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# *Fiscal News and Inflationary Expectations in Germany After World War I*

STEVEN B. WEBB

Inflation in Germany from 1919 to 1923 resulted from the accumulation and the anticipation of government deficits. Inflationary expectations depended therefore on fiscal news. Allied demands for reparations, the occupation of the Ruhr, and domestic revolts were important negative news and led to increased inflation. Tax reforms and eventually the end to government deficits were important positive news and ushered in periods of price stability. Political events were fiscal news as they changed the chances for the government to balance the budget.

**T**HE German inflation, already a frequent testing ground for monetary theory, offers the opportunity to gain new insight into the connection between government deficits and inflationary expectations. The gross correlation between government deficits and rapid inflation is obvious and important to keep in mind. Every case of rapid inflation—like in Israel and many Latin American countries, and the industrial countries in the 1970s—and every case of hyperinflation in Europe after the world wars has been accompanied by government spending well in excess of revenues. The timing of the relationship between deficits and inflation has not been consistent, however, which has led some economists to downplay the relationship.<sup>1</sup> For the German case, Figure 1 shows the wide fluctuations of the inflation rate. Real government deficits had smaller fluctuations and followed a different time path. Current inflation did not depend on current deficits, but rather on a combination of the accumulation of past deficits and the expectation of future ones.

A theory of rational expectations of inflation built upon an accurate understanding of the historical policies leads directly to the hypothesis that expected inflation should have depended on expected deficits. To test the hypothesis, we must see how well fiscal news corresponded with changes in indicators of inflationary expectations. Important fiscal

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<sup>1</sup> Robert J. Barro, *Macroeconomics* (New York, 1984), pp. 192–96, 383–85.

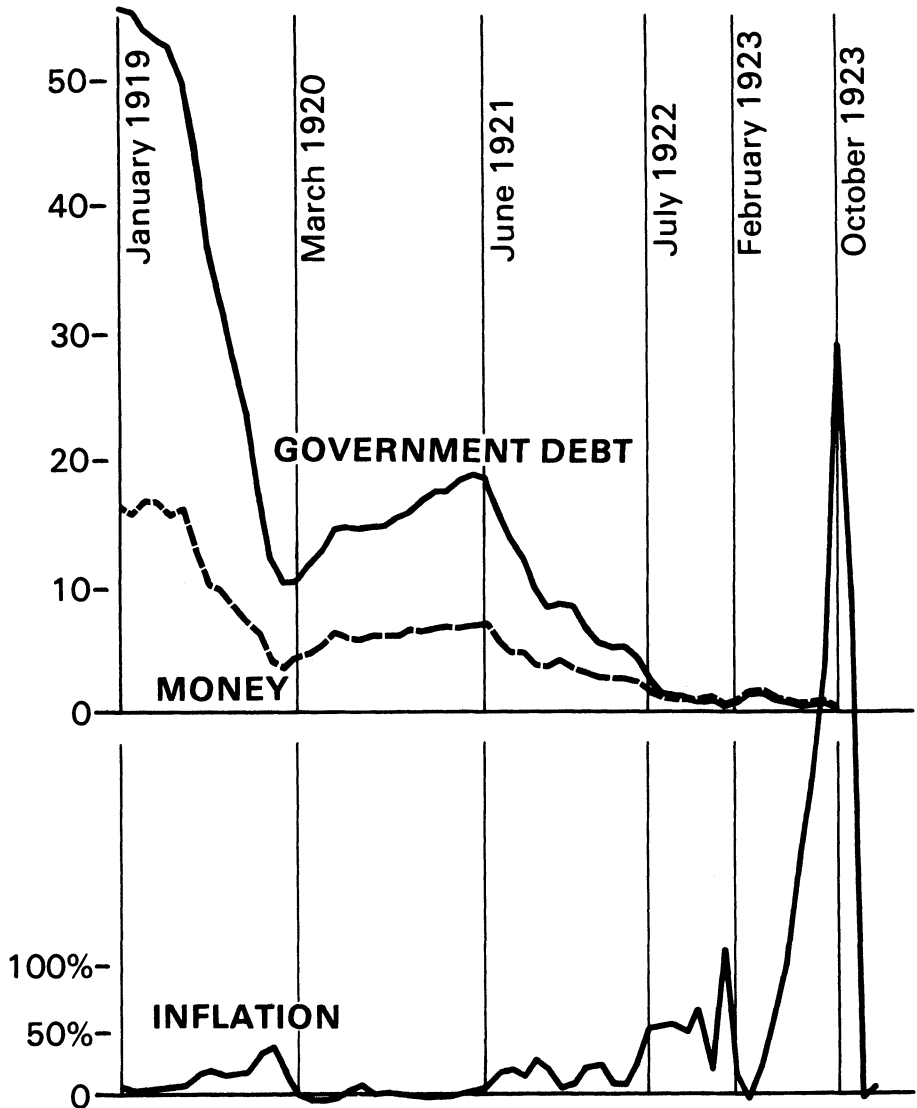


FIGURE I  
REAL VALUES OF TOTAL GOVERNMENT DEBT AND OF HIGH-POWERED MONEY  
AND THE INFLATION RATE OF WHOLESALE PRICES

*Note:* Government Debt and Money are in billion marks, deflated to 1913 values with wholesale prices. "Inflation" is the monthly rate, continuously compounded.

*Source:* Tables 1 and 2.

news included not only matters narrowly related to the budget, like tax reforms and Allied reparation demands, but also challenges to the government's authority—armed uprisings and foreign invasions.

#### I. A THEORY OF INFLATIONARY EXPECTATIONS

To understand what should have determined inflationary expectations we must combine the insights of economic theory with knowledge about

policy making during the German inflation. When an economist says that his model incorporates rational expectations, he means that the expectations variable is endogenous and dependent on the exogenous variables in a way that takes account of all the relationships assumed in the model. While this assumption may imply that people have unrealistic amounts of insight and computational power, it seems preferable to the alternative assumption—that people always neglect a variable or a relationship which the economist deems important enough to put in his model.

