Fatal Austerity?

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Abstract

What does fiscal austerity do to an economy that cannot devalue? We study the sharpest historical case: Heinrich Brüning's consolidation into the depths of the Great Depression, under a gold-standard peg that foreclosed devaluation and left the Reichsbank unable to ease. We assemble the first monthly dataset of German federal revenues and expenditures, 1927–1935, disaggregated into detailed spending and revenue categories. The disaggregation yields a discretionary fiscal measure purged of automatic stabilisers and allows us to identify an austerity shock through narrative sign restrictions anchored on the two 1930 emergency decrees, which are free of confounding from the financial turmoil of 1931. The consolidation's durable imprint is on the price level, which falls on impact and keeps falling for more than a year. Output falls too, but the contraction fades within half a year. Our counterfactual shows that the real collapse cannot be attributed to the discretionary shock. Under a fixed parity, austerity deepened the deflation rather than the slump. (C32, E62, E65, N14)

Key words: Austerity, Germany, Great Depression, Fiscal Policy, Structural Vector Autoregression.

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1 Introduction

Between 1930 and 1932, Chancellor Heinrich Brüning raised taxes and cut government spending in the midst of a deep recession, enacting the consolidation through a series of presidential emergency decrees. It is rare for macroeconomists to observe mandatory wage cuts, reductions in unemployment-insurance benefits, or a sudden halt to all public construction. And the consolidation was carried out under a binding constraint: with the Reichsmark tied to gold, devaluation was foreclosed and the Reichsbank could not ease.

What a fiscal contraction does in these conditions is a question that recurs whenever a country must consolidate but cannot devalue. It faces every member of a currency union and every economy tied to a hard peg, and it returned to the euro-area periphery after 2010. Brüning's Germany is its sharpest historical instance: a large, discretionary consolidation forced into a collapsing economy, with no exchange rate to give and no central bank to cushion it. The severity was not lost on contemporaries. Of the December 1931 decree, *The Economist* wrote:

> "Coming on top of three previous Emergency Decrees, which have already reduced terribly the German standard of life, and imposed, as it is, in the middle of a crisis in which Germany has five million unemployed, her stock markets closed, her tale of bankruptcies mounting to catastrophic figures, and her whole economic system 'frozen' by credit restrictions and standstill agreements, this latest 'turn of the screw' will undoubtedly place a dangerous strain on the psychology of the German people."

We ask what Brüning's discretionary austerity did to the German economy, and through which channel it worked. For April 1927 to February 1935 we construct the first monthly dataset of German federal spending and revenues, disaggregated into nine expenditure and four revenue categories. The disaggregation lets us build discretionary fiscal series that exclude items outside discretionary control, such as automatic stabilisers, transfers to the states, debt service and reparations. The monthly frequency is essential to the identification. It lets us date each decree to the month it was taken and separate the two 1930 decrees, enacted before the financial turmoil of 1931, from the later ones, whose timing was entangled with the banking crisis and Britain's departure from gold.

We identify a single austerity shock in a Bayesian VAR of spending, taxes, output, prices and the discount rate, combining sign restrictions on the fiscal instruments with a narrative

restriction that ties the shock to the 1930 decrees (Antolín-Díaz and Rubio-Ramírez, 2018). That the decrees were not attempts to manage the business cycle is not in dispute: the historical record locates their motive in the reparations regime and the inherited budget position (Borchardt, 1979; Ritschl, 2002b). The budget data bear this out. When the Hoover moratorium suspended reparations in mid-1931, the relief did not loosen the consolidation, and two further decrees followed (Section 2.3). The threat to identification is confounding, not endogeneity to the cycle: the crises of 1931 moved the same variables an austerity shock would move. We therefore anchor only on the two 1930 decrees, which precede the banking crisis, the currency crisis and sterling's departure from gold.

Under the peg, the consolidation transmits through the price level. Wholesale prices fall on impact and stay below baseline through the eighteenth month. Output falls too, but its decline is distinguished from zero only through the fourth month, and in a historical counterfactual the shock accounts for a modest share of either decline. The lasting real collapse for which the period is remembered is, in the main, not what the discretionary consolidation produced. It belongs to the wider forces of the Depression, the collapse in world trade, the banking crisis, the capital outflow. What can be cleanly attributed to the austerity is the deflation. That is not to say the consolidation was harmless. A sustained fall in the price level raises the real burden of nominal debt, a channel through which austerity may have fed back into the real economy in the spirit of Fisher (1933). But its durable, identifiable imprint is nominal. This is what a fixed parity does to fiscal policy. When the exchange rate cannot move, a nominal contraction is absorbed by domestic prices, and that is where austerity leaves its mark.

Previous studies have examined fiscal policy during the Weimar Republic, including Cohn (1992)'s analysis of annual budget data and Ritschl (2013)'s evaluation of Germany's macroeconomic performance. Fisher and Hornstein (2002) used a neoclassical growth model to highlight fiscal policy's role in the downturn, while whether Brüning had macroeconomic alternatives at all was long debated in the Borchardt–Holtfrerich controversy (Borchardt, 1979; Holtfrerich, 1982). We revisit the episode with an identified fiscal shock at monthly frequency. Beyond it, our results speak to three strands of the literature.

The first asks how the effects of fiscal policy depend on the environment in which it is conducted, on the state of the cycle (Auerbach and Gorodnichenko, 2012; Jordà and Taylor, 2016; Ramey and Zubairy, 2018; Guajardo, Leigh, and Pescatori, 2014) and, most relevant here, on the exchange-rate regime: under a fixed parity, fiscal shocks transmit more forcefully than under floating, a gap traced to the monetary response to the shock (Corsetti,

Meier, and Müller, 2012; Born, Juessen, and Müller, 2013; Ilzetzki, Mendoza, and Végh, 2013). That work measures the output multiplier of government spending. We study a consolidation under the canonical hard peg and find its durable margin to be the price level, not output. The second literature concerns the gold standard's role as the central propagation mechanism of the Great Depression (Eichengreen, 1996; Accominotti and Eichengreen, 2016; Eichengreen, 2015): the regime that transmitted deflation across borders also shaped how a domestic fiscal contraction was absorbed at home. Work on the financial crisis of 1931 documents its large real effects on the German economy (Ritschl and Sarferaz, 2014). The third literature examines the consolidation's distributional and political fallout, exploiting cross-sectional variation. Galofré-Vilà, Meissner, McKee, and Stuckler (2021) link the depth of local austerity to the rise of the Nazi vote, identifying consequences from differences across places where ours identifies the macroeconomic channel from variation over time. We make no claim on the last.

The paper proceeds as follows. Section 2 provides the historical background. Section 3 describes the new data and the fiscal construction. Section 4 lays out the identification strategy and Section 5 presents the results. Section 6 concludes.

2 Historical Context: Consolidation Under the Peg

> *Wait a while and just you'll see,*
> *And Brüning will come up to you*
> *With the ninth emergency decree*
> *And make mincemeat out of you.*
> (German nursery rhyme, cited in Evans, 2003)

The Treaty of Versailles left Germany owing reparations of 132 billion gold marks, on the order of one-and-a-half times national income, and though the Dawes and Young Plans eased the schedule, the reparations question governed German economic policy throughout the 1920s and into the Depression (Borchardt, 1979; Feldman, 2005; Ritschl, 2013). It is against this backdrop that Brüning's consolidation must be read.

2.1 The Sudden Stop and the Gold-standard Constraint

Germany's recovery in the second half of the 1920s was financed from abroad. With the Reichsmark stabilised and tied to gold, foreign capital, much of it American and short-term, flowed in to fund investment, public budgets and, indirectly, the reparations transfer. That dependence made the German economy hostage to conditions in the lending centres, and those conditions turned. From 1928 the inflow reversed, driven by tightening conditions abroad rather than by German fundamentals (Accominotti and Eichengreen, 2016). The reversal had an institutional trigger as well: under the Dawes Plan, commercial creditors' claims had ranked ahead of reparations in the event of a transfer crisis, a protection the Young Plan removed in 1929, weakening the standing of foreign lenders and contributing to the outflow (Ritschl, 2002b). This was, in Accominotti and Eichengreen's phrase, a sudden stop, a sharp reversal of the capital flows on which the economy had come to depend.

Under the gold standard the Reichsbank could not cushion the shock. The Bank Law of 30 August 1924 required note circulation to be covered at least forty percent by gold and foreign exchange (Art. 28), and permitted the cover ratio to fall below that floor only in exceptional circumstances and by unanimous resolution of the General Board (Art. 29). The parity was a legal commitment, not a discretionary setting.[1] As capital flowed out, the Reichsbank's gold and foreign-exchange reserves fell sharply, and defending the parity required the Reichsbank to hold or raise rates into a contracting economy rather than to ease. The banking crisis of 1931 intensified the drain (Born, 1967; James, 1986). A fixed parity that monetary policy cannot accommodate is the configuration in which the burden of an adverse shock falls on internal prices and wages rather than being offset by the exchange rate (Schmitt-Grohé and Uribe, 2016).

