addition to mentions of the hyperinflation of 1923, we identified references to at least one actual political event or debate in each month. We have indicated these events in Figure 3.⁶

In September 1931, inflationary news predominantly covered Britain abandoning the gold standard and related this event to expected inflationary tendencies in Britain. In the following months, the discussion about Britain remained prominently in the news at least until January 1932, as indicated by the topics in Table 1. As a consequence of Britain abandoning the gold standard, the news account in *Vossische Zeitung* reveals that after the fall of 1931, inflationary policies and a devaluation of the Reichsmark were also discussed in Germany. German economic conditions were regularly compared with those of other countries such as Britain and also to Germany's experience with hyperinflation. Importantly, the news account also shows that such considerations were regularly opposed by the German government and central bank.

In January 1932, during the ongoing inflationary debates in Britain and the U.S., a plan for a more expansionary economic policy proposed by the head of the statistical office, Ernst Wagemann, received some media attention. In June 1932, the new Papen government was allegedly expected to implement inflationary policies. In January 1933, this was the case when Hitler seized power. Inflationary policies in the U.S. were in the focus of the now controlled media for the remainder of 1933. The word counts visualized in Figure 3 are therefore remarkably in line with Borchardt's (1985) notion that fears of inflation prevailed after political events associated with currency devaluation, credit

⁶ To provide additional information on how we selected articles into events and contexts, we describe our classification of three articles in Appendix A.3.5: one article refers to an actual event, one article is related to the hyperinflation of 1923, and one article is without an economically relevant context. We further provide numerous relevant articles from *Vossische Zeitung* and other news sources including translations in Appendix A.4.

expansion, or expected government deficits.⁷

3.2 A detailed narrative study of media sources September 1931 to August 1933

Next, we conduct a chronological investigation of the relevant political events and debates regarding a possible shift in inflation expectations through a careful narrative study of media sources. For this study, we read weekly issues of the economic periodical *Der Deutsche Volkswirt (1931/1933)* over a two-year period from September 1931 to August 1933. The weekly frequency permitted a careful reading of articles over a prolonged time period. We divided our analysis according to the spikes in the news coverage discussed in Section 3.1 and included potential inflationary events during other periods. As one of the leading and influential periodicals in its field at that time (Röpke, 1933), *Der Deutsche Volkswirt* had up to 6,000 subscriptions and provided a summary of political events and the state of the economy (Sattler, 1982).

For relevant dates, we considered two major daily newspapers: *Vossische Zeitung (1931/1933)* and *Berliner Lokal-Anzeiger (1931/1933)*. We read both newspapers one week before and after such dates to observe responses and to identify diverse opinions regarding the events. While *Der Deutsche Volkswirt* and *Vossische Zeitung* were considered economically liberal and politically centrist, *Berliner Lokal-Anzeiger* supported more nationalist, conservative positions. With a daily circulation of approximately 200,000 in 1932, it was an influential news source of the political right. As a

⁷ As Eichengreen (1992) noted, events that reminded Germans of the hyperinflation in 1923. In Appendix A.3.3, we plot an additional word count that dates back to 1918. This Figure A.8 indicates that our measure of inflationary terms reveals inflationary events and fears of inflation, as described by Borhardt (1985), before the 1930s. A potential concern is that articles that mention inflation actually discussed its opposite: the ongoing deflation and price declines present during the early 1930s. As a robustness check, we conducted word searches of terms related to deflation. We also assessed if price reductions were discussed in the articles mentioning inflation. We verified that this was not the case and the ongoing deflation was not considered a problem in the news account. We illustrate this finding by contrasting scaled word counts of “inflationary” and “deflationary” terms in Appendix A.3.4.

robustness check, we considered further news sources that spanned the entire political spectrum and contemporary scientific publications. For instance, we assessed the coverage of relevant events in the social-democratic newspaper *Vorwärts*, the catholic-centrist *Germania*, and the weekly reports of the Institute for Business Cycle Studies.⁸

3.2.1 September to December 1931 - Britain abandons the gold standard and inflation debates in the Reichstag

The first potentially inflationary situation occurred in September 1931. After Britain left the gold standard on September 21, on several occasions, the German government and Reichsbank announced that they were “not considering devaluing the Reichsmark for the possible loss of currency stability and inflationary consequences” (*Vossische Zeitung*, September 25-30, 1931). *Der Deutsche Volkswirt* (September 25, 1931) argued that similar measures in Germany could cause inflation because of its experience with hyperinflation in 1923 and claimed that fears of inflation were already fueled by right-wing calls for more autarky, that is, to abandon the gold standard and establish an unconvertible “interior currency” in Germany. This claim was not far-flung, considering that some industry groups and numerous conservative figures somewhat openly demanded deflation to end (*Berliner Lokal-Anzeiger*, September 20, 1931, *Vorwärts*, September 19, 1931).

Two weeks later, the political right announced a vote of no-confidence against the Brüning government for the following parliamentary sessions (*Vossische Zeitung*, October 12, 1931). For the remainder of the parliamentary week, inflation became a persistent topic during the important speeches. Speakers from the moderate left to the center-right defended the government’s policy of economic stability while denouncing the nationalists for allegedly turning Germany into inflationary chaos should their no-confidence vote

⁸ In Appendix A.4, we provide several articles that we refer to in the following analysis.

succeed. On October 16 - the day of the vote - *Der Deutsche Volkswirt* declared that the fall of the government as threatened by the “right-wing-opposition, raised fears of another inflation” that already articulated in “panic buying and a retention of the sellers” (see also *Vossische Zeitung*, October 13-15, 1931).

After Brüning’s victory in the confidence vote, *Der Deutsche Volkswirt* (October 23, 1931) summarized the dramatic events of the preceding week as a “commotion of mistrust in the banks and toward the stability of the currency”. It recognized an increase in acquisitions and an expansion of retail sales due to panic buying in the preceding week (October 30, 1931). In November, news regarding inflation abated, and no “inflationary events” were reported in the media. Possible inflationary tendencies in England and other countries that had abandoned the gold standard were frequently discussed, and potential currency experiments in Germany were regularly opposed by politicians and interest groups (see *Vossische Zeitung*, November 1, 6, 10, 24 and 28, 1931). Reasons for the strong opposition to inflationary tendencies can be found in a statement by Hans Luther, head of the central bank, from November 24, 1931:

“Beyond what is happening already there is nothing that can be done through either currency or credit policy to provide an impulse for economic recovery. [...] The decision by the German government and the Reichsbank to not let the Reichsmark float on September 20 was the necessary conclusion given German indebtedness and inflation experiences by the German people.”

The German experience with hyperinflation thus seemed to be a strong factor that determined policymaking. This topic returned two months later when Ernst Wagemann, head of the German statistical office, asserted his proposal to end the Depression. One consequence of the currency devaluations in other countries was that economic discussions in Germany shifted to the decrease in prices and wages. To maintain Germany’s competitiveness in world markets, which basically constituted the opposite of inflation

expectations. The result was the emergency decree of December 8, which forcibly cut prices, rents, wages, and interest rates as of January 1, 1932.⁹ First price reductions as a reaction to the decree came within a few days (*Vossische Zeitung* December 18, 1931). During the debate about the decree and in the following weeks, news coverage revealed no indication of a potential increase in prices in the future due to the drastic cut in the present.