Most models applied to hyperinflations have been simple. The level of real money balances that people demand depends on the opportunity cost, which is the expected inflation in the immediate future.<sup>2</sup> Prices adjust instantly to equate actual with desired real balances, it is usually assumed, and therefore the price level depends on the current money stock and inflationary expectations,  $\pi$ :

$$\log (M/P) = f(\pi), \quad \partial f / \partial \pi < 0 \quad (1)$$

$$\text{or } \log P = \log M - f(\pi)$$

Since future prices will also depend on the money stock and inflationary expectations in each future period, today's price level and expectations of inflation should depend on the expected path of the money stock into the infinite future.<sup>3</sup> Economists often close their models by assuming that the money supply is exogenous and follows a time-series process—for instance, the growth rate of money equals the rate in the previous period plus a random error.<sup>4</sup>

During the inflation of 1919–1923, however, the money stock was not exogenous. As some historians and economists have suggested, the supply of money depended on the government debt.<sup>5</sup> The Reichsbank

<sup>2</sup> The interest rate and income, arguments in conventional money demand equations, fluctuated too little to noticeably affect real balances during the hyperinflations. Phillip Cagan, "The Monetary Dynamics of Hyperinflation," in Milton Friedman, ed., *Studies in the Quantity Theory of Money* (Chicago, 1956), pp. 27–35; Steven B. Webb, "Money Demand and Expectations in the German Hyperinflation: A Survey of the Models," in Nathan Schumkler and Edward Marcus, eds., *Inflation Through the Ages* (New York, 1983).

<sup>3</sup> The inflationary expectations term for each future period is eliminated by recursive substitutions of an expression with the money stock and expectations one period further into the future. Thomas J. Sargent, *Macroeconomic Theory* (New York, 1979), pp. 268–69; Thomas J. Sargent and Neil Wallace, "Rational Expectations and the Dynamics of Hyperinflations," *International Economic Review*, 14 (June 1973), pp. 328–50.

<sup>4</sup> Robert P. Flood and Peter M. Garber, "An Economic Theory of Monetary Reform," *Journal of Political Economy*, 88 (Feb. 1980), pp. 24–58; Edwin Burmeister and Kent D. Wall, "Kalman Filtering Estimation of Unobserved Rational Expectations with an Application to the German Hyperinflation," *Journal of Econometrics*, 20 (Nov. 1982), pp. 255–84.

<sup>5</sup> Costantino Bresciani-Turroni, *The Economics of Inflation: A Study of Currency Depreciation in Post-War Germany* (London, 1931; trans. 1937), pp. 51–74; Frank D. Graham, *Exchange, Prices, and Production in Hyperinflation: Germany, 1920–1923* (Princeton, 1930), pp. 35–42; Heinz Haller, "Die Rolle der Staatsfinanzen für den Inflationsprozess," in Deutsche Bundesbank, ed., *Währung und Wirtschaft in Deutschland 1876–1975* (Frankfurt am Main, 1976); Carl-Ludwig Holtfrerich, *Die deutsche Inflation, 1914–1923: Ursachen and Folgen in internationaler Perspektive* (Berlin, 1980), pp. 97–178; Rodney L. Jacobs, "Hyperinflation and the Supply of Money,"

stood ready to buy or sell any amount of government debt at a fixed discount rate.<sup>6</sup> Thus the private sector could choose what fraction of the government liability to hold as interest-bearing debt and what fraction to hold as high-powered money—Reichsbank deposits and currency.

The chief influence on the fraction of debt monetized was inflationary expectations. With greater expected inflation, more of the debt was monetized.<sup>7</sup> Let us see how this aggregate result could have arisen from the behavior of individuals. If a person expected very low or negative inflation rates, she would wish to hold a substantial part of her wealth in government debt, paying a nominal return of 5 percent per year. Suppose new information shifted her probability distribution of expected inflation upward. She would then wish to hold less of her wealth in government debt and more in real assets—stocks, steel, sausages. To try to fulfill this wish, she would discount some of her T-bills at the Reichsbank, take the cash, and go out to buy goods. But if everyone else heard the same news and interpreted it in a similar way, they would try to do the same thing. Their behavior would, in the aggregate, monetize more of the debt; bid up the nominal prices of real assets; decrease the real value of government debt (monetized and unmonetized); and decrease the real value of money balances. The Reichsbank knew that the fraction of debt monetized was neither constant nor exogenous, but depended on public confidence in German government finances.<sup>8</sup> Econometric analysis shows that government debt and inflationary expectations explain the money supply well—better than the usual time-series models.<sup>9</sup> We can also estimate how powerfully inflationary expectations affected the real value of government debt.<sup>10</sup>

$$\log (DEBT/WPI) = 4.79 - 3.33 DISCOUNT \quad (2)$$

(2.31)    (.56)

May 1920–August 1923

$$\bar{R}^2 = .98 \quad \text{Durbin-Watson} = 2.00 \quad \rho = .99$$

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*Journal of Money, Credit and Banking*, 9 (May 1977), pp. 287–303; Sargent and Wallace, “Rational Expectations and the Dynamics of Hyperinflations.”

<sup>6</sup> The Reichsbank kept the annual discount rate at 5 percent until raising it to 6 percent on 28 July 1922, to 7 percent on 15 August 1922, to 8 percent on 21 September 1922, to 10 percent on 13 November 1922, to 12 percent on 18 January 1923, to 18 percent on 23 April, to 30 percent on 2 August, and to 90 percent on 15 September 1923. Statistisches Reichsamt, *Wirtschaft und Statistik*, 2–3 (1922–1923), passim.

Before May 1921 a law restricted the share of government debt in the Reichsbank portfolio, but creative accounting sidestepped the constraint; Steven B. Webb, “Government Debt and Inflationary Expectations as Determinants of the Money Supply in Germany, 1919 to 1923,” *Journal of Money, Credit, and Banking*, 17 (Nov. 1985, part 1), pp. 479–92.

<sup>7</sup> Steven B. Webb, “The Supply of Money and Reichsbank Financing of Government and Corporate Debt in Germany, 1919–1923,” this JOURNAL, 44 (June 1984), pp. 499–507.

<sup>8</sup> Reichskanzlei, *Akten der Reichskanzlei, Weimarer Republik, Das Kabinett Bauer* [henceforth, *Reichskanzlei Kabinett Bauer*], Karl D. Erdmann, et al., eds. (Boppard-am-Rhein, 1968–1978), pp. 40–43.

<sup>9</sup> Webb, “Determinants of the Money Supply.”

<sup>10</sup> Standard errors are in parentheses. The equation is estimated with a recursive Cochrane-Orcutt procedure.

*DEBT* is total government debt (including what the Reichsbank held), *WPI* is the wholesale price index, and *DISCOUNT* is the discount of the mark in the forward exchange market (an indicator of inflationary expectations, explained in the next section).<sup>11</sup> Changes in the forward exchange discount explain most of the changes in the real value of the debt. Conditional on their expectations, firms and households wanted to hold a certain real value of government liabilities—money and debt—and they bid exchange rates and prices up or down to make the total debt have that real value.