The same external bind shaped the choice of instrument. Brüning treated devaluation and default as ruled out by considerations outside the domestic economy: the reparations regime, the imperative of preserving creditworthiness, and the parity itself. The reparations transfer, restructured by the Young Plan in 1929, tied fiscal policy directly to the external position (Ritschl, 2002b). Wilhelm Lautenbach, an official in the Ministry of Economics, framed the resulting choice as one between internal deflation, which he labelled the *Methode Brüning*, and manipulation of the exchange rate (Holtfrerich, 2016, pp. 668-669). With devaluation off the table, internal deflation was, in Brüning's view, what remained. Whether alternatives

[1] Bank Law of 30 August 1924, RGBl. 1924 II, p. 235, here Arts. 28-29 (p. 242).

were in fact available, the question of the *Zwangslage*, is contested, and we take it up in Section 2.2.

2.2 Brüning's Austerity by Emergency Decree

Brüning enacted his consolidation not through ordinary legislation but through presidential emergency decrees issued under Article 48 of the Weimar constitution, which let the executive bypass the Reichstag. The first came on 26 July 1930. Four further decrees followed, each titled a *Verordnung des Reichspräsidenten zur Sicherung von Wirtschaft und Finanzen* and numbered consecutively, the last on 8 December 1931. All five combined cuts in nominal expenditure with increases in taxation. The July 1930 decree raised income taxes, imposed a supplementary levy on single earners and higher beer and citizen taxes, and tightened unemployment-insurance terms. The December 1930 decree cut civil-service pay and raised income, tobacco and consumption taxes. The June 1931 decree added a crisis tax, further pay cuts and reduced unemployment benefits. The October 1931 decree brought further salary cuts, a halt to public construction and pension cuts of up to three-quarters for public employees, and the December 1931 decree cut public salaries again, rolled wages back toward their 1927 level, mandated rent reductions and raised the turnover tax (James, 1986; Winkler, 2018).

That these measures were not countercyclical is clear from the record. Brüning tightened into a worsening contraction rather than acting to arrest it, and the historical record locates his motive in the external position, the reparations regime and the inherited budget, rather than in the management of domestic activity. Reparations were, by his own account, the overriding aim: ending them ranked so high among his priorities that he came to see the depression itself as leverage, reflecting later that "from the disease we could create our weapon."[2] He said as much at the time: at a January 1932 meeting with the French, Italian and British ambassadors he remarked that the catastrophic world crisis also had its uses for Germany in reparations terms, and where cabinet members pressed for interim arrangements that would have eased part of the burden, he held out for a complete and final settlement (Winkler, 2018; Büttner, 1989, pp. 438, 405). That output stabilisation was not the objective is equally clear from how he treated the alternatives. The stabilising potential of expansionary policy was understood and openly debated at the time: contemporaries

[2]Own translation; the German original reads "Aus der Krankheit konnten wir unsere Waffe machen" (Brüning, 1970, p. 309).

advanced concrete reflationary proposals, state-financed public investment, an expansion of credit, even a partial suspension of the gold parity, several of them from within his own administration and the official statistical establishment.[3] Brüning did not pursue them. Only in the spring of 1932, as the economy deteriorated further, did he seriously weigh a large-scale work-creation programme, and that was blocked by the Reichsbank (Holtfrerich, 2016). Consistent with these priorities, he publicly played down the relief afforded by the Hoover moratorium and pressed Germany's case for revision at every turn, conduct that Appendix A documents and that Section 2.3 confirms in the budget data.

A separate and long-debated question is whether Brüning had any expansionary alternative at all. Borchardt (1979) argued that the inherited debt burden and the external position left none, a *Zwangslage*, or constrained situation, while Holtfrerich (1982) disputed that the constraint bound so tightly. Ritschl (2002b) reads the balance of the debate as broadly confirming Borchardt, though it remains contested.[4]

2.3 Reparations and the Hoover Moratorium

Reparations bound the German budget directly, and the monthly accounts show how. Figure 1 plots the reparations transfer against tax revenue. Under the Young Plan schedule, the transfer ran at 135 to 170 million Reichsmark a month through the first half of 1931; in June, on the eve of the moratorium, it stood at 18.6 percent of average monthly tax revenue over the preceding twelve months.[5]

The Hoover moratorium, proposed on 20 June 1931 and in force from 1 July, suspended the transfer almost entirely: payments fell below one percent of average monthly tax revenue and stayed there. Over the following twelve months the suspension freed 1.63 billion Reichsmark, nearly a fifth of a year's tax receipts, or six months of discretionary spending.

None of this relief loosened the consolidation. Discretionary spending fell through the moratorium year, its monthly average 16 percent below that of the preceding twelve months,

[3] Among them Hans Schäffer's (state secretary in the Finance Ministry) plan for state-financed investment, Wilhelm Lautenbach's (Ministry of Economics) for a credit expansion, and Ernst Wagemann's (president of the Statistical Reich Office) for a partial suspension of the gold parity; see Holtfrerich (1982, 2016) and Appendix A.

[4] See, among others, Köppen (2014); Müller (2014); Borchardt (2015); Kailitz (2015); Köster (2015).

[5] To our knowledge, reparations payments have not previously been available at monthly frequency; Ritschl (2002b) reports them annually (Table A.12). Because tax receipts are strongly seasonal around quarterly payment dates, we express the transfer relative to average monthly revenue over July 1930 to June 1931. Construction is described in Appendix C.

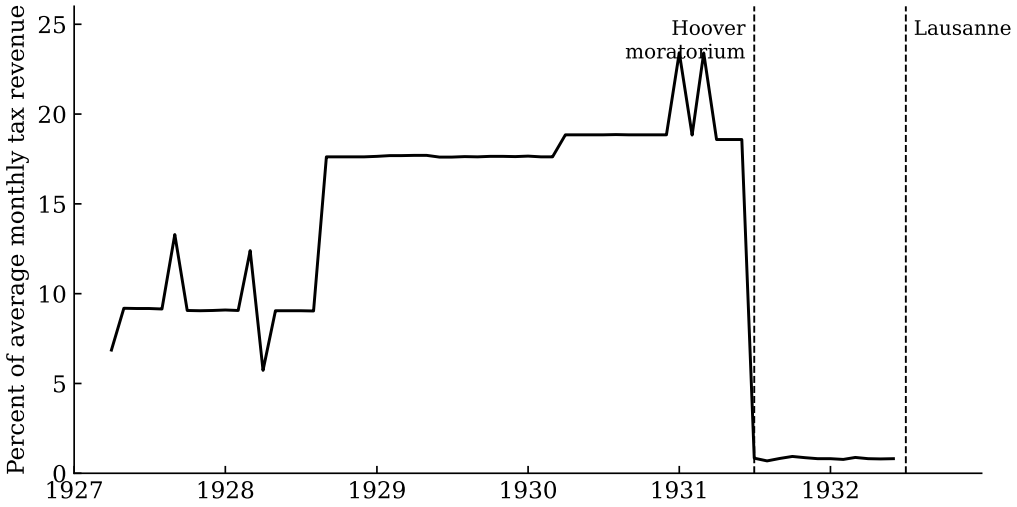


Figure 1: Monthly reparations transfers relative to tax revenue. The solid line shows reparations payments as a share of average monthly tax revenue (July 1930 to June 1931 mean); the dashed vertical lines mark the Hoover moratorium (July 1931) and the Lausanne Conference (July 1932). Source: monthly Reich accounts, see Appendix C.

and the October and December 1931 decrees deepened the cuts while the moratorium was in force. Brüning played down the relief publicly and insisted it be applied in full to the budget, pressing Germany's case for a final settlement at every turn (Appendix A). The outlays that did rise in the moratorium year were crisis containment, outside the discretionary budget: transfers to overburdened municipalities and the recapitalisation of the Dresdner and Akzept banks answered the welfare and banking emergencies prompted by the 1931 crisis.

3 A Monthly Fiscal Dataset

This section describes the new monthly dataset and what it shows about the consolidation.