3.2.2 January to May 1932 - Expansionary policies are ruled out

In January 1932, Ernst Wagemann, head of the Institute for Business Cycle Research and president of the statistical office of the Reich, published a plan to counter the Depression in Germany. The proposal comprised work programs financed by a moderate credit expansion that considered mild inflation (*Der Deutsche Volkswirt*, January 22, 1932, *Berliner Lokal-Anzeiger*, January 20, 1932, also Wagemann (1932)). Some observers indicated positive examples from other countries, and the industry-leaning press hoped for a reflation of the devalued economy. *Der Deutsche Volkswirt* (January 29, 1932) - and as it argued "all experts" - declined Wagemann's idea as either too small and therefore useless or devastatingly inflationary. The economist Carl Landauer warned in an article published on January 22, 1932, that Wagemann's plan could result in "the same inflationary export premium that we know from the years 1921-1923." The editor of *Der Deutsche Volkswirt*, Gustav Stolper concluded his article from February 12, 1932, with the words: "But Wagemann's reform plan would be the safest option to instantly tear down the ramparts that surround the German banking- and currency system; the ramparts that protect it against the rush of inflationary tendencies, and secure its indispensable remaining trust."

Under the impression of this continuing discussion, the German government an-

⁹ We describe the emergency decree in detail in Appendix A.1.

nounced on January 30, 1932, that it would not consider currency experiments or a change to the Reichsbank law (*Vossische Zeitung*, January 30, 1932). Following this virtual refusal of the Wagemann plan, no news was published thereafter that mentioned inflationary fears or concrete expansionary policies; therefore, no permanent shift in inflation expectations or a “reflation” of the depressed economy occurred.

In the following months, further public work programs drew support from agricultural and industrial interest groups, banks, and trade unions (e.g., *Der Deutsche Volkswirt*, February 19, 1932, *Vossische Zeitung*, January 30, 1932). Hitler’s national socialists put credit-financed work programs into their 1932 party manifesto, and its electoral success may in part be attributed to this unique feature. A common feature of all the proponents of work programs was emphasizing that their plans were too small to be inflationary (e.g., *Vossische Zeitung*, April 14, 1932, also Borchardt (1985)).

3.2.3 June to December 1932 - The Papen government

After Brüning’s centrist minority government ended on May 30, stock markets rose, bond prices fell, and cash withdrawals were reported. *Vossische Zeitung* (June 1-2, 1932) noted that “certain circles advocating currency experiments observed their time coming” while “scared capitalists engaged in stocks as a safeguard”. *Der Deutsche Volkswirt* (June 3, 1932) interpreted the situation that “under the prospect of the next, more right-wing government, the general public takes flight into real assets” and concluded: “The events of the last days are object teaching how credit expansion and currency experiments in Germany would take effect. We only hope, the next government will understand.” By contrast, *Berliner Lokal-Anzeiger* (June 1, 1932) suspected “certain circles” of engaging in the stock market to “stage a flight into real assets”. Additionally, “the left-wing press gave the impression that new inflation was about to come.” Both were intended to “increase nervousness”, “panic” and a “catastrophe mood” in Germany. Regardless

of whether this interpretation was correct, the media coverage regarding the danger of inflation certainly induced or reflected fears in parts of the public.

When it was announced that Franz von Papen would form the next government, the “dark nightmares” of inflationary measures were suddenly possible (*Der Deutsche Volkswirt* June 3, 1932). The new chancellor appeared willing to form a majority in the Reichstag with German nationalists and potentially even backed by Hitler’s national socialists, which seemed to favor inflationary measures. The media speculated that Reichsbank president Hans Luther could resign for his inconsistent views on stable economic policies (*Vossische Zeitung* and also *Vorwärts*, both on June 2, 1932).

After Papen’s appointment, however, he immediately met with the central bank president and made clear that Luther would continue, and they both publicly declared that “any currency or credit experiments, that could possibly endanger the value of the currency were out of question” (*Vossische Zeitung* June 3, 1932). This action seems to have been sufficient to stop the flight into real assets. The “severe psychosis faded after the new government left no doubt about currency stability” (*Der Deutsche Volkswirt*, June 10, 1932). In the following weeks, no indications of lasting fears of inflation, an end of deflation, or expected price increases appeared in the news accounts.

In July 1932, the Lausanne Conference reached an agreement, namely, a cut in reparations by 90% and, hence, new financial scope for action to fight the Depression. The quasi-end of reparations as negotiated in Lausanne could have provided the conditions for an economic upturn in Germany, although many observers (especially from the right-wing press) did not praise this remarkable success (*Der Deutsche Volkswirt*, July 15, 1932). The agreement implied a gain in sovereignty: implementing Lausanne would mean the end of international supervision of the Reichsbank, which was the policy under the Young Plan, and room to maneuver in monetary policy, a point that Hans Luther was pessimistic about. The president of the Reichsbank warned that Germany should

by no means devalue from gold as a consequence of the newly gained freedom because such measures could lead to high rates of inflation. In the following weeks, bond prices increased, possibly because of an expectation of quick discount rate cuts or a change in the Reichsbank law (*Vossische Zeitung* July 9, 1932); however, no news indicated expected inflation.

In late August 1932, under the impression of growing political violence and election campaigns, chancellor Papen announced an expansionary economic agenda. Although work programs had been discussed in the preceding months, *Der Deutsche Volkswirt* (September 2, 1932) stated that the “timing and announcement of the Papen program was psychologically quite effective” and that market participants were initially surprised by its dimension (also *Vossische Zeitung*, August 29, 1932). The plan comprised moderately sized work programs, tax reductions for hiring, and subsidies for building repairs and was financed by central bank loans and wage cuts.

The implemented measures could have potentially fueled inflationary tendencies or reduced deflation (as mentioned at least once in *Vossische Zeitung*, August 28, 1932). However, the media did not expect inflationary tendencies of the measures. The social-democratic newspaper *Vorwärts* highlighted the stock market surges, but it explicitly did not link them to fears of inflation: “stocks of firms that would possibly benefit most from wage cuts proposed by the program gained most”. Hence, if the program had positive effects on the economy, contemporary observers expected them through wage reductions, a small credit expansion, wage subsidies, and incentives (e.g. Carl Landauer in *Der Deutsche Volkswirt* October 26, 1932). None of the measures could be related to price increases or to end deflation. The government underscored that it would refrain from currency experiments (*Der Deutsche Volkswirt*, September 9, 1932), whereas the central bank had declared earlier that it was funding projects only if no inflationary policies were implemented (*Vossische Zeitung*, August 24, 1932).

The narrative evidence, therefore, provides no indications for a lasting shift in inflation expectations as a result of this program. In December 1932, under the short-lived Schleicher government, further work programs showed a comparable reaction without expected price increases mentioned in the media.

3.2.4 January to August 1933 - The Hitler administration and U.S. inflation

Hitler's seizure of power on January 30, 1933, shocked most German public - politically but also economically. The Nazis had favored a costly large-scale extension of work programs. Compared to other politicians, to reach their goals, national-socialist speakers appeared sufficiently willing and aggressive to use drastic measures: autarky, currency devaluation, a large deficit, and the violation of international treaties. Gustav Stolper interpreted in *Der Deutsche Volkswirt* (February 2, 1933) the resulting dramatic fall in bond prices and increases in stock prices as motivated by fears of inflation: "The economy is paralyzed again by uncertainty about what will come, despite assertions that economic and currency experiments would be ruled out."