If the deflated value of government debt depended on the expected future changes in the deflator, it can be shown that rational inflationary expectations depended on the expectations of government debt for all future periods.<sup>12</sup> Two features of people's expectations about fiscal policy remained constant throughout the first five postwar years. Deficits would continue into the immediate future. And the government would eventually balance its budget and repay whatever real value of its debt remained. How soon the reform would come and how much inflation would occur in the meantime remained uncertain. Let us consider two polar scenarios: one in which there is no inflation from the current period until the surpluses start, and another in which there is so much inflation that current debt holders get no real repayment.

In the stable-price scenario, the present value of future government surpluses (net of interest and amortization) equals or exceeds the current value of the debt.<sup>13</sup> To compute values for that scenario, consider an economy with  $D$  nominal marks of government debt outstanding. People expect the government to run real annual (net) surpluses  $S$ , which will pay interest and principal to the holders of debt (other than the Reichsbank). The real demand for high-powered money is  $H$ , which is also the real value of government debt monetized by the Reichsbank and therefore not requiring service from the surplus.<sup>14</sup> The present value (*p.v.*) of the surpluses should equal the real value of the debt held by the public:

$$p.v. (S) = D/P - H \quad (3)$$

If the interest rate  $r$  is constant, we can approximate *p.v.* ( $S$ ) with  $S/r$ . We do not directly know  $S$ , the future deficits people expected, but we can compute the expected  $\tilde{S}$  that is implied by actual values of debt, the interest rate, and prices, and by the value of real high-powered money  $\tilde{H}$  observed during periods of price stability:

$$\tilde{S} = (D/P - \tilde{H}) \cdot r \quad (4)$$

<sup>11</sup> See Tables 1 and 2 for sources. All variables are measured at or interpolated to the end of the month.

<sup>12</sup> See footnote 3.

<sup>13</sup> Olivier J. Blanchard, "Current and Anticipated Deficits, Interest Rates and Economic Activity," *European Economic Review*, 25 (June 1984), pp. 7-27.

<sup>14</sup> High-powered money equals currency plus nongovernment deposits at the Reichsbank.

At the time the fiscal reform to generate surpluses  $S$  is announced,  $H$  and  $D/P$  would probably not be at their equilibrium values for the stable-price scenario. A one-time adjustment would follow. The adjustment phase would change the nominal debt  $D$  and makes a precise analysis complex. So the model of a stable-price scenario gives only an order-of-magnitude prediction.

In the pure-inflation scenario, expected government surpluses are too remote, and the interest on debt is too small relative to inflation for either to matter. Therefore people monetize all debt ( $M = D$ ), and we have simple inflationary finance. Let  $G$  be the real gross government deficit per month, including debt service:

$$G = \dot{D}/P \quad (5)$$

where  $\dot{D}$  is the nominal gross deficit.<sup>15</sup> If the real value of the debt  $D/P$  ( $= M/P$ ) equals  $f(\pi)$ , a negative function of inflationary expectations  $\pi$  as in equations 1 and 2, the rate of growth of debt depends on the real deficit and inflationary expectations:

$$\frac{\dot{D}}{D} = \frac{\dot{D}/P}{D/P} = \frac{G}{f(\pi)} \quad (6)$$

Although the inflation rate varied wildly in Germany, it is useful to think about what an inflationary-steady state would have looked like. In a steady state, the expected inflation would equal the actual, which would equal the rate of growth of debt.

$$\pi = \dot{P}/P = \dot{D}/D = \frac{G}{f(\pi)} \quad (7)$$

Thus we have an equation in one unknown  $\pi$ , in which inflationary expectations are a positive function of the real deficit.<sup>16</sup>

A pure-inflation scenario might be unstable. As Cagan shows, the inflation tax raises the maximum revenue in the steady state when the inflation rate is  $1/\alpha$ , where  $\alpha$  is the elasticity of demand for real balances with respect to inflationary expectations.<sup>17</sup> With  $\alpha = 2.72$ , as estimated in equation 2, the revenue-maximizing inflation rate is 30 percent per month. That is the peak of the Laffer Curve. Further increases in the rate of debt growth and inflation produce more than proportional

<sup>15</sup> Actually the nominal deficit depended on lagged rather than current prices, making the nominal deficit predetermined. Steven B. Webb, "Government Revenue and Spending in Germany, 1919–1923," in Gerald Feldman et al., eds., *Inflation and Reconstruction in Germany after World War I* (Berlin, 1986).

<sup>16</sup> The model here is not linear, and therefore there is no analytic solution for rational expectations. Equation 2 is linear in logs, but equation 5 is linear without logs. See also Olivier J. Blanchard and Charles M. Kahn, "The Solution of Linear Difference Models under Rational Expectations," *Econometrica*, 48 (July 1980), pp. 1305–11.

<sup>17</sup> Cagan, "The Monetary Dynamics of Hyperinflation," pp. 80–81.

decreases in real debt, causing the real revenue from the inflation tax to fall. If the government continued to try to raise more than the maximum revenue from the inflation tax, the process would explode. In the German case, sticky wages of government employees served as a safety valve that kept the inflation rate from going instantly to infinity. Lags in the indexation and payment of most government expenditures meant that an acceleration of inflation lowered the real deficit.<sup>18</sup> As employees and suppliers caught on, the lags shortened in 1922 and 1923, but they remained long enough to prevent an instantaneous explosion.

The political economy of early Weimar fluctuated so widely that people were never certain which scenario to expect. Section III narrates the events that changed the probabilities that people assigned to the different scenarios. News that promised a long-run increase of real revenues or decrease of real expenditures should have lowered inflationary expectations, and vice versa.

## II. EXPECTATIONS INDICATORS

We can compare policy announcements with several indicators of expectations. The real value of money and debt depended on inflationary expectations and, therefore, should also have reflected them. Table 1 shows the real value of government debt, deflated with the dollar exchange rate index and with wholesale prices. The exchange rate reacted to news more quickly than wholesale prices, and for those with international investment opportunities, the exchange rate was probably the more relevant deflator for their mark-denominated portfolios. For households and smaller businesses, which usually had direct links with only the domestic economy, wholesale prices were the more relevant deflator. The purchasing power parity relationship kept the wholesale-price and exchange-rate measures of real balances from getting too far out of line with each other. As Figure 1 shows, real money balances moved in the same direction as real debt—inflection and turning points rarely differed by more than a month—but they changed less dramatically. Bidding up prices to deflate the debt, when inflationary expectations increased, entailed converting more of the debt to money, whose real value therefore fell more slowly than the real value of debt.