3.1 Sources and Construction

We construct a new monthly dataset of German federal revenues and expenditures spanning 1927:M4 to 1935:M2. To our knowledge, it is the first fiscal dataset of the late Weimar Republic at the monthly frequency. We assemble it from the aggregated monthly budget series in Wagemann's *Konjunkturstatistisches Handbuch* (Wagemann, 1935), which we disaggregate into consistent categories using the detailed federal accounts published in the *Statistisches*

Jahrbuch für das Deutsche Reich (April 1927 to December 1931) and in *Wirtschaft und Statistik* (from January 1932). The monthly frequency is essential for our strategy: Brüning's consolidation was enacted through emergency decrees announced on specific dates, and only monthly data resolve their timing finely enough to date each fiscal innovation to the month of announcement and to separate it from contemporaneous events such as the 1931 banking crisis and Britain's departure from gold.

Our series extend Ritschl (2002b)'s quarterly budget figures to the monthly frequency and, aggregated back to quarters, reconcile with them (Appendix B). Beyond the fiscal variables, we digitise the full handbook of Wagemann (1935), more than 500 monthly time series of the interwar German economy, and release the collection, a resource that should be of use well beyond this paper.

The granular accounts let us strip out items outside the government's discretionary control, leaving a measure that reflects policy choices rather than the budget's automatic response to the cycle. This matters for identification: in the gross series, discretionary cuts and the automatic rise in cyclical transfers move in opposite directions, so a fall in spending need not signal consolidation. Restricting attention to the discretionary component lets the sign restriction identify the austerity shock cleanly. We group expenditures into nine categories and revenues into four (Appendix C) and construct discretionary measures,

$$\begin{aligned} \tau_t^* &= \tau_t - \left(s_t^f + s_t + b_t\right), \\ g_t^* &= w_t + a_t + d_t + o_t, \end{aligned} \tag{1}$$

where τ_t^* removes from total taxes, duties and levies (τ_t) the transfers to federal states (s_t^f), social transfers (s_t) and interest and debt service (b_t), and g_t^* sums civil-servant remuneration (w_t), housing and assets (a_t), military, police and transport (d_t) and other expenditure (o_t). The measures exclude reparations, debt service and the principal automatic stabilisers, and capture 43 and 41 percent of total revenues and expenditures, respectively. Appendix D shows that federal and local budgets contracted in step, so federal cuts were not offset at the local level.

The remaining variables are monthly real GDP per capita from Albers (2018), the wholesale and consumer price indices and the Reichsbank discount rate from Wagemann (1935). We seasonally adjust the fiscal series with X-12-ARIMA, including a dummy for March, the last month of the fiscal year, when outstanding items are posted, as a regressor to absorb the deterministic end-of-year spike. Appendix E documents all sources.

3.2 A Nominal Consolidation

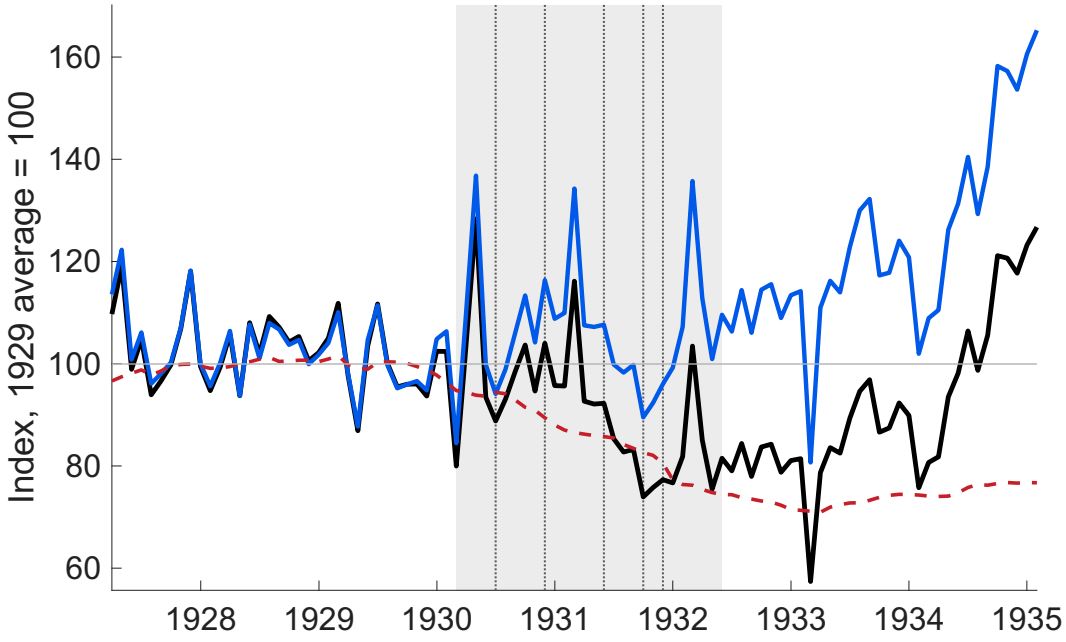


Figure 2: Government spending and the price level, each indexed to the 1929 average (=100). Spending is our discretionary measure g^* (Section 3.1), which excludes automatic stabilisers such as social transfers. The solid black line is nominal government spending; the solid blue line is the same series deflated by the price level; the dashed red line is the price level itself, computed as the mean of the consumer and wholesale price indices. The shaded band marks Brüning's chancellorship (March 1930 to May 1932); the dashed vertical lines mark the five emergency decrees.

Brüning's decrees cut expenditure in nominal terms: civil-service salaries, pensions and public wages were reduced by stated percentages, and the December 1931 decree went further, rolling contractual wages back toward their 1927 level and mandating reductions in rents and cartel prices (Section 2.2). Measured against the price level, these cuts look far milder. Figure 2 indexes nominal spending (black solid line), the same series deflated by the price level (blue solid line), and the price level itself (red dashed line) to their 1929 average. Over the chancellorship nominal spending falls well below its pre-crisis level. At its trough in late 1931 nominal spending stood roughly a quarter below its 1929 level, and the price level had fallen by nearly as much, so that the deflated series is close to unchanged over the same span.

This choice carries a measurement implication. The decrees set nominal magnitudes, so a nominal measure tracks the policy as enacted. A real measure nets those cuts against a deflator that fell alongside them, and, if the consolidation transmitted through prices, against

a deflator the policy itself moved. We therefore enter the fiscal variables in nominal terms in the baseline and report real and alternative price-index variants as robustness (Section 5.3).

4 Identification

We estimate the macroeconomic effects of Brüning's consolidation from a Bayesian vector autoregression in which a single structural shock, the austerity shock, is identified by combining sign restrictions with narrative anchors. The sign restrictions encode what a discretionary austerity shock does to the fiscal instruments. The narrative anchors tie the shock to the two decrees whose timing is driven by reparations politics rather than by the contemporaneous business cycle. Section 4.1 sets out the model and the restrictions, while Section 4.2 explains why we anchor on the 1930 decrees and not the later ones.

4.1 Sign Restrictions and Narrative Anchors

We collect the five endogenous variables in the vector $y_t = [\, g_t^*,\ \tau_t^*,\ \Delta gdp_t,\ \Delta wpi_t,\ i_t \,]'$, where g_t^* and τ_t^* are the discretionary spending and revenue measures of Section 3.1 in logs, Δgdp_t and Δwpi_t are the log changes in real GDP per capita and the wholesale price index, and i_t is the Reichsbank discount rate. The reduced-form VAR is

$$y_t = B_0 + B(L)\, y_{t-1} + u_t, \qquad u_t \sim \mathcal{N}(0, \Sigma), \tag{2}$$

estimated with six lags over 1927:M4–1935:M2, with a dummy for the banking crisis (June 1931) entering as an exogenous regressor. The reduced-form innovations relate to the structural shocks through $u_t = A\,\varepsilon_t$, $\varepsilon_t \sim \mathcal{N}(0, I)$. We do not identify the full matrix A: we identify only the austerity shock, leaving the remaining shocks unrestricted and unlabelled.

We identify the austerity shock following the narrative sign-restriction approach of Antolín-Díaz and Rubio-Ramírez (2018), using the qualitative narrative record of the decrees (Boer and Lütkepohl, 2021). Two sets of restrictions pin it down. First, sign restrictions on the impulse responses: a positive austerity shock raises discretionary revenues and lowers discretionary spending over the first four months ($h = 0, \ldots, 3$). We leave the responses of output, prices and the interest rate *unrestricted*: these are the objects of interest, and restricting them would build in the answer. Second, a narrative restriction on the shock itself: we require

a positive austerity shock to have occurred in the two months in which the cleanly exogenous decrees were announced, July and December 1930. We impose no narrative restriction on the 1931 decrees, whose timing was entangled with the banking crisis and Britain's departure from gold (Section 4.2).