Within days, possible fears of currency experiments were no longer mentioned in the media. On the one hand, the government repeatedly announced that it had no such plans and emphasized the importance of absolute security for the German people and the economy; on the other hand, pressure on the free press intensified and economic opinion articles were published less frequently. In one of those articles, Hans Luther warned, in February, that the fall of the international constraints under the Lausanne treaty could be exploited to put the central bank under political influence with unpredictable consequences for financial stability (*Der Deutsche Volkswirt* February 24, 1933). *Vossische Zeitung* (March 10, 1933) discussed the possibility that as part of the consolidation of powers under the new government (Gleichschaltung), the Reichsbank might be the next institution to become disempowered and highlighted Luther's achievement of

currency stability. Nonetheless, Luther's resignation as central bank president one week later was not being debated critically. Several newspapers printed Luther's open farewell letter, in which he mentioned his relentless stance in favor of central bank independence and emphasized that Hitler himself had assured him that no currency experiments were planned. His successor, Hjalmar Schacht, declared currency stability a central objective of the Reichsbank (*Vossische Zeitung* April 7, 1933) and continued to pursue an orthodox policy (see James, 1993).

Despite possible expectations of drastic policy changes under the Hitler government, we find no shift toward inflationary policies or expected inflation in the first months of the new government. The Hitler dictatorship clearly did not conduct an openly inflationary policy. Notably, Hitler himself opposed inflationary policies and regarded the power of the state (in the shape of stormtroopers and concentration camps) as a decisive safeguard against it (James, 1986). In a unique example of this power, on May 16, the Munich police accused 200 small businessmen of raising prices and detained them in the Dachau concentration camp. The incident was made public as a cautionary tale, and the public was requested to report imitators (*Vossische Zeitung* May 21-22, 1933, also *Völkischer Beobachter* May 20, 1933; see Domröse (1974)).¹⁰ One factor demonstrating the resoluteness of the regime in terms of price increases may be because of the implementation of a general freeze on pay increases shortly beforehand. The freezing of wages meant that price increases became less likely in the short and medium term and made them even more unpopular among the working population.

Between April and August, the news coverage mentioning inflation focused mainly on the U.S., where the Roosevelt administration had been pursuing its inflationary program since April 1933 (*Vossische Zeitung*, April 19-22, 1933). The measures taken in the U.S., especially the devaluation of the U.S. dollar, were welcomed in the German news

¹⁰ We thank Harold James for emphasizing this important incident.

because of the high indebtedness of the German economy to the U.S. and implied a real reduction of the German debt burden. A devaluation of the Reichsmark would have countered this effect and was not considered: *Der Deutsche Volkswirt* (for instance April 28, May 5, June 2-30, July 14, August 4, 1933) made the case that Germany and the U.S. were different and an inflationary program similar to the U.S. would either be useless or harmful. Therefore, no policy measures were implemented with the expressed intention of raising price levels, and the government and Reichsbank repeatedly ruled out inflationary policies (*Vossische Zeitung*, April 4, June 2, August 10, August 26, 1933). The few incidents in which government intervention resulted in increased prices of particular goods were carefully discussed and the restricted scope of such increases was emphasized. For example, this was the case for minimum prices on animal fats to support suffering farmers and a revision of the cartel law (*Vossische Zeitung*, May 22-23, July 15, July 18, August 29, 1933).

In summary, we observe no regime shift to inflation expectations under the Nazis before September 1933. We likewise detected no indication for the expressed aim to end deflation. Wage controls certainly reduced the acceptability of price increases among the working population.¹¹

4 Time series evidence

In this section, we employ a factor model to estimate inflation expectations. Factor models have gained considerable popularity for forecasting economic time series. Boivin

¹¹ Because of the likely bias of the media account due to suppression and government control, we verified that there were no inflation expectations in the first months of the Third Reich by examining further sources: the briefings to the press of the Reich Ministry of Public Enlightenment and Propaganda (Reichsministerium für Volksaufklärung und Propaganda) and the reports of the secret state police (Gestapo), available in the German federal archives (Bundesarchiv in Berlin-Lichterfelde) and the Prussian Privy State Archives of the Prussian Cultural Heritage Foundation (Geheimes Staatsarchiv Preußischer Kulturbesitz, Berlin). We thank Mark Spoerer for emphasizing this point.

and Ng (2005) evaluated forecasting methods and found that for prices and one-month-forecast horizons, factor-based forecasts performed better than simple AR(1) forecasts. Bernanke and Boivin (2003) showed that factor models produce forecasts of similar accuracy as the Federal Reserve Greenbook forecasts. Eickmeier and Ziegler (2008) also showed that factor models perform very well than simpler benchmark models or small-scaled models. Therefore, a factor model is appropriate to answer our research question. In addition, we augment this approach with real interest rate regressions as in Mishkin (1981) and quantitative news estimates proposed by Binder (2016).

4.1 The empirical model

The factor model we use relates a large number of time series Y to a small number of common but unobserved factors f . The dynamics of these factors are described by a vector-autoregression (VAR) process. Formally, the model is given by

$$Y_t = \Lambda f_t + e_t \quad (1)$$

$$f_t = B_1 f_{t-1} + \dots + B_L f_{t-L} + v_t \quad (2)$$

$$e_t \sim \mathcal{N}(0, \Omega), \quad v_t \sim \mathcal{N}(0, \Sigma) \quad (3)$$

In Equation (1), Y_t is a 109×1 vector of observed variables, f_t is a 3×1 vector of common latent factors, Λ is the corresponding 109×3 matrix of factor loadings, and e_t is a 109×1 vector of idiosyncratic errors. We assume that e_t and v_t are uncorrelated and that Ω is a diagonal matrix. Equation 2 specifies the dynamics of the factors as a VAR with corresponding 3×3 coefficient matrices. Because we use monthly data, we set the lag length to $L = 12$, which is the most commonly used lag length for monthly VAR models. As in any factor model, we need to address the issue that the common factors and loadings are not separately identified. We resolve this issue by

following common practice and restricting the upper 3×3 block of Λ to be the identity matrix. The model is estimated using Bayesian methods. The specification of the prior distributions for the parameters follows Ritschl and Sarferaz (2014). We describe the prior distributions and the estimation procedure in detail in Appendices A.2.1 and A.2.2. With this model, we aim to produce h -step out-of-sample forecasts of inflation rates, conditional on information available at some point in time T . This is easily done using the state-space form of the model in Equations (1) and (2), which implies the following expressions for the forecasts

$$F_T = [f'_T \ f'_{T-1} \ \dots \ f'_{T-L}]' \quad (4)$$

$$f_{T+h|T} = JB^h F_T + J \sum_{j=0}^{h-1} B^j \tilde{V}_{T+j} \quad (5)$$

$$Y_{T+h|T} = \Lambda f_{T+h|T} + \tilde{e}_{T+h} \quad (6)$$

Equation (4) combines the relevant factor values into a single column vector, according to the lag length in the factor VAR. Equation (5) then uses the VAR system to produce a forecast of the factors. Matrix J refers to the matrix that selects the first three rows of the companion form forecasts of the common factors, and matrix B is the companion form coefficient matrix. Lastly, Equation (6) uses the factor forecasts to produce the h -step ahead forecast of the panel. Note that in Equations (5) and (6), we add random errors drawn from their respective posterior distributions to accurately reflect the uncertainty associated with the forecasts.