The forward discount on the mark in the foreign exchange market, shown in Table 1, also indicates inflationary expectations.<sup>19</sup> If the expected spot rate at the end of the next month equals the current

<sup>18</sup> This shows up in the monthly figures from which Table 1 was calculated. Accelerations of inflation also lowered real revenue, but in absolute terms not by as much as spending; Webb, "Revenue and Spending."

<sup>19</sup> Jacob A. Frenkel, "The Forward Exchange Rate, Expectations, and the Demand for Money: The German Hyperinflation," *American Economic Review*, 67 (Sept. 1977), pp. 653–70.



TABLE I  
INFLATION AND INFLATIONARY EXPECTATIONS

Month	Rate of Increase per Month			Real Value of Government Debt Deflated with		Forward Exchange Discount	
	Exchange Rate	Wholesale Prices	Government Debt	Exchange Rate Index	Wholesale Price Index		
1919	Jan.	-1%	5%	2%	72336	55946	n.a.
	Feb.	12	2	2	65115	55537	n.a.
	March	16	3	0	55510	54088	n.a.
	April	11	4	2	51109	53132	n.a.
	May	5	4	3	49925	52771	n.a.
	June	8	7	1	46617	49956	n.a.
	July	15	16	2	41215	43700	n.a.
	Aug.	23	19	1	33014	36672	n.a.
	Sept.	18	14	1	27943	32122	n.a.
	Oct.	23	16	2	22543	27880	n.a.
	Nov.	28	18	1	17297	23628	n.a.
	Dec.	26	31	-0	13257	17263	n.a.
1920	Jan.	50	37	2	8145	12100	n.a.
	Feb.	10	15	1	7433	10468	n.a.
	March	-33	-4	0	10409	10896	n.a.
	April	-23	-6	2	13330	11806	-.6%
	May	-43	-6	3	21098	12968	-.8
	June	3	-5	4	21348	14239	-.5
	July	10	2	5	20388	14644	-.8
	Aug.	16	5	3	17948	14422	-.4
	Sept.	22	1	3	14788	14767	-.6
	Oct.	21	0	1	12148	14858	-.7
	Nov.	-8	-1	3	13509	15439	-.6
	Dec.	4	-2	1	13176	15994	-.9
1921	Jan.	-19	-2	2	16335	16700	-1.2
	Feb.	4	-4	1	15861	17471	-1.1
	March	-1	-2	-2	15687	17480	-.9
	April	6	-1	4	15355	18326	-.7
	May	-4	1	4	16763	18853	-.8
	June	17	4	2	14384	18396	-.6
	July	7	17	2	13675	15851	-.5
	Aug.	7	18	4	13286	13711	-.6
	Sept.	29	12	2	10170	12399	-.4
	Oct.	45	25	2	6635	9836	-.4
	Nov.	31	17	3	5016	8473	-.3
	Dec.	-29	4	6	7057	8642	-.4
1922	Jan.	9	8	3	6659	8224	-.3
	Feb.	12	20	2	5983	6872	-.2
	March	29	22	2	4542	5616	-.0
	April	-7	9	3	5024	5284	-.0
	May	-2	5	2	5249	5139	-.0
	June	30	22	1	3916	4154	.1
	July	58	50	4	2271	2608	.3
	Aug.	95	52	5	928	1623	2.3
	Sept.	-4	54	24	1231	1200	4.1
	Oct.	100	48	27	589	973	12.0

TABLE I—continued

Month	Rate of Increase per Month			Real Value of Government Debt Deflated with		Forward Exchange Discount
	Exchange Rate	Wholesale Prices	Government Debt	Exchange Rate Index	Wholesale Price Index	
Nov.	53	66	30	467	679	10.7
Dec.	-4	17	50	801	948	6.6
1923 Jan.	190	112	35	170	436	14.8
Feb.	-77	13	54	628	653	20.9
March	-8	-7	62	1259	1301	4.6
April	35	21	25	1134	1345	10.2
May	85	58	18	585	902	12.2
June	80	103	75	555	680	18.1
July	196	181	97	207	295	46.2
Aug.	224	247	284	378	430	35.6
Sept.	274	342	352	821	472	n.a.
Oct.	612	592	510	296	208	n.a.

Notes: Rates of Increase are *continuously compounded* (logarithmic) rates of change from the end of one month to the next. For wholesale prices the end of the month values are usually log-linearly interpolated.

Government Debt includes T-bills and bonds, see note to Table 2.

Forward Exchange Discount is the one-month forward discount rate (negative means forward premium) on the mark-dollar exchange rate, at a log monthly rate.

Sources: Allied Powers, Reparation Commission, *Deutschlands Wirtschaft, Währung und Finanzen* (Berlin, 1924), pp. 29, 62; Statistisches Reichsamt, *Zahlen zur Geldentwertung in Deutschland 1914 bis 1923*, Sonderhefte 1 zu *Wirtschaft und Statistik* (Berlin, 1925), pp. 5-18, 45-51; John Maynard Keynes, *A Tract on Monetary Reform* (London, 1923), pp. 119-20; Paul Einzig, *The Theory of Forward Exchange* (London, 1937), pp. 450-55.

forward exchange rate,  $E_t(S_{t+1}) = F_t$ , then the expected rate of depreciation equals the forward exchange discount:

$$DISCOUNT = \log(F_t/S_t) \tag{8}$$

This indicator has the advantage that it is explicitly an expectation, but its disadvantage is the narrower spectrum of participants in the forward market. The main forward market was in London, and exchange controls restricted the access of Germans. A curious phenomenon, addressed in Section III, is that expectations revealed by the (spot) exchange rate value of the debt moved more closely with expectations revealed by wholesale prices than with those revealed by the forward exchange discount.