The narrative restriction anchors the sign of the shock in the month each decree was promulgated, the date of the policy decision recorded in the *Reichsgesetzblatt*. This has two implications. It does not require the cuts to be disbursed in that month; the decrees scheduled much of the adjustment for later dates, and the anchor is unaffected by that staggering. Nor does it require the consolidation to have been a surprise; the direction of policy was known before its provisions were settled, but anticipation changes when the effects begin, not the sign we impose. Anchoring the sign at the decision date is therefore robust to both the timing of implementation and the anticipation of the decrees.[6]

We estimate (2) under a Normal-inverted-Wishart Minnesota prior whose tightness is selected by maximising the marginal data density (Kadiyala and Karlsson, 1997). No zero restrictions are imposed. We sample from the posterior by accept/reject, retaining draws whose structural rotation satisfies the identifying restrictions; Appendix Table A-2 reports the acceptance rates. Impulse responses are reported in levels, cumulating the responses of the variables that enter in first differences.

By construction the identified shock tightens fiscal policy within the restriction window. Whether the tightening persists beyond it, and whether it moved output and prices, is left to the data and taken up in Section 5.

4.2 The Timing of the Decrees

The narrative approach treats an intervention as exogenous when the historical record shows it was undertaken for reasons unrelated to the short-run state of the economy (Romer and Romer, 1989, 2004; Ramey, 2011; Cloyne, 2013). That Brüning's decrees meet this condition is not seriously in dispute. Their motive lay in the reparations regime and the inherited budget position, as the historical record (Section 2.2), Appendix A, and the budget data (Section 2.3) both show. They differ, however, in how much confounding they carry. The two 1930 decrees were enacted before the financial turmoil of 1931, whereas the three 1931

[6]Identifying the impact magnitude as a causal multiplier would require dating the shock to the moment private agents learned of the consolidation, and hence a measure of fiscal expectations (in the spirit of Ramey, 2011). No such series exists for the late Weimar economy.

decrees fell amid the banking crisis and Britain's departure from gold, events that moved the very aggregates the austerity shock is meant to move. We therefore anchor only on the July and December 1930 decrees. October and December 1931 fell squarely within the crisis. June 1931 is the harder case: it preceded the German banking crisis, but the financial system was already under strain, and rather than adjudicate we take the conservative course and exclude it. Anchoring on the two 1930 decrees alone is the cautious choice.

The monthly accounts speak to a subtler concern: that the decrees were not discretionary at all, but a rule responding to a budget position that was itself cyclical. The Hoover moratorium provides the test. When it suspended the reparations transfer in mid-1931, it freed substantial resources (Section 2.3). Had the decrees been a feedback rule on the budget, this relief should have eased the path of consolidation. Instead, discretionary spending kept falling, and the October and December 1931 decrees deepened the cuts while the moratorium was in force. The consolidation did not respond to the budget; it was pursued in spite of the relief.

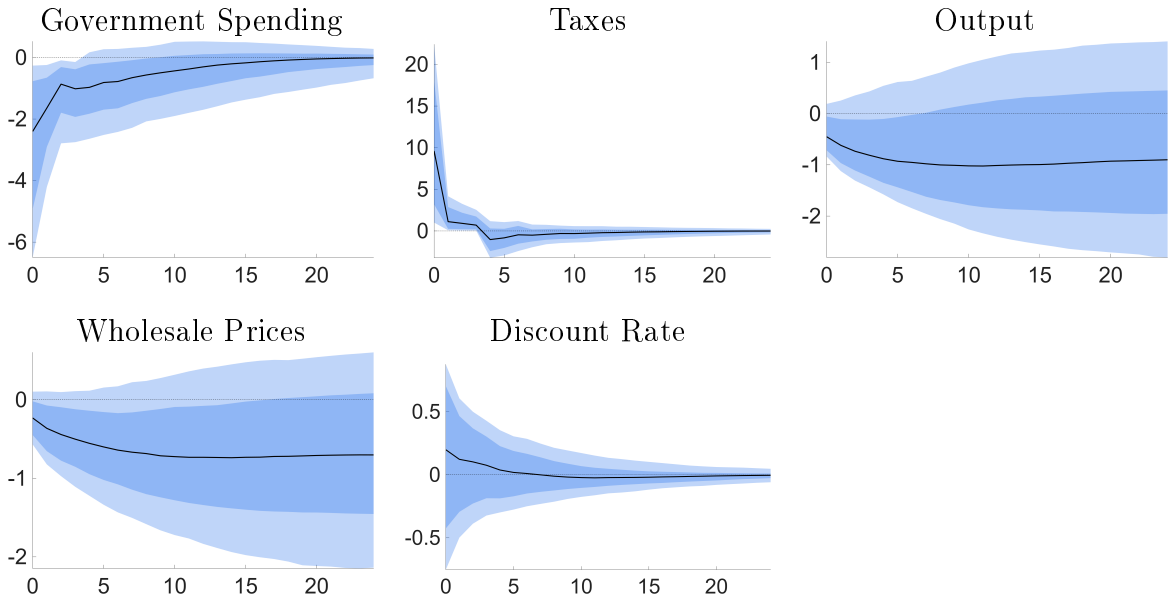
A final check guards against the concern that sign restrictions alone mechanically deliver the result. Imposing the sign restrictions on the fiscal instruments alone, without the decree information, leaves the responses of output, prices and the discount rate without a determinate sign, with 68% credible sets that include zero at every horizon (Appendix F, Figure A-4). The fiscal restrictions on their own thus do not manufacture the price response. It emerges only when the estimation incorporates the decrees of Section 2.2, whose exogeneity the historical record supports. Identification by sign restrictions means set identification. This leaves a role for the prior over rotations (Baumeister and Hamilton, 2015; Giacomini and Kitagawa, 2021; Giacomini, Kitagawa, and Read, 2023). Section 5.3 gauges the role of this prior directly.

5 Results: Adjustment Through Prices

Section 3.2 showed, in the raw data, that the consolidation was nominal: spending was cut in nominal terms while the price level fell alongside it. We now ask whether that pattern survives identification. Section 5.1 presents the impulse responses to the identified austerity shock, Section 5.2 asks how much of the price and output movements the shock can account for, and Section 5.3 probes the result.

5.1 Impulse Responses

Figure 3: Impulse Responses to an Austerity Shock



Notes: Responses to a one-standard-deviation identified austerity shock, defined by a fall in discretionary spending and a rise in revenues over horizons h = 0-3. Output, the price level and the discount rate are left unrestricted. Solid line: posterior median. Shaded areas: 68 and 90 percent posterior credible sets. Spending, taxes, output and prices in percent; the discount rate in percentage points. Horizon in months.

Figure 3 reports the responses to a one-standard-deviation identified austerity shock. By construction the shock operates on the fiscal instruments: discretionary spending falls and revenues rise over the first four months, the horizons at which the sign restrictions bind. Output, the price level and the discount rate are left unrestricted.

A one-standard-deviation austerity shock corresponds, on impact, to a consolidation of roughly half a billion Reichsmark at an annual rate, about a two-and-a-half percent cut in the modelled spending measure alongside a near ten percent rise in revenues. The spending contraction is sizeable and persistent. Spending falls on impact and, beyond the four-month restriction window, remains negative with at least 68 percent posterior probability through the eighth month. The identified shock thus represents a sustained consolidation rather than a transient cut.

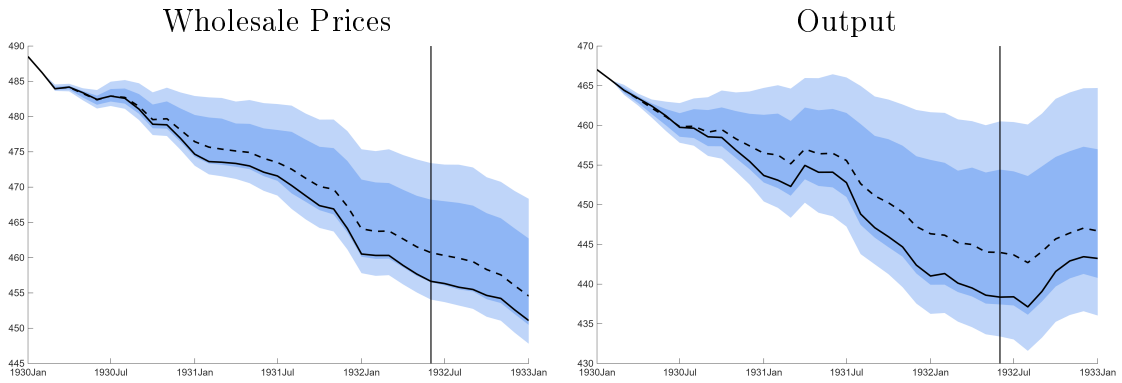
We now turn to the unrestricted responses. The wholesale price index falls on impact, with posterior probability 0.86 that the response is negative, and the decline persists and

deepens: its 68 percent credible set lies below zero from impact through the sixteenth month, reaching a trough near 0.74 percent around the fourteenth month. A sustained fall in the price level is consistent with adjustment under a fixed parity: with devaluation foreclosed, a nominal consolidation registers in internal prices rather than in the exchange rate.