One critical concern with any forecast is the appropriate choice of the information set at any particular point in time; it would be inappropriate to estimate the model over the entire sample once and base forecasts on these estimates. This is because the Gibbs sampling algorithm that we use estimates the common factors backward through time and

thus necessarily includes information from future time periods. To avoid this problem, we use a recursive forecasting procedure and estimate the econometric model first on a sample that ends in December 1929. With this sample, we produce forecasts of inflation rates for the following one, six, and twelve months. We subsequently add one month at a time to the original dataset and estimate the econometric model again. This approach ensures that we do not include information that was actually not available to agents into the information set. Furthermore, this approach allows the coefficients to be potentially different for each window. The model does not allow for structural breaks in the time series because structural break tests indicated breaks only in a very small number of inflation rates and growth rates of real variables.¹² Thus, it is reasonable to assume that a model with constant coefficients for each window is a satisfactory econometric model for our question.

4.2 Data

We use a rich dataset from Wagemann (1935): 109 time series covering important areas such as production and employment, various price indices, trade, banking and monetary aggregates, and nominal interest rates. The data are collected at monthly frequency. All the time series, except for nominal interest rates, were seasonally adjusted prior to estimation and transformed into 100 times the monthly difference in natural logarithms of the adjusted series.¹³ The nominal interest rate series are divided by 12 to convert them into monthly rather than annual interest rates. The panel with these definitions then starts in February 1925 and ends in June 1935. A complete list of the variables

¹² Out of the 34 inflation time series available to us, the tests indicated structural breaks in only five. The only break close to the economic through was detected in clothing prices for households in July of 1932. Inflation in prices for agricultural machinery indicated a break in February of 1932. For the remaining three series - artificial fertilizers, building materials, and crafting materials - structural breaks were detected much earlier, in December of 1927, February of 1928, and July of 1927, respectively.

¹³ Seasonal adjustments were performed with the Iris toolbox for Matlab, which implements X13-ARIMA routines for seasonal adjustments.

used to extract the common factors is provided in Appendix A.2.3. When estimating the common factors, we used standardized values of the time series; thus, each series has zero mean and variance one for each estimation sample. This commonly used transformation of the data ensures comparability across time series. When constructing the forecasts, we convert them back by adding the mean and the standard deviation of each variable in every run of the sampling procedure to measure inflation expectations that can be compared with actually realized inflation rates.

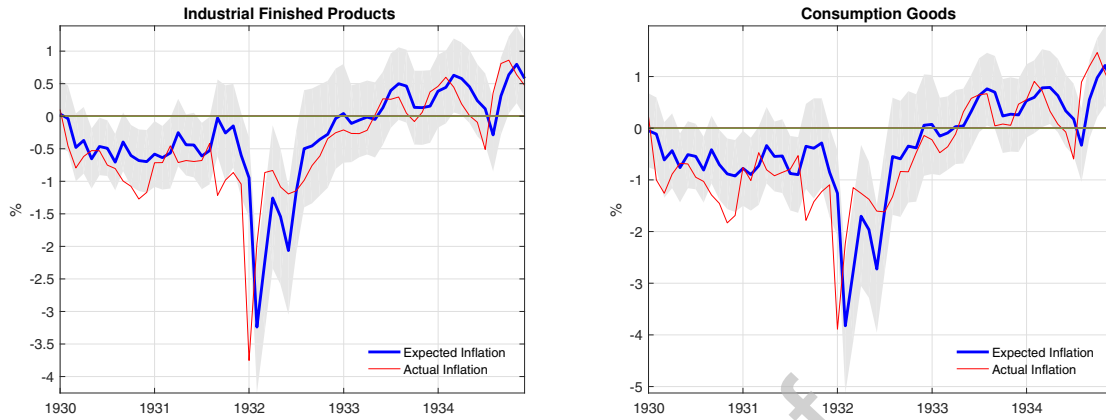
Notably, regarding data transformations, we convert the time series to month-to-month changes for two reasons. First, from the perspective of forming expectations about future inflation rates, it is much more sensible to assume that agents track the month-to-month change in price levels or aggregate activity, rather than assuming that the relevant growth rates span an entire year. Second, the underlying econometric theory is mostly developed for stationary time series, and most studies that forecast economic time series have used period-by-period log differences of the variables. Stock and Watson (1999), Stock and Watson (2002a), Stock and Watson (2002b), Eickmeier and Ziegler (2008) have all used transformations of this type, and we use this common practice in this paper.

4.3 Results

We start by considering one-month-ahead forecasts for two important inflation series, namely, inflation of industrial finished products and inflation of consumption goods. In this subsection, we report the median of the posterior distributions together with 95% of the posterior probability mass. Additionally, actual monthly inflation rates are reported as a point of reference.¹⁴ In Figure 4, the forecasts closely track the actual

¹⁴ Note that because we estimate the model on monthly inflation rates, these are of course smaller than annual inflation rates reported in Mitchell (1975). When we calculate annual inflation rates from our data, we find inflation rates that are very similar to those reported in Mitchell (1975). Figure A.1

Figure 4: One-month ahead forecasts



Notes: Medians of posterior distribution shown in blue, 95 % of the posterior probability mass in gray.

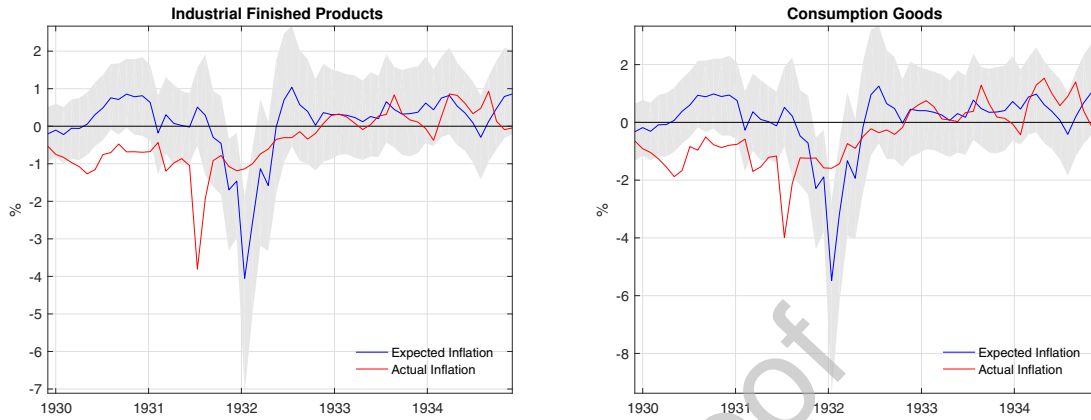
monthly inflation series, albeit with a one-month delay, and this is expected because of the linearity of the forecasting model. We observe two facts regarding expected inflation. First, throughout 1930 and 1931, continued deflation was expected each month, as shown by the consistent negative forecasted series. The large deflation shock of January 1932, which was due to the emergency decree in December 8, 1931, also fueled expectations of further large deflation rates. Given that by this time Germany had already experienced continued deflation rates pursued by the German administration even more strongly in December 1931, there is no reason for any difference in expectations.¹⁵ Second, although the deflation period was to a large extent expected to continue during the early 1930s, the evidence for expected inflation rates after the summer of 1932 is mixed. Although inflation expectations together with actual inflation returned to lower deflation rates, both inflation and deflation are consistent with agents' forecasts from mid-1932 onward. Actual inflation rates were consistently negative until the end of 1932 for both series, and the evidence does not support the perspective that Germany experienced a similarly

in Appendix A.2.4 provides a comparison of these annual inflation rates as a consistency check.