### III. POLICY NEWS AND EXPECTATIONS

A narrative account of events from 1919 through 1923 provides a framework to discuss whether and why changes of expectations corre-

sponded with fiscal news. Table 2 gives real expenditures and revenues per quarter. Since net domestic product was 8 to 10 billion marks per quarter in 1913 prices, government outlays were one-fifth to one-third of national income in most of the period.<sup>20</sup>

### *Facing Defeat*

After the German revolution ended the war in November 1918, people did not know what financial policy the new government would try to follow, nor whether it would succeed in the face of domestic and international opposition. The price level had more than doubled during the war, while the supply of money had increased almost fivefold. From 6.5 billion marks before the war, the real value of money rose to over 15 billion at the war's end. Government debt had been under 5 billion marks before the war, with none of it monetized. By the war's end the public held about 40 billion marks worth of government debt, in 1913 prices, plus the high-powered money, which was mostly monetized government debt.<sup>21</sup> Although rationing and shortages had discouraged spending, the increased real holdings of government liabilities also reflected hope that Germany might return to the gold standard at prewar parity and to the prewar price level. Prices in Germany had not risen much more than in the United States and Britain, and less than in France.<sup>22</sup>

In the first half of 1919 the value of the government debt fell by 12 percent in wholesale prices and by one-third in foreign exchange. In winter 1919 the defeat of radical socialist elements of the 1918 revolution created some optimism, but people recognized that "the further progress of the mark depended substantially on the outcome of the peace treaty negotiations."<sup>23</sup> In May 1919 the terms of the Versailles Treaty became public, but the German government refused to accept it without revisions and on June 20 resigned. A new government, formed of ministers who would not see Germany dismembered and plunged into civil war, signed the treaty on June 28.

To an unexpected degree, the treaty took away from Germany territories with valuable industries and natural resources. It demanded substantial reparations in kind and laid down the principles for high demands of cash reparations.<sup>24</sup> Although the reparations, particularly those in kind that were due immediately, were not impossible in relation

<sup>20</sup> Walther G. Hoffmann, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (Berlin, 1965), p. 455; Holtfrerich, *Die deutsche Inflation*, p. 221. Billion equals milliard in German notation.

<sup>21</sup> Sources to Tables 1 and 2.

<sup>22</sup> Holtfrerich, *Die deutsche Inflation*, pp. 115–35; Jan Tinbergen, *International Abstracts of Economic Statistics*, International Conference of Economic Services, ed. (London, 1934), pp. 72, 82, 105, 210.

<sup>23</sup> *Vossische Zeitung*, May 1, 1919 Finanz- und Handelsblatt.

<sup>24</sup> The treaty required the Allies to settle on a total reparation bill by May 1921.

TABLE 2  
REAL GOVERNMENT DEFICITS, REVENUES, AND SPENDING  
(million marks per quarter in 1913 values)

Quarter	Deficit	Revenue	Spending	Cash Reparations	
1919	I	1,501	n.a.	n.a.	0
	II	3,394	987	4,381	0
	III	1,977	854	2,831	0
	IV	780	653	1,432	0
1920	I	348	397	745	0
	II	1,188	542	1,730	0
	III	1,648	843	2,490	0
	IV	743	1,389	2,132	0
1921	I	196	1,904	2,100	0
	II	1,816	1,819	3,635	319
	III	1,230	1,410	2,640	451
	IV	916	1,103	2,019	460
1922	I	499	1,205	1,703	347
	II	297	1,293	1,590	177
	III	585	888	1,473	92
	IV	826	646	1,472	149
1923	I	1,054	628	1,682	99
	II	1,091	743	1,798	30
	III	2,645	415	3,062	6
	IV	1,928	803	2,730	0
1924	I	177	1,947	2,124	0

Notes: Each quarterly entry was summed from monthly figures that had been deflated with the monthly average wholesale price index, 1913 = 1.

Deficit: The change in the government debt, which was figured as the bonds and T-bills outstanding, not counting those T-bills at the Reichsbank that were backing government deposits there. Monthly bond totals were interpolated linearly from the annual figures.

Revenue: Tax revenue (including forced loans—Zwangsanleihe) plus income of the state railroad and post.

Spending: Revenue plus deficit.

Cash reparation expenses: Monthly outlays for cash reparations.

Sources: Allied Powers, Reparation Commission, *Deutschlands Wirtschaft, Wahrung und Finanzen* (Berlin, 1924), pp. 29, 62; Statistisches Reichsamt, *Zahlen zur Geldentwertung in Deutschland 1914 bis 1923*, Sonderhefte 1 zu *Wirtschaft und Statistik* (Berlin, 1925), pp. 45–51; *Wirtschaft und Statistik*, 1–4 (1921–1924), passim; Arnd Jessen, *Finanzen, Defizit und Notenpresse 1914–1922* (Berlin, 1923), Table 6; Bundesarchiv, Koblenz [BAK] Reichsfinanzministerium R2/2659, R2/2795; BAK, Reichskanzlei R431/2357; Zentrales Staatsarchiv, Potsdam [ZSa] Reichsschatzministerium 22.01/3488. For further details, see Webb, "Revenue and Spending."

to Germany's total productive capacity, they loomed large in relation to the government's ability to raise revenue. The beginning of deliveries of reparations in kind to France in fall 1919 must have helped convince people that at least some of the claims outlined in the treaty would be exacted. In December the French rejected the German offers to assist directly in the reconstruction of northern France, which Trachtenberg

calls a “turning point” toward uncooperative strategies on both sides of the Rhine.<sup>25</sup>

Although real deficits were declining in the latter half of 1919 (see Table 2), inflation increased and the real value of total government debt fell dramatically (see Figure 1 and Table 1). The conditions of the Versailles Treaty made it impossible for the German government to run large enough surpluses to repay the war debt at prewar values. On the other hand, people did not believe that Germany was in a pure-inflation scenario, which is clear once we see what happens in the hyperinflation in 1922. In 1919 most people believed that the stable-price scenario would require only a one-time increase of the price level to bring the real debt burden down to a level compatible with the feasible surpluses.

### *Stabilizing the Republic*

In the fall and winter of 1919–20 the government took steps to enhance its taxing power. The decline of the real value of debt from November 1919 to February 1920 suggests that people had counted on tax increases and were disappointed by the reforms proposed. The *Vossische Zeitung*, a leading middle-class paper in Berlin, was extremely critical of the new tax proposals.<sup>26</sup> In November, Minister of Finance Matthias Erzberger, optimistic about the reforms he was proposing, forecast that revenues would exceed expenses by about 1.3 billion marks per year, 0.2 billion in terms of 1913 wholesale prices.<sup>27</sup> Although his expense estimates omitted some major items like reparations and included debt service, they give at least an order of magnitude. If people believed Erzberger, they should have expected a stable-price scenario and adjusted prices to the level that made the real value of government debt consistent with his forecast. The debt was 172 billion marks (nominal) at the end of October 1919, and the market interest rate was 3.8 percent.<sup>28</sup> In 1913, when prices had last been stable, (real) high-powered money was 6.5 billion, as mentioned earlier. The price level of 6.2 (1913 = 1) was, therefore, consistent with annual surpluses of .81 billion marks in 1913 values.<sup>29</sup> The price level in October was still not high enough to bring real debt down to a level commensurate with Erzberger’s forecast. Rapid inflation through the winter brought wholesale prices in February to a peak of 17 times the 1913 level. This, along with nominal debt of 178 billion marks and an interest rate of 3.8

<sup>25</sup> Marc Trachtenberg, *Reparation in World Politics: France and European Economic Diplomacy, 1916–1923* (New York, 1980), pp. 116–18.