Output falls as well, but only at shorter horizons. Its 68 percent set lies below zero from impact through the sixth month, before widening to include zero further out: the contraction is present but transitory. The discount rate cannot be signed at any horizon. The price response is persistent and negative for more than a year, while output moves with the shock only briefly. The durable margin of a nominal consolidation under a fixed parity is the price level.

5.2 A Historical Decomposition

Figure 4: Historical Decomposition: Prices and Output



Notes: Observed path (solid black) and counterfactual absent the austerity shock (dashed), holding all other shocks at their estimated values. Shaded areas: 68 and 90 percent posterior credible sets of the counterfactual. The vertical line marks the end of Brüning's chancellorship (May 1932). Both series in logs (×100).

The impulse responses describe the effect of a single shock. A historical decomposition turns to the episode itself: it traces how much of the price and output declines of 1930–1932 the austerity shock can account for. Figure 4 plots the observed paths against the counterfactual that removes the austerity shock while leaving all other shocks at their estimated values.

The austerity shock contributes a directionally consistent component to both paths: the counterfactual price level lies above the observed one throughout the chancellorship, as does

the counterfactual output path, with median contributions of 9.9 and 15.4 percent of the total price and output declines. In both cases, however, the observed path lies within the counterfactual's 68 percent band, so neither contribution is precisely distinguished from zero.

We therefore do not read the decomposition as a measurement of austerity's total effect. What it shows is that the consolidation added to both the price and output declines of 1930-1932, but modestly: the broader forces of the Depression, the collapse in world trade, the banking crisis, the capital outflow, carry the larger part. This is consistent with a deflation already under way before the consolidation, to which austerity then added.

Taken together, the impulse responses and the decomposition give a consistent picture. The identified consolidation transmits through a persistent fall in the price level, the internal margin left once devaluation and easing are foreclosed. Output falls too, but transitorily, and austerity's contribution to the episode, on both margins, was modest relative to the wider Depression. The macroeconomic signature the identification isolates most sharply, and most durably, is the price channel.

5.3 Robustness

We probe the price response in three ways: the choice of price index, the treatment of the fiscal variables, and the role of the rotation prior. The full set of impulse responses for each check is reported in Appendix F.

The price channel is not an index artefact. Our baseline uses the wholesale price index. To check that the result does not hinge on this choice, we re-estimate the model with the consumer price index in its place, leaving the specification otherwise unchanged. The price response is essentially the same and, if anything, more persistent: the CPI falls at the posterior median, with posterior probability 0.84 of a negative response on impact, and deepens to a trough near 0.62 percent. Its 68 percent credible set, which includes zero only on impact, excludes it from the first month through the twenty-second. Output is again negative at short horizons and the discount rate cannot be signed, as in the baseline. The full set of responses is shown in Appendix Figure A-5.

Nominal versus real fiscal variables. The baseline measures the fiscal variables in nominal terms, as the decrees set them. Because the price level fell over the period, a real measure differs: deflating the fiscal series nets the cuts against a falling deflator. Entered

in real terms, the fiscal variables leave the price response intact, while the output response, negative at short horizons in the baseline, can no longer be signed at any horizon (Appendix Figure A-6). The price channel is therefore not a product of the nominal treatment. We adopt it as the baseline because it expresses the shock in the nominal magnitudes the decrees set.

The role of the rotation prior. Sign restrictions do not point-identify the model: they rule out rotations whose fiscal responses carry the wrong sign, but the rotations that satisfy them fit the data equally well. As Baumeister and Hamilton (2015); Giacomini and Kitagawa (2021); Giacomini, Kitagawa, and Read (2023) show, the uniform prior placed on the rotation matrix is not neutral, and because the likelihood is flat across the identified set, its influence does not vanish as the sample grows. To gauge how much of our result rests on the prior rather than on the restrictions, we fix the reduced-form parameters at their posterior median and trace out the entire set of responses the restrictions admit (Appendix Figure A-3). Fixing the parameters strips away the estimation uncertainty carried by the main responses in Figure 3, leaving only the rotation prior at work. Two things emerge. First, the admissible set itself is almost entirely negative: at the posterior median the price response can rise no higher than about 0.2 percent and falls as far as -1.5 percent, and the output set lies wholly below zero at short horizons. The negative sign is thus a property of the restrictions and the data, not of the prior. Second, within these bounds the uniform prior places almost all of its mass on negative responses for both variables. For output the prior plays no role; for prices it plays one, but a limited one, and it pushes in the same direction as the restrictions rather than against them.

6 Conclusion

The Brüning years are remembered for a collapse - mass unemployment, a contracting economy, the slide toward political catastrophe - and the historiography has long counted austerity among its causes. We have asked what a clean identification can actually attribute to the discretionary consolidation. Recovering an austerity shock from the 1930 emergency decrees, we find a persistent fall in the price level, the internal margin left once devaluation was foreclosed. The output response is present but short-lived, and the shock accounts for a modest share of either decline. The large and lasting real collapse cannot be cleanly attributed to the discretionary shock. It is bound up with the wider forces of the Depression,

the banking crisis, the capital flight, the collapse in world trade. What can be attributed is the deflation.

The mechanism is not specific to interwar Germany. Wherever a fixed exchange rate removes devaluation and monetary accommodation from the menu, a fiscal consolidation cannot work through the exchange rate and is forced onto domestic prices and wages instead. Brüning's Germany is the sharpest historical case because the constraint bound hardest: devaluation was foreclosed by the reparations regime and the gold statute, and the Reichsbank had no room to ease. The same bind, in milder form, returned to the euro-area periphery after 2010, where consolidation under a shared currency again worked through internal deflation. The channel matters because deflation is not neutral: a falling price level raises the real burden of nominal debt, a force that can deepen a downturn well beyond the direct effect of the cuts (Fisher, 1933).

None of this measures the full toll of the period. Brüning was remembered as the *Hungerkanzler*, and work exploiting cross-sectional variation finds that localities hit harder by the decrees suffered measurably more, in mortality as well as in support for the Nazi party (Galofré-Vilà, Meissner, McKee, and Stuckler, 2021). That evidence identifies the consolidation's consequences from differences *across* places, holding the national aggregate fixed. Ours identifies its macroeconomic channel from variation *over time* in the aggregate. The two are complementary: austerity's human cost fell unevenly across the population, while the aggregate channel our identification isolates was the price level. If the austerity of these years was fatal, it was fatal on more than one margin, and the one our identification isolates is a sustained deflation under a fixed parity.

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This Appendix consists of the following sections:

A. Brüning's Motivation: Historical Evidence

B. Comparison to Ritschl's Federal Government Spending Data

C. Constructing a Monthly Dataset of the German Federal Government

D. Federal Versus Local Government Spending

E. Data Description

F. Additional Results

A Brüning's Motivation: Historical Evidence

This appendix collects the documentary evidence that Brüning's austerity decrees were not directed at the short- or medium-run state of the economy, organised under three headings: his own statements, the contemporaneous awareness of expansionary alternatives, and his symbolic conduct toward Germany's creditors.

Brüning's own statements.

- Reflecting in his memoirs on his time as chancellor, Brüning makes plain that ending reparations ranked high among his priorities: "from the disease we could create our weapon" (Brüning, 1970, p. 309).[7]
- At a January 1932 meeting with state secretary von Bülow and the French, Italian and British ambassadors, Brüning observed that the catastrophic world economic crisis also had its uses for Germany in reparations terms (Winkler, 2018, p. 438).[8]
- While cabinet members such as interior minister Joseph Wirth pressed for interim arrangements that would have waived part of Germany's obligations, Brüning held out for a complete and final settlement of the reparations question (Büttner, 1989; Winkler, 2018, p. 405).

Expansionary alternatives were known.

- From the banking crisis of summer 1931 onward, reflationary policies were openly discussed as an alternative to austerity, several of them from within the administration or from actors close to it: Hans Schäffer, state secretary in the Finance Ministry and a Brüning adviser, proposed countering the deflation through state-financed investment. Wilhelm Lautenbach, an official in the Ministry of Economics, proposed jump-starting the economy by expanding credit, and Ernst Wagemann, founder of the Institute for

[7] Own translation. German original: "Aus der Krankheit konnten wir unsere Waffe machen."
[8] Own translation. German original: "die katastrophale Weltwirtschaftskrise reparationspolitisch für uns auch ihr Gutes habe."