¹⁵ We provide a detailed description of the measures taken in December 1931 in Appendix A.1.

clear-cut reversal in inflation expectations as the U.S. did.

Figure 5: Six-months ahead forecasts



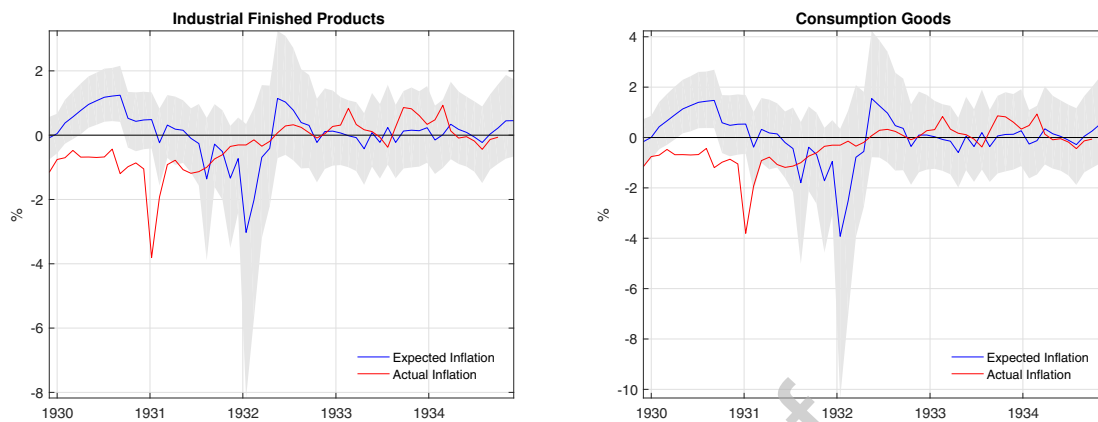
Notes: Medians of posterior distribution shown in blue, 95% of the posterior probability mass in gray. Realized inflation rates shown in red.

We next discuss forecasts over the following six months from each point in time in Figure 5. The two graphs show for each time point the expected inflation at six months from that particular point onwards. For example, the value for January 1931 measures expected inflation for July 1931 based on information available until January 1931. We also plot in red the realized inflation rates six months later. At first glance, the plot seems to indicate that over longer horizons, there was indeed an upward shift in inflation expectations starting in mid-1932; however, a comparison with expected inflation rates from the early 1930s shows that this is actually a reversal of expectations that the public already held, which was only disrupted by the abnormally large deflation period. This conclusion holds true for both inflation rates considered here, and both series are very similar.¹⁶

As a final check, we compute forecasts for an entire year from each time point onward; these results are shown in Figure 6. The pattern we observed for six months ahead

¹⁶ We also estimated forecasts for other price series in the dataset and obtained similar results.

Figure 6: Twelve-months ahead forecasts



Notes: Medians of posterior distribution shown in blue, 95% of the posterior probability mass in gray. Realized inflation rates shown in red.

expected inflation remains until mid-1932. The striking aspect about this figure, however, is the clear and quick convergence of expected inflation rates to zero toward the end of 1932. Essentially, there was nothing known to the public that would have indicated that positive inflation rates, if they were expected at all, would persist over time. Clearly, the results were opposite during the early years of the decade, where continued deflation impulses lead inflation expectations to be adjusted downward. This observation also suggests that inflation expectations are essentially zero toward the end of the sample period and to a large extent not driven by the stationarity assumption of the VAR model, which implies that over longer horizons, the forecasts converge to the unconditional mean of the factors. If this were the case, we would also see zero expected inflation at the beginning of the sample.

4.4 Inflation expectations according to interest rate forecasts (Mishkin 1981)

Although a FAVAR model is a natural candidate from a forecasting standpoint, it is unlikely that economic agents at that time would have used such a complex model. Therefore, we corroborate our previous findings with simpler approaches. The first approach is from Mishkin (1981). His insight was that under the assumption of rational expectations, ex-ante real interest rates can be obtained as the fitted values from a regression of the ex-post real interest rate on a set of predictor variables:

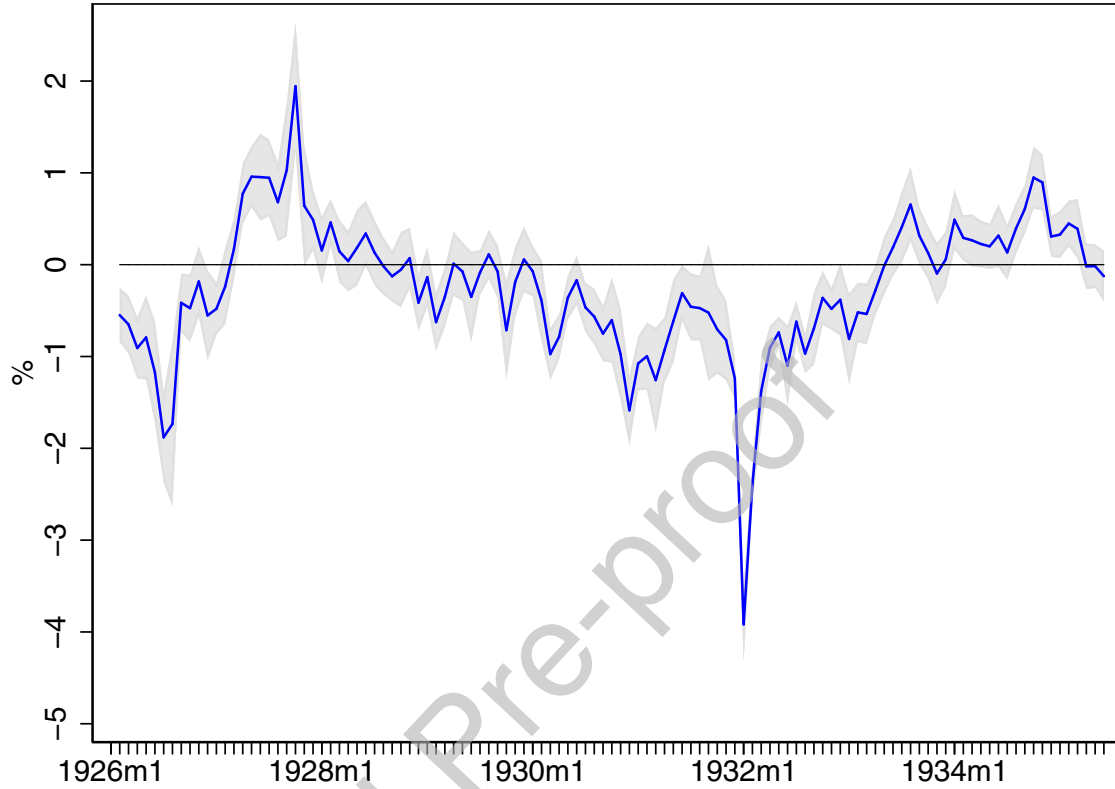
$$eprrr_t = \beta X_{t-1} + u_t - \epsilon_t \quad (7)$$

With the nominal interest rate in hand, this allows to calculate expected inflation. This approach has also been used by Cecchetti (1992) and Romer (1992) for the U.S. Great Depression. In the spirit of Romer (1992), we run regressions of the realized monthly real interest rate on lagged values of the monthly growth rate of nominal total money in circulation, the monthly inflation rate of industrial finished products, the monthly growth rate of industrial production, and the Reichsbank nominal discount rate. For each variable, we include twelve lags in the regressions.¹⁷

Figure 7 shows the results of this exercise. Although inflation expectations were large and positive in 1927, deflation was expected from 1929 onward, in line with the results from the FAVAR approach. More importantly, for our present question, inflation expectations during 1932 were negative and very similar to those held by the public

¹⁷ We use the following series, as stated in Wagemann (1935): nominal total money in circulation: XIII.b.1, “Geldumlauf insgesamt, Stand Monatsende”. Inflation rate of industrial finished products based on the price series: IX.B.23, “Industrielle Fertigwaren insgesamt”, Industrial production: III.B.11 “Industrieproduktion”, Reichsbank nominal discount: X.A.a.1, “Reichsbankdiskont”.