<sup>26</sup> *Vossische Zeitung*, Dec. 4, 1919, a.m., p. 1 Dec. 12, 1919, p.m., pp. 1–2.

<sup>27</sup> *Reichskanzlei, Kabinett Bauer*, pp. 389–93.

<sup>28</sup> Sources to Tables 1 and 2.

<sup>29</sup>  $\delta_{\text{October } 1919} = (D/P - \bar{H})r = (172/6.2 - 6.5) .038 = 0.81$ .

percent, implied real surpluses of .15 billion marks—not far from Erzberger's projection.<sup>30</sup>

Good fiscal news accounts for the improved expectations after March 1920. Opposition from the right had made passage of the tax package uncertain. Karl Helfferich, a former minister of finance under the Kaiser, led the opposition with vicious personal attacks on Erzberger. Their intensity and publicity increased in January, as a libel suit against Helfferich went to trial—a trial in which Erzberger was in effect the defendant.<sup>31</sup> On March 12 Helfferich more or less won the trial, and Erzberger resigned the same day, but the legislature had passed his tax package the day before. So, although the new taxes would not bring in substantial revenues for almost a year, there was positive fiscal news of a direct sort.

From a broader political perspective, there was also good news. On March 13 right-wing paramilitary forces attempted a coup d'état, the Kapp Putsch, but it was defeated even before full news of it leaked to the outside world.<sup>32</sup> The antirepublican forces had played their trump cards but lost anyway. In March the French occupation authorities in the Rhineland finally permitted German customs officials to control exports of raw materials and to collect import duties there, thus closing the "hole in the West." Political victories were essential complements to the new taxes, for fiscal reform required a strong government. Stabilizing the government's authority ushered in a year and a quarter without inflation (see Figure 1). Wholesale prices fell to 13.8 in June 1920 and were 13.7 a year later.

The stabilization of the mark reflected market valuation, not artificial government support. Because the exchange rate fell faster than domestic prices in spring 1920, the Reichsbank worried that German industry would lose its export advantage. To slow the appreciation of the mark, they intervened in the foreign exchange market *against* the mark.<sup>33</sup> Liberal monetary policy kept the German economy growing and close to full employment, at a time when contractionary monetary policy in the United States and Britain was causing severe depressions.<sup>34</sup> The relative German prosperity further encouraged confidence in its financial future and in the prospects for the stable-price scenario.

<sup>30</sup>  $\sqrt[5]{\text{February } 1920} = (178/17.0 - 6.5) .038 = 0.15$ .

<sup>31</sup> John G. Williamson, *Karl Helfferich, 1872–1924: Economist, Financier, Politician* (Princeton, 1971), pp. 291–327.

<sup>32</sup> Gerald D. Feldman, "The Political Economy of Germany's Relative Stabilization during the 1920/21-Depression," in Feldman et al., eds., *The German Inflation: A Preliminary Balance* (Berlin, 1982), p. 187.

<sup>33</sup> *Ibid.*, pp. 188–189; Zentrales Staatsarchiv-Potsdam [henceforth ZSa], Reichsbank RB/6435, Bl. 15–17.

<sup>34</sup> Steven B. Webb, "The German Inflation and Foreign Business Cycles, 1920–1922," forthcoming in *Explorations in Economic History*.

Because most of the Erzberger taxes did not have to be paid until the year after they were incurred, government debt continued to rise, from 179 billion marks (nominal) in March 1920 to 257 billion in June 1921.<sup>35</sup> But the stability of prices indicates that people thought the present value of future government surpluses was positive. Equation 4 allows us to estimate the surpluses they expected. From July 1920 to June 1921 government debt averaged 231 billion marks, wholesale prices 14.1, real high-powered money 6.4 billion, and the market discount rate 3.4 percent, which implies that people expected annual surpluses around 0.34 billion marks in 1913 prices.<sup>36</sup> How well does this implicit expectation correspond to the actual progress of the Reich's finances?

The year of actual price stability after July 1920 provides a basis for calculating what the budget surplus would have been in a counterfactual scenario of continuing price stability. The crucial question is what would have happened to receipts from the income tax and the wealth tax (Reichsnotopfer)—the two most important of the Erzberger taxes. The income tax was steeply graduated, and payroll deductions were made only at the minimum rate. Most of the revenue came from the graduated assessments made and paid after the close of the tax year. Inflation resumed, however, before the government received most of the assessments even for 1920, and it left payroll deductions as the predominant revenue source in real terms.<sup>37</sup> Nevertheless, if prices had remained stable, total *real* income-tax revenue would be about the same multiple of the payroll deduction as was the total *nominal* revenue. From the time revenues from payroll deductions plateaued in November 1920 to the end of price stability in June 1921, they came in at a real rate of 1.04 billion marks per year (deflated with wholesale prices to 1913 values). In fiscal year 1920, payroll deductions were .34 of total nominal income-tax revenue. So total real income-tax revenues in a noninflationary state would have been about 3.06 billion marks per year. From February to June 1921 real revenue from the wealth tax averaged 1.35 billion marks per year. (The wealth tax brought unusually large payments in December 1920 and January 1921). From July 1920 to June 1921 the real revenues from the other taxes, the railroad, and the post were 4.06 billion marks, making the total counterfactual revenues 8.47 billion marks per year.<sup>38</sup>

Real spending net of interest was 9.78 billion marks for the year July

<sup>35</sup> Sources to Table 2.

<sup>36</sup>  $\bar{S} = (\bar{D}/\bar{P} - \bar{H}) r = (231/14.1 - 6.4) .034 = .31$  billion.

<sup>37</sup> Peter-Christian Witt, "Tax Policies, Tax Assessment and Inflation: Toward a Sociology of Public Finances in the German Inflation 1914–1923," in Schmukler and Marcus, ed., *Inflation Through the Ages*.