Business Cycle Research and president of the Statistical Reich Office, proposed partially abandoning the gold parity of the Reichsmark (Holtfrerich, 1982, 2016). Brüning pursued none of them, even as the deflation deepened.

- Feldman (1994) notes that Brüning did implement a number of small-scale work-creation programmes, financed out of savings on social expenditure, to cushion the decline.

- Holtfrerich (2016) records that in spring 1932, as conditions deteriorated again, even Brüning began to consider large-scale work creation financed by the Reichsbank, on condition that it not interfere with Germany's foreign relations, but the plan never took effect, opposed by Reichsbank president Luther.

Symbolic rhetoric and conduct.

- The emergency decree of 5 June 1931 was announced immediately before Brüning's departure for the Anglo-German talks at Chequers on 6-7 June. According to Winkler (2018, p. 404), the timing was meant to impress on Britain the severity of Germany's position. The announcement was paired with an official statement stressing the need to revise Germany's obligations and the dangers of default (Ritschl, 2002b, pp. 146f).

- Brüning publicly downplayed the relief afforded by the Hoover moratorium of 20 June 1931. In a radio address on 23 June he warned Germans not to imagine that accepting Hoover's proposal would lift the country's hardships, insisting that the gesture could bear fruit only if Germany pressed on with austerity in every area.[9] On 7 July the government reiterated, through the *Vossische Zeitung*, that the reparations relief would be used in full to consolidate public finances rather than to ease the population's suffering.

- At the seven-nation London conference of July 1931, Brüning instructed officials to understate the favourable outcomes for Germany (Winkler, 2018, pp. 419f).

[9] Own translation; for the German original see Winkler (2018, p. 415).

B Comparison to Ritschl's Federal Government Spending Data

In Figure A-1, we aggregate our monthly budget data to quarterly frequency and find that it corresponds well with the series in Ritschl (2002b).[10] During the late 1920s, we underestimate total Reich expenditures, however, both series move closely together.

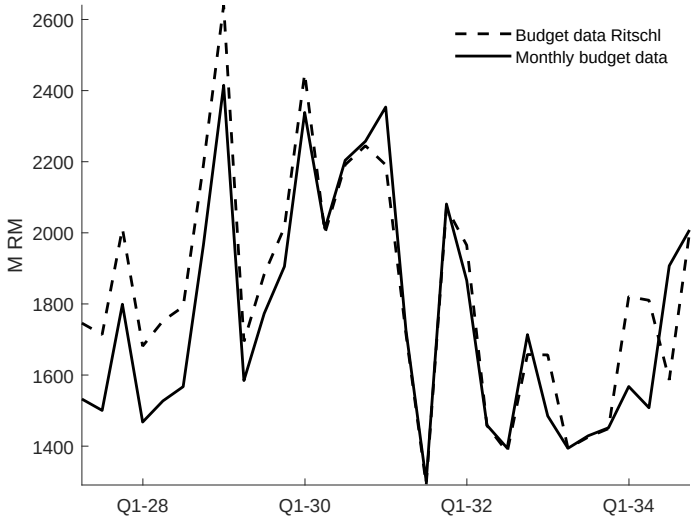


Figure A-1: The dashed lines shows quarterly total federal expenditures as compiled by Ritschl (2002b). The bold line shows our monthly measure of total expenditures aggregated to quarterly frequency.

As Ritschl (2002a) notes, the official budgeting process somewhat masks the true extent of public finances because the German government tried to hide some of its outlays from international monitors. During the early 1930s and, hence, during Brüning's term of office, the series coincide almost perfectly. This comparison shows that the monthly data provides a very good account of federal government expenditures. If anything, the fact that we do not account for the hidden spending positions places a higher bar for our results.

[10]The benchmark series in Ritschl (2002b) consists of total expenditures by the federal government net of transfer payments to local governments and municipalities (Table A.6 "Die vierteljährlichen Einnahmen und Ausgaben des Reiches 1925 - 1938 (Mio. RM), A.6.35, "Reiner Finanzbedarf").

C Constructing a Monthly Dataset of the German Federal Government

This appendix specifies how we group the budget items on the expenditure and revenue sides and how we construct the *nominal* spending and tax-revenue variables used in the baseline VAR (the real and CPI-deflated variants of Section 5.3 apply the respective deflator to these nominal series). Grouping is necessary because the items' declarations and composition change across the statistical sources (April 1927-December 1931: *Statistisches Jahrbuch für das Deutsche Reich*, January 1932-February 1935: *Wirtschaft und Statistik*). Items are listed under their original German terms, "(EO)" marks items of the extraordinary budget.

C.1 Total Expenditures

Total federal expenditures are split into nine broad categories. The monthly nominal government spending variable corresponds to the sum of "Remuneration of civil servants and employees" (3E), "Housing, assets "(4E), "Military, police, transportation"(5E), and "Other expenditure" (9E).

1E Transfers to federal states

- Steuerüberweisungen an die Länder
- Überweisungen an die Länder

2E Social transfers

- Sozialversicherung
- Zuweisung an die knappschaftliche Pensionsversicherung
- Für die Befreiung der Untertagearbeiter von der Arbeitslosenversicherung
- Erwerbslosenfürsorge (unterstützende)
- Kleinrentnerfürsorge
- Krisenunterstützung für Arbeitslose
- Arbeitslosenhilfe und Arbeitsbeschaffung
- Schaffung von Arbeitsmöglichkeiten und Verstärkung der Krisenfürsorge

Wertschaffende Arbeitslosenfürsorge
Arbeitslosenversicherung
An Reichsanstalt für Arbeitsvermittlung und Arbeitslosenversicherung
Freiwilliger Arbeitsdienst usw.
Fettverbilligung
Zur Erleichterung der Wohlfahrtslasten der Gemeinden
Arbeitslosenversicherung (EO)
Wertschaffende Arbeitslosenfürsorge (EO)
Erwerbslosenfürsorge (produktive) (EO)

3E Remuneration of civil servants and employees

Besoldungen
Pensionen
Bezüge der Beamten und Angestellten (ausschl. Ruhegehälter)
Versorgung und Ruhegehälter einschl. der Kriegsbeschädigtenrenten

4E Housing, assets

Vorstädtische Kleinsiedlung für Erwerbslose
Wohnungs- und Siedlungswesen
Beteiligung an der Dresdner Bank
Beteiligung an der Akzept-Bank
Stützung der Landesbank der Rheinprovinz
Erwerb von Gelsenkirchen-Aktien
Wohnungs- und Siedlungswesen (EO)

5E Military, police, transportation

Heer - sächliche Ausgaben
Marine - sächliche Ausgaben
Verkehrswesen
Schutzpolizei
Verkehrswesen (EO)

6E Debt and coverage of public deficit

Reichsschuld: Verzinsung und Tilgung
Reichsschuld: Anleiheablösung
Ausserordentliche Tilgung der schwebenden Schuld

Tilgung in Ausführung des Gesetzes vom 23.10.1930
Rücklauf von Schuldverschreibungen
Zur Deckung der Fehlbeträge früherer Jahre
Rücklauf von Schuldverschreibungen usw. des Reiches (EO)
Einlösung von Schatzanweisungen usw. (EO)

7E War burdens

Innere Kriegslasten
Sonstige äußere Kriegslasten
Innere Kriegslasten (EO)

8E Reparations

Reparationszahlungen
Reparationszahlungen (EO)

9E Other expenditure

Münzprägung
Sonstiges
An die Bank für internationalen Zahlungsabgleich (Sondereinlage) (EO)
Zuschuß an den ordentlichen Haushalt (EO)
Sonstiges (EO)

C.2 Total Revenues

Total federal revenues are split into four broad categories. The monthly nominal tax revenues variable is constructed as "Taxes, duties, levies" (1R) minus the sum of "Transfers to federal states" (1E), "Social transfers" (2E), and "Reichsschuld: Verzinsung und Tilgung"[11] in category 6E.

1R Taxes, duties, levies

Aus Steuern, Zöllen und Abgaben

2R Capital income

[11] Translation: *Reich debt: interest and debt repayments*

Aus der Münzprägung
Aus Anleihe
Anteil des Reichs am Reingewinn der Reichsbank
Überschuss der Post und Reichsdruckerei
Vorzugsdividende aus den Vorzugsaktien der Deutschen
Reichsbahn-Gesellschaft
Verzinsung aus den Vorzugsaktien der Deutschen Reichsbahn-Gesellschaft
Einnahmen aus Verkauf von Vorzugsaktien der Deutschen
Reichsbahn-Gesellschaft
Erlös aus der 5 % Anleihe von 1927 (EO)
Aus Anleihen und Betriebsmitteln (EO)
Aus dem Verkauf von Vorzugsaktien der Deutschen Reichsbahn-Gesellschaft (EO)

3R Extraordinary taxes

Reparationssteuer der Deutschen Reichsbahn-Gesellschaft

4R Other revenue

Sonstige Verwaltungseinnahmen
Verwaltungseinnahmen (EO)
Sonstiges (EO)

D Federal Versus Local Government Spending

In this appendix, we discuss how government spending in the Weimar Republic was divided between the federal government and local governments. We show that Brüning's austerity measures affected not only the federal government budget, but, in the same manner, the finances of states and municipalities. Hence, budget cuts at the federal level were not compensated by the local government.