Figure 7: Expected inflation from real interest rate regressions



Notes: Implied expected inflation from regressions of monthly realized real interest rates on growth rates of nominal money in circulation and industrial production, inflation of industrial finished products, and the central bank nominal discount rate.

during 1930 and 1931. Only toward the end of 1933, we observe positive expected inflation rates. That is, the FAVAR and the real interest rate regressions deliver the same result, namely, the beginning of the German recovery cannot be explained by a dramatic shift in inflation expectations or positive expected inflation in general. Our results agree with Voth (1999) who found that during 1932, inflation expectations did not surpass their previous levels and only started to return to zero from 1933 onward.

4.5 Quantitative news estimates (Binder 2016)

Binder (2016) proposes to regress future inflation rates on a scaled measure of news counts. More specifically, the news measure is split into two components: one that counts news reports related to inflation ($News_t^+$), and one that measures the news count related to deflation ($News_t^-$). The log of the ratio is then used in the regression of future inflation on news. Formally, the model is

$$\pi_{t+j} = \alpha + \beta \ln \left(\frac{News_t^+}{News_t^-} \right) + u_t \quad (8)$$

The rationale underlying this approach is that news about price changes should be positively related to expected inflation rates. As proposed by Mishkin (1981), under rational expectations, it is possible to obtain estimates of expected inflation as the fitted values of future inflation rates on the news variable. Table 2 shows the results of this approach where we used one month (columns 1 to 2) and 12 months (columns 4 to 5) ahead inflation rates for industrial finished products and consumption goods as dependent variables. As expected, the news variable is highly significantly correlated with future inflation rates with a positive coefficient. Notably, when we replace future inflation rates with future growth in industrial production (columns 3 and 6), news about price changes are not significant and explain very little of the variation.

Further, in Figure 8, we plot the two components of the news measure in logs and expected inflation of industrial finished products as measured by the fitted values of column 1 of Table 2. As shown in the upper part, the newspaper coverage of deflation increases dramatically during the final months of 1930, thus closing the previous gap between the number of articles covering inflation and deflation. From this time onward, many articles addressed the prevalent and ongoing price reductions of many products.

Table 2: Forecasting regressions with narrative news measure

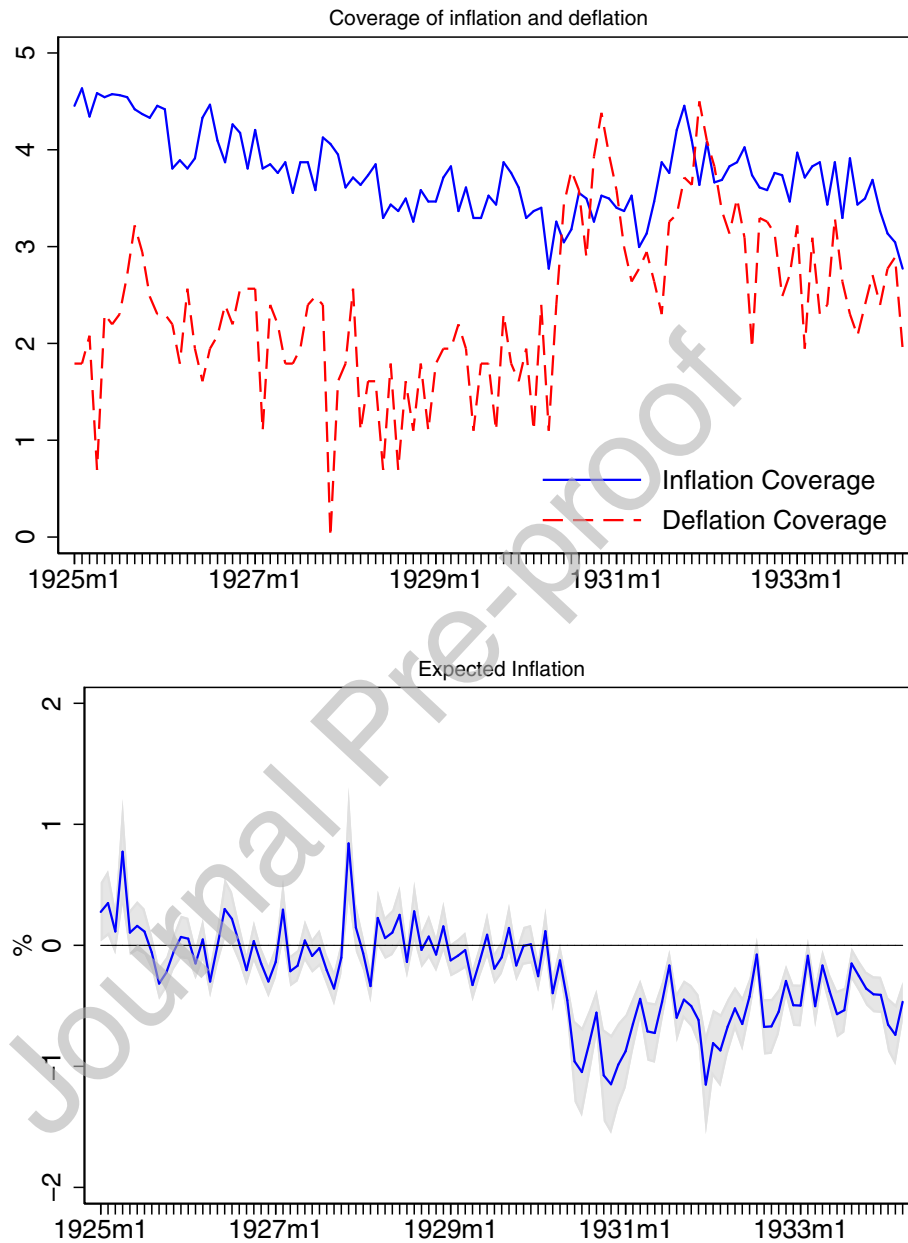
	π_{t+1}^{IFP}	π_{t+1}^C	ΔIP_{t+1}	π_{t+12}^{IFP}	π_{t+12}^C	ΔIP_{t+12}
News	0.405*** (0.0864)	0.436*** (0.0996)	0.321 (0.367)	3.397*** (0.437)	3.958*** (0.557)	3.336 (1.984)
Constant	-0.802*** (0.140)	-0.933*** (0.163)	-0.511 (0.633)	-8.764*** (0.839)	-10.77*** (1.075)	-7.579* (3.278)
N	110	110	110	99	99	99
R^2	0.238	0.178	0.00650	0.217	0.184	0.0251

Notes: Regressions of future inflation rates and growth of industrial production on the news measure constructed under Equation 8. π_{t+j}^{IFP} and π_{t+j}^C denote inflation rates of industrial finished products and consumption goods, respectively, between periods t and $t+j$. ΔIP_{t+j} denotes the growth rate in industrial production between periods t and $t+j$. Series of prices and industrial production are taken from Wagemann (1935), series No. III.B.11, IX.B.23, IX.B.30.