<sup>38</sup> Data from Witt, "Tax Policies, Tax Assessment," p. 466, and Webb, "Revenue and Spending." In 1921 and 1922 the share of income-tax revenue from assessments was higher, but this may be partly because the inflation raised people's nominal incomes faster than the Reichstag indexed the brackets.

1920 to June 1921. This included 2.24 billion marks in reparations and other expenses of the Treaty. So if the real budget had remained as it was in 1920/21, real surpluses would have been *negative* 1.31 billion marks. To get to the expected real surplus of 0.34 billion marks calculated earlier, real revenue would need to rise 1.65 billion more than expenses. In other words, the real debt in July 1920/June 1921 implied expectations that, holding expenses constant, the government would raise 20 percent more revenue, plus a little extra to offset delays in getting surpluses.

Even without additional taxes, Germany might have raised the revenue through growth in the real tax base. Net national output grew 11 percent from 1920 to 1922; by 1925–1929 it was another 16 percent above its level of 1922.<sup>39</sup> Even those with much sympathy for Germany's predicament have not realized that the financial reforms of Erzberger and Wirth came so close to success.<sup>40</sup>

The continuation of government deficits through the year of price stability does not refute the hypothesis that they were the fundamental cause of the German inflation. People were willing to hold increased government debt, shown in Figure 1, *because* they believed that future surpluses would redeem it. Whether the stabilization of 1920 would continue and lead to the surpluses depended upon how high the Allies set the reparation burden.

### *Paying Reparations*

The first half of 1921 brought bad news about German government expenses. In January 1921, the Allies set a schedule for reparations, but German objections and counterproposals led to further conferences, declarations of German default, and Allied imposition of trade sanctions. On April 27 the Reparation Commission announced a plan for Germany to pay reparations of 132 billion goldmarks plus interest.<sup>41</sup> To amortize the bill, the Germans had to pay 2 billion goldmarks in fixed annual annuities plus 26 percent of the value of their exports, which added another billion to the annual bill. Most of the reparations would

<sup>39</sup> Peter-Christian Witt, "Finanzpolitik und sozialer Wandel in Krieg und Inflation 1918–1924," in Hans Mommsen, Dietmar Petzina, and Bernd Weisbrod, eds., *Industrielles System und politische Entwicklung in der Weimarer Republik* (Düsseldorf, 1974), p. 424.

<sup>40</sup> David Felix, *Walther Rathenau and the Weimar Republic: The Politics of Reparations* (Baltimore, 1971), p. 29; Peter-Christian Witt, "Staatliche Wirtschaftspolitik in Deutschland 1918–1923: Entwicklung und Zerstörung einer modernen wirtschaftspolitischen Strategie," in Feldman et al., eds., *The German Inflation*.

<sup>41</sup> The goldmark was a unit of account defined by the gold value of the prewar mark. Since the United States stayed on the gold standard, 4.2 goldmarks equalled a dollar. Except for inflation in the United States and deviations from purchasing power parity, a goldmark was worth a mark in 1913 prices.

Although the interest rate was specified at 5 percent, the total interest charges remained indefinite, because the Reparation Commission retained discretion to decide when interest charges would begin on a major portion of the debt—the "C-bonds."



be in cash—foreign exchange—because the payments in kind (coal, and so forth) had been running less than a billion goldmarks per year. On top of the 3 billion goldmarks of reparations, Germany had to continue paying about 1 billion per year for occupation and other nonreparation expenses of the Treaty.<sup>42</sup> In 1921 German national income was 35 to 40 billion 1913 marks.<sup>43</sup> Thus, the Allies were demanding about one-tenth of Germany's national income, every year and far into the future.

The Allies threatened to occupy the Ruhr if the Germans did not agree to their demands. After one German government resigned, the new chancellor, Joseph Wirth, accepted the London Ultimatum on May 10. He accepted it in a formal sense and in the sense of adopting a policy of "fulfillment" that intended to demonstrate how a sincere effort to make the reparation payments would lead to economic disaster for Germany and the world economy. Payments began immediately. The expenses for cash reparations were at substantial levels from May until the end of 1921 (see Table 2). In 1922 Germany failed to keep up with the London Schedule, and in summer 1922 they virtually halted the cash reparations.

Such a brief episode may seem undeserving of the attention devoted to the reparation problem, but a closer look at the Reich's finances reveals how crucial the reparations were. Until the London Ultimatum the real value of tax revenues had been growing steadily and at a faster rate than spending. The wealth tax was the largest revenue source in the first half of 1921. Payers had the option of amortizing their obligation at 5 percent interest, but, with stable prices and a market interest rate of 3.5 percent, many people wanted to pay off their obligation as soon as possible. When inflation resumed in summer 1921, however, even the nominal returns on the wealth tax fell. Real revenue from the income taxes also shrank sharply, instead of rising as it would have with continued price stability. In early 1922 new procedures for tax collection tried to reduce the payments lag, but they failed to take the one step that could have made the tax system really inflation-proof—indexing liabilities in foreign exchange.

Although the bad news on reparations had been coming for months, the fall of the real value of government debt and money, indicating a rise of inflationary expectations, did not start until June 1921. Reparations would lead to inflation only if unmatched by increased revenues. Wirth tried to get the Reichstag to increase taxes, but it adjourned in June without taking action.<sup>44</sup> In June the inflation restarted. People lost faith

<sup>42</sup> Webb, "Revenue and Spending."

<sup>43</sup> See footnote 20.

<sup>44</sup> Wirth considered several plans for raising more revenue. The most specific proposal was an amendment to the corporate tax, which he estimated would bring in about 5 billion marks, in 1913 values. Ernst Laubach, "Die Politik der Kabinette Wirth, 1921/22," *Historische Studien*, 402 (1968), p. 65.

that the economy was in a stable-price scenario, with surpluses to come before any further inflation was necessary. But in the year of fulfillment, from June 1921 to June 1922, people did not yet believe that they were in a pure-inflation scenario either. They continued to hope for a compromise on reparations, which would restore stable prices, albeit at a higher level.

The Allies decided in October 1921 to take Upper Silesia, an important coal-mining and industrial region, from Germany and give it to Poland.<sup>45</sup> This weakened the financial and political position of the German government and explains the sharp increase of inflationary expectations in October.