In a first step, we use data from Ritschl (2002b) to examine the relative importance of federal and local authorities in total government expenditures. Table A-1 provides an overview of how total expenditures were distributed across federal and local governments. Until 1933 the shares are remarkably constant, with the Reich accounting for about 40 % of total expenditures, while states and municipalities accounted for the remaining 60 %. Only in the last year of the sample does this pattern reverse.

Table A-1: Share in spending (%) by Reich and local government

Year	Reich	Local
1925	37.19	62.81
1926	37.59	62.41
1927	36.78	63.22
1928	36.3	63.7
1929	38.21	61.79
1930	39.47	60.53
1931	38.16	61.84
1932	39.03	60.97
1933	42.54	57.46
1934	52.03	47.97

Notes: Ratios of government spending by Reich and local government. Data comes from Ritschl (2002b), Table A.12 "Die Ausgaben und Einnahmen des öffentlichen Sektors nach Kalenderjahren 1925 - 1938 (Mio. RM), II Sachausgaben und Transfers".

The fact that spending at both governmental levels was similarly affected by Brüning's austerity measures is illustrated in Figure A-2, which plots nominal expenditures for the federal government as well as for all states and municipalities over time. Both series show

drastic cutbacks in spending after 1930, which is consistent with the discussion in Galofré-Vilà, Meissner, McKee, and Stuckler (2021) that the austerity policies trickled down from federal to local government. Between 1930 and 1932, Reich expenditures decreased by 28 %, while the corresponding drop at the local level was similarly high at 26 %. The data clearly does not support the idea that spending cuts at the Reich level were offset by expansionary fiscal policy at the local level. What is equally interesting from Figure A-2 is that expenditures by states and municipalities did not revert back to their pre-crisis levels, but remained low. Hence, given these considerations, investigating the economic impact of austerity with federal government data is ideal for two reasons. First, federal government data is available at the monthly frequency, while local government data exists only at annual basis. Second, federal budget data is not confounded by offsetting trends at the local government level.

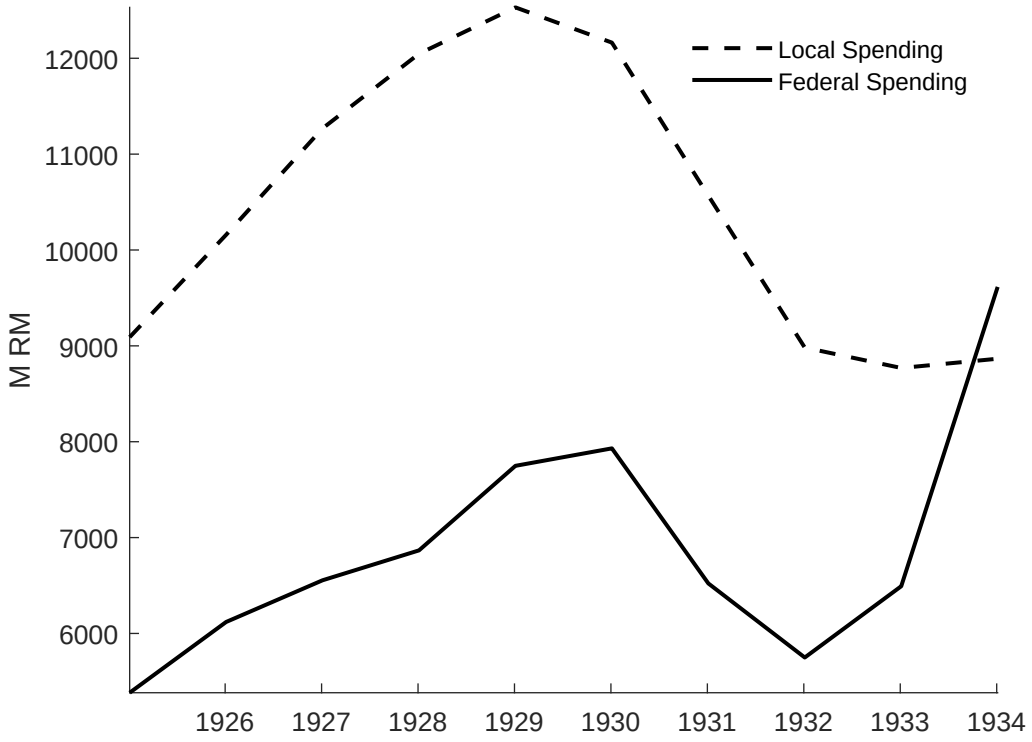


Figure A-2: Nominal expenditures by the federal government and local authorities in million Reichsmark. Data comes from Ritschl (2002b), Table A.12, "Die Ausgaben und Einnahmen des öffentlichen Sektors nach Kalenderjahren 1925-1938 (Mio. RM)", "Sachausgaben und Transfers, Reich, LGH"

E Data Description

All data are monthly. The five variables of the baseline VAR are government spending, tax revenues, GDP per capita, the wholesale price index and the Reichsbank discount rate.

Government spending: Constructed from our budget dataset (C). Seasonally adjusted; entered in nominal terms in the baseline. The real variant divides by the arithmetic mean of the CPI (Wagemann, 1935, p. 107) and WPI (p. 99), respectively.

Tax revenues: As above, constructed from C; seasonally adjusted.

GDP per capita: Monthly real GDP per capita from Albers (2018), who estimates a latent monthly activity factor from a large panel of Wagemann (1935) series.

Wholesale prices: WPI from Wagemann (1935), p. 99, "Indexziffern der Großhandelspreise", total (1913 = 100).

Consumer prices: CPI from Wagemann (1935), p. 107, "Reichsindexziffern der Lebenshaltungskosten", total (1913/14 = 100).

Interest rate: Reichsbank discount rate, Wagemann (1935), p. 109.

F Additional Results

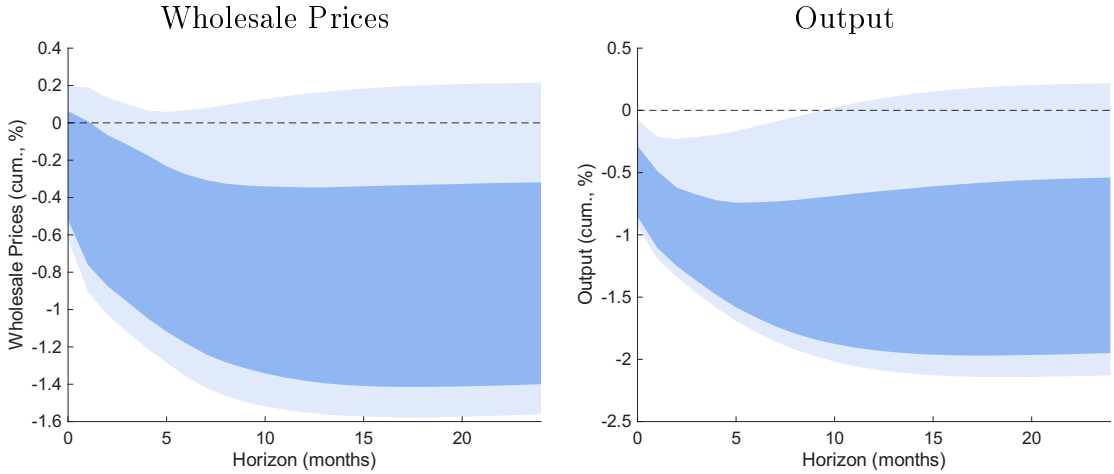
This appendix reports sampling diagnostics for the baseline and the full impulse-response panels for the identification check of Section 4.2 and the robustness checks of Section 5.3. It also reports the identified sets underlying the prior check of Section 5.3. Except for the identified sets, each impulse-response figure shows all five variables.