The deflation news count then remains elevated throughout, similar to the inflation news count. It is crucial to note here that deflation is not mentioned in the context of deflation coming to an end, but rather is described as a continued process of price cuts. That is, the deflation news count does not serve as a double negative for inflation. In summary, the regression results imply that expected inflation was actually negative from mid-1930 onward, with no sign of a shift toward smaller deflation rates or even inflation rates.

The use of only one newspaper in this context is potentially problematic. Because different newspapers favor different political positions, how the same events are presented and discussed across newspapers may differ dramatically. Hence, we conducted inflation and deflation news counts for four additional newspapers and constructed a scaled news measure for each them. A problematic issue is that sometimes the additional newspapers were not available or started at later dates. These measures are shown in Appendix A.3.4, Figure A.9. The scaled measure is remarkably similar across newspapers, and the results from model (8) are robust to this broader news measure. This result suggests that our

Figure 8: News coverage and expected inflation



Notes: The first panel plots the log of the number of articles covering inflation and deflation. The second panel plots the fitted values from the first column of Table 2.

focus on only one newspaper does not bias our results, and that our baseline news count accurately captures the media account regarding inflation and deflation at that time.

From the results of this section, across approaches, we consistently observe evidence that during 1932, expected inflation rates were stable and negative. That is, when the recovery started, there is little to suggest that inflation expectations changed. We interpret the large decline in expected inflation rates in early 1932 following the price cuts dictated by the government as a very temporary negative shock that did not affect inflation expectations much during the following months. These results are also consistent with our narrative analysis. Newspaper articles reveal strong opposition from policymakers to inflationary policies, and a sharp increase in newspaper coverage of deflation from 1931 onward. Apart from the sharp fall of prices in January 1932 because of forced price reductions due to the emergency decree, the time series forecasts indicate essentially the same expected price movements in 1932 as in 1931: no shift to inflation or flat expectations.¹⁸

5 Role of inflation expectations for the recovery

Thus far, our results imply that compared with the U.S., no measures to increase expected inflation were feasible in Germany. The quantitative forecasting results show no

¹⁸ We further considered additional approaches to identify inflation expectations, namely using the spot and forward exchange rates (as proposed by Voth (1999)) or inferring information regarding expected inflation from shipment rates on railroads that Klug, Landon-Lane, and White (2005) tested for the U.S. interwar period. However, because the data were not available, we could not pursue both approaches. For instance, the Reichsmark forward exchange data ended in August 1931. Railroad freight rates and shipper's forecasts for the German interwar period are yet to be discovered. Lastly, referring to Hamilton (1992), we investigated the use of futures prices for wheat to infer a market-based measure of expected inflation rates. For this purpose, from the *Vossische Zeitung*, we collected monthly wheat futures of different maturity in the months they were posted between 1925 and 1933. An issue about this data is that it is very frequently missing; thus, we were unable to construct a continuous series. In addition, a potential caveat is that commodity futures prices potentially reflected exchange rate fluctuations or global price movements. We therefore decided to exclude them from this discussion; however, we added them as an additional section of Appendix A.2.5, where we plot the prices and expectations for each available month and duration in Figures A.2 and A.3, respectively.

indication for a clear shift in inflation expectations at any point between 1931 and 1933. The detailed narrative study of media articles ruled out a regime change that was potentially undetected by our quantitative estimates. Newspaper article counts with respect to inflation reveal four spikes in the coverage, which could possibly indicate inflationary news.

To provide further evidence for the absence of an inflation expectations channel for the recovery, we estimated a small-scale VAR model of the form

$$Y_t = C + \sum_{l=1}^L B_l Y_{t-l} + u_t \quad (9)$$

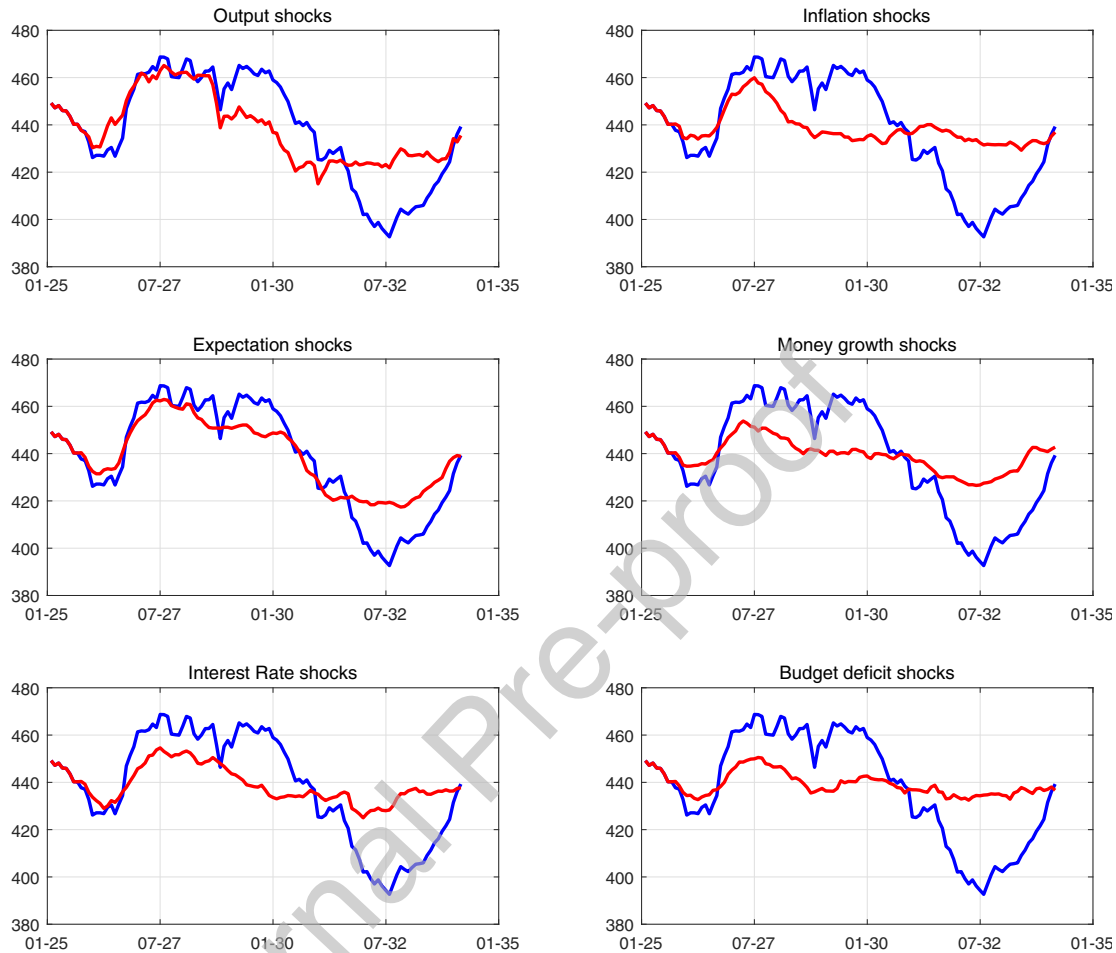
with the following variables in order: the log of industrial production, the log of the price index of industrial finished products, expected inflation, the nominal central bank interest rate, the growth rate of nominal money balances, and the real government budget deficit. As our measure of expected inflation, we use the expected inflation series as implied by the approach in Binder (2016). The government deficit is obtained from Wagemann (1935) as the difference between total expenditures and revenues for the central government. We posit that this specification captures several potential channels through which the recovery may have occurred. The VAR setting allows us to assess the contribution of structural shocks to each variable on the path of the real economy, in this case, industrial production, through historical decomposition. This approach was similarly employed by Shibamoto and Shizume (2014) to study the role of inflation expectations for the case of Japan. The structural shocks are identified through a Cholesky factorization of the residual covariance matrix with the ordering just specified. The deficit is ordered last because total expenditures naturally include automatic stabilizers that react contemporaneously to the real economy, and because fiscal policy is

assumed to react to the stance of monetary policy. We also assume that shocks to policy variables do not affect the real economy and expectations within each month but that policy variables react contemporaneously to shocks to the real economy. This ordering follows Shibamoto and Shizume (2014) who also order expected inflation after real economy variables but before policy variables in their VAR analysis.¹⁹ The lag length was chosen to be eight to strike a balance between a large number of several estimation parameters with a short sample and to accurately capture the dynamics of the variables over time.

The result is presented in Figure 9. In each panel, we plot the original series for industrial production in blue, and the time series that we obtained had only structural shocks to the respective variable occurred over time in red. We observe that together with shocks to the real economy, shocks to expected inflation were important drivers of the economic downturn until mid-1931. This result is consistent with the perspective that the public, expecting deflation throughout this period, postponed consumption, leading to the large economic decline. The second large drop during the banking crisis is largely attributed to shocks to the nominal rate and, to a lesser extent, to fiscal policy. This result agrees with the arguments in the literature that the banking crisis forced the German monetary authority to drastically increase the interest rate to prevent capital outflows under the gold standard. Additionally, the fiscal authority continued the highly unpopular austerity policies, which have often been blamed for worsening the Depression. Lastly, we observe that the start of the recovery emanated from the nominal and real sector, whereas expected inflation became an important economic driver only later on, once the recovery had been under way for some months. This result is consistent with our previous findings that expected inflation was stable and negative during 1932.

¹⁹ The results are robust to ordering expected inflation first or last in the VAR. Additionally, the results are virtually identical when we use expected inflation as implied by real interest rate regressions as in Romer (1992) or Mishkin (1981). Robustness checks can be found in Appendix A.2.6.

Figure 9: Historical decomposition of industrial production



Notes: Blue lines denote 100 times the log of the industrial production index. Red lines depict the series for industrial production that would have been obtained if only shocks to the respective variable occurred. Sources: Wagemann (1935), series No. III.B.11, IX.B.23, X.A.a.1, XIII.b.5, XVIII.A.b.5, XVIII.A.b.6.

6 Implications and future directions

Our results rule out a shift in inflation expectations as a potential explanation of the German recovery from the Great Depression. The narrative account and time series models show that when the recovery started, expected inflation rates remained unchanged. Whenever fears of inflation were mentioned, politicians denounced any price-increasing

policies and emphasized the unconditional stability of the currency. Therefore, the exact cause of the recovery remains a puzzle. Our results from the historical decomposition support some of the explanations that have been previously analyzed. One potential explanation is that the conference of Lausanne boosted public confidence or significantly reduced uncertainty about future economic policy because it put an end to the issue of reparation payments that plagued German politics. Based on an indicator of the state of business across major German industries, Buchheim (2003, 2008) showed that producer confidence indeed markedly increased during the second half of 1932. Machine orders lastingly increased and stock markets had been uptrending since June. Voth (1999) made the same argument when he found that fears of inflation during the Great Depression greatly limited the scope for expansionary policies, at least before the resolution of the reparations problem. Tooze (2006) similarly views the agreement reached in Lausanne as a likely precondition for the recovery because it provided the financial relief that banks and the government needed to promote active economic programs. The narrative sources, however, contain no evidence of a link to an increase in prices.

Temin (1990) provided a monetary explanation for the successful German recovery and argued that low wages played a crucial role in the German economic success of the 1930s. The freezing of wages allowed for a quick reutilization of underused resources. In contrast to raising demand and thereby prices of stimulated production, political pressure under the Nazis reallocated production to the military and public sector. The now controlled economy no longer depended on the price mechanism for allocation of scarce resources. In that sense, the Nazis managed potential inflationary tendencies by freezing prices. As Temin (1990) argued, instead of raising prices after 1933, producers started to reduce the quality of goods, which underlines our argument, that is, inflation expectations likely played no central role at the beginning of the German recovery.

In many industries, prices were fixed by cartels and government controls, so we

surveyed our narrative sources for signs of expected rationing as a potential explanation of the recovery, with no indications that this channel was at play. In contrast, in 1932 and 1933, we find numerous pieces of evidence indicating unused capacities on a large scale that could have quickly been put into operation in case of surges in demand. In addition, during the Great Depression, the data from Buchheim (2008) indicate that low consumer demand led to growing inventories and to businesses reducing employment. Hence, we deem it unlikely that households expected shortages at the beginning of the recovery, causing an increase in demand and production. Although rationing certainly became a problem in the roaring economic upturn during the mid-1930s, it did not play a role in jump-starting the recovery.

By contrast, fiscal policy serves as a promising alternative explanation of the recovery period. In August of 1932, the newly elected chancellor Franz von Papen publicly announced his fiscal program. The main feature of the program was tax rebates and wage cuts, and both were intended to incentivize businesses to hire workers. Papen declared that deflation, if not stopped, would further harm the economy. Although this announcement could have changed public expectations about future inflation and stimulated the economy this way, the program did not signal the intention to raise prices or reduce price reductions. This stands in stark contrast to Roosevelt's pledges to raise prices. For the U.S., the economic reform foresaw the devaluation of the U.S. dollar, and unprecedented discretionary powers of U.S. monetary policy. In Germany, by contrast, the chancellor explicitly stated that the Reichsmark would not be devaluated, and his program foresaw no changes regarding the regulations of the German central bank, which had hindered it from acting as a financier of previous public works projects. The central bank only gave the promise to grant limited credit to the government to finance tax redemptions. The repayment of the Reichsbank loan was described well in the program and in the news accounts, indicating that the potential monetary expansion was restricted to a limited

time period. In summary, the Papen program did not work through affecting inflation expectations as the monetary expansion in the U.S. did. Instead it attempted to establish incentives for the private sector, even at the cost of further wage cuts argued to be indispensable. Examining the real effects of the Papen program in detail is a promising topic to explore in further research.

Jalil and Rua (2016) thoroughly traced the causes of the regime shift in the U.S. to inflation expectations in spring 1933, and our study provides considerable evidence that no such event occurred in Germany. The sources of the German recovery remain unclear. The story of Temin and Wigmore (1990) and Eggertsson (2008) may hold for the U.S., but in the German recovery, inflation expectations played no major role.

A Appendix

Supplementary material and data to this article is available in an online Appendix.

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