Table A-2: Sampling Diagnostics

Posterior draws retained	1,000
Acceptance rate, sign restrictions	3.5%
Acceptance rate, sign and narrative restrictions	0.8%
Narrative restriction given sign restrictions	21%

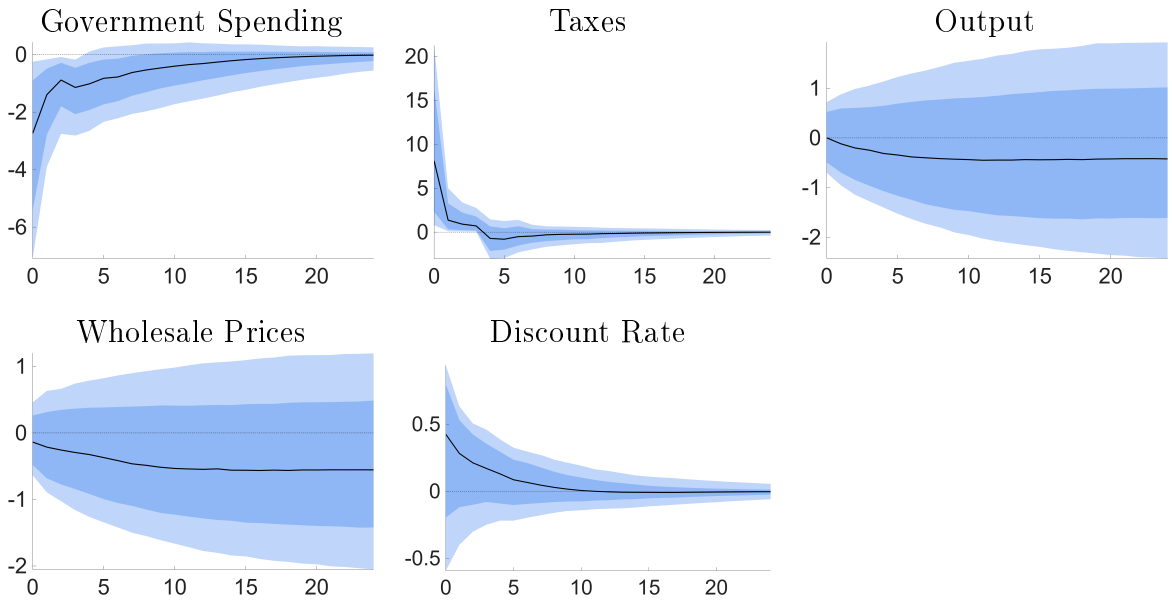
Notes: Baseline specification. Acceptance rates are the shares of candidate draws of the reduced-form parameters and the rotation matrix that satisfy the stated restrictions. The last row reports the share of rotations satisfying the sign restrictions that also satisfy the narrative restriction on the two 1930 decrees.

Figure A-3: Identified Sets at the Posterior Median



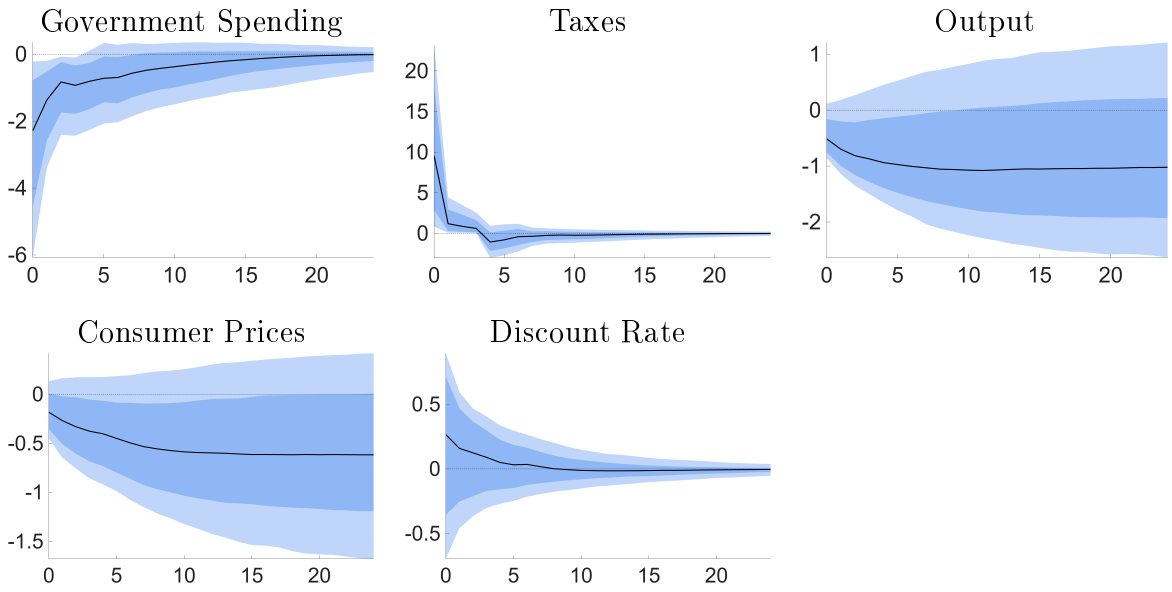
Notes: Cumulative responses to the identified austerity shock across the rotations admitted by the sign and narrative restrictions, with the reduced-form parameters fixed at their posterior median. Light band: minimum and maximum over the admissible rotations, the identified set. Dark band: 5th to 95th percentile under the uniform prior over rotations. Horizon in months.

Figure A-4: Sign Restrictions Without the Decree Information



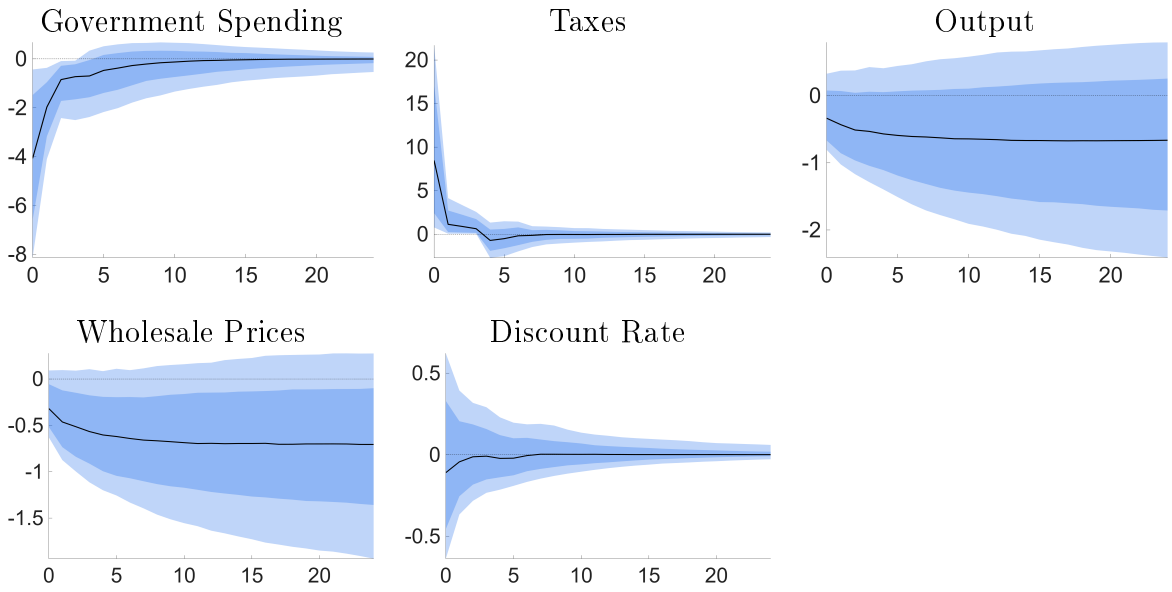
Notes: Responses to a one-standard-deviation austerity shock identified by the sign restrictions on the fiscal instruments alone, without the narrative restriction on the 1930 decrees. Specification otherwise as in Figure 3. Solid line: posterior median. Shaded areas: 68 and 90 percent posterior credible sets. Spending, taxes, output and prices in percent; the discount rate in percentage points. Horizon in months.

Figure A-5: Robustness: Consumer Price Index in Place of the Wholesale Index



Notes: Responses to a one-standard-deviation austerity shock, with the consumer price index replacing the wholesale price index. Specification otherwise as in Figure 3. Solid line: posterior median. Shaded areas: 68 and 90 percent posterior credible sets. Spending, taxes, output and prices in percent; the discount rate in percentage points. Horizon in months.

Figure A-6: Robustness: Real Fiscal Variables



Notes: Responses to a one-standard-deviation austerity shock with the fiscal variables entered in real terms, deflated by the mean of the consumer and wholesale price indices. Specification otherwise as in Figure 3. Solid line: posterior median. Shaded areas: 68 and 90 percent posterior credible sets. Spending, taxes, output and prices in percent; the discount rate in percentage points. Horizon in months.