During the year of fulfillment, the mark remained at a premium in the forward exchange market, even though the real values of debt and money indicated that people expected more inflation and depreciation of the mark. (See Table 1 and Figure 1). It is tempting to attribute this discrepancy to differences in the information sets of Germans and foreigners. But foreigners read German news.<sup>46</sup> A more plausible explanation involves differences in attitudes toward risk. Wholesale prices and the spot exchange rate reflected the decisions of businessmen in activities that were the main part of their livelihood. They were therefore risk-averse in these activities and set their portfolios to match a scenario with the German government running big deficits to pay reparations. Foreign speculators, on the other hand, were well diversified elsewhere and would have seen the forward mark as an opportunity to make a favorable bet. Although the mark was most likely to continue its decline, as Germany's financial picture was not *likely* to improve soon, the risk-averse businessmen in the spot market were pushing the mark's value there below the value that corresponded to the actual probability of a successful fiscal reform. For risk-neutral speculators, therefore, there were favorable odds that the mark would recover as it had in 1920.

### *Hyperinflating*

The events of Summer 1922 taught speculators that things could get worse in ways they had not considered.<sup>47</sup> Stopping reparation payments did not reverse the effect of starting them. France declared it would no longer accept the judgment of the other Allies on the Reparation Commission as to whether German payments were sufficient. France

<sup>45</sup> The actual transfer took place a year later.

<sup>46</sup> Holtfrerich, *Die deutsche Inflation*, p. 189.

<sup>47</sup> We must remember that Europe had no experience with hyperinflation since the French Assignats of the 1790s. As of spring 1922, Austria and the Soviet Union had each experienced only a couple of months of inflation rates over 50 percent per month, and the inflation rates there seemed headed down again. The extreme parts of their hyperinflations did not come until late summer 1922 in Austria and late 1923 in the Soviet Union.

would make its own judgment and would seize some of Germany's productive assets—in particular the Ruhr coal mines—to enforce its claims if Germany defaulted.<sup>48</sup>

The escalation of French insistence on reparations coincided with a decline in Germany's ability to pay. Table 2 shows how government revenues continued to deteriorate through 1922. In June a committee of American and British bankers, headed by J. P. Morgan, tabled indefinitely the consideration of a long-term loan to Germany, because the French would not meet their precondition of reducing reparation claims. Although the amount of the proposed loan was small, only 200 million goldmarks, the denial signaled a lower credit rating for Germany and discouraged short-term foreign lending, which had financed some of Germany's debt and had made it unnecessary for the Reichsbank to monetize much corporate debt.<sup>49</sup> On June 24 right-wing assassins killed Foreign Minister Walter Rathenau, the only German politician trusted by Allied diplomats as well as by a broad spectrum of his countrymen. His death further undercut confidence in the stability and accountability of the German government.<sup>50</sup>

The policy of fulfillment had aimed to follow an inflationary-finance scenario in the short run in order to convince the Allies to reschedule reparations. That would eventually allow Germany to run budget surpluses and return to a stable-price scenario. The tactic failed in 1922. Although the French refusal to grant a long-term moratorium did not result in any increase of payment to them, it certainly dashed all hopes for German budget surpluses. The reparation crisis of summer 1922 convinced people that they were in a pure-inflation scenario.

From the end of June to autumn 1922 inflationary expectations increased dramatically, as indicated by the real debt and the forward exchange discount (see Table 1). Government debt had typically grown 2 or 3 percent per month prior to July 1922, and never more than 6 percent—well below the 30 percent revenue-maximizing rate calculated earlier. By December 1922 the monthly growth rate of debt had risen to 50 percent, and it fluctuated in double-digit rates until August 1923. Since the real value of deficits remained in the same range as in the previous three years (see Table 2), it seems clear in retrospect that the German government had been able to run those real deficits only

<sup>48</sup> Trachtenberg, *Reparation in World Politics*, pp. 243–75; *Vossische Zeitung*, Aug. 1, 1922, a.m. and p.m., p. 1.

<sup>49</sup> *Frankfurter Zeitung*, July 4, 1922, p. 1; Carl-Ludwig Holtfrerich, "U.S. Capital Exports to Germany 1919–1923 Compared to 1924–1929," *Explorations in Economic History*, 23 (Jan. 1986), pp. 1–32; Webb, "Determinants of the Money Supply." By fall 1922 and thereafter, discounted corporate debt accounted for about one-third of the Reichsbank's money creation; *Zahlen zur Geldentwertung*, p. 52. Hence in Figure 1 the value of high-powered money exceeds the value of government debt after October 1922.

<sup>50</sup> Charles S. Maier, *Recasting Bourgeois Europe: Stabilization in France, Germany, and Italy in the Decade after World War I* (Princeton, 1975), pp. 293–94.

because people thought that surpluses might be coming soon. Once they believed they were in a pure-inflation scenario, however, the real value of debt and money dropped to levels that made the unchanged real deficit explosive.

### *Occupation and Resistance*

As they had so often threatened to do, the French with token Belgian assistance began occupying the Ruhr in January 1923. They hoped the seizure of its primary industrial region would force the German government to pay reparations more cooperatively. The German government called on industry and labor in the Ruhr to passively resist the French by refusing to produce for them. The government paid compensation to firms and workers for the costs of resistance. Although the invasion did not have a clear impact on the deficits, it did immediately worsen inflationary expectations (see Table 3).<sup>51</sup>

The unprecedented rates of inflation in January caused the government to fear a total breakdown of the economy, as in the Austrian hyperinflation of 1922.<sup>52</sup> On February 1, the Reichsbank, under secret government instructions, intervened to stop the foreign exchange depreciation of the mark. Loose as it was in the early 1920s, the purchasing power parity relationship would not allow domestic prices to hyperinflate while the exchange rate fell, so domestic prices also stabilized, as Table 3 shows. At first even the Reichsbank expected the stabilization to last no more than four weeks. It lasted twelve, despite the absence of any good fiscal news.<sup>53</sup>

The stabilization lasted as long as people believed the Reichsbank could defend the mark in the foreign exchange market. The Reichsbank's task was not as hopeless as one might suppose, for the dollar value of total government debt at the end of January had fallen to about one-sixth of the value of the Reichsbank's 1 billion goldmarks of gold reserves. People quickly realized that the Reichsbank was behind the stabilization.<sup>54</sup> Also, exchange controls kept households and smaller firms from buying any significant amount of foreign exchange. At first the Reichsbank's efforts had easy success, because even a temporary stabilization could bring prices down by increasing people's willingness to keep marks in their pockets. The real value of money and debt rose and the forward discount on the mark fell, although not to levels corresponding with stable prices.

Just as the French government was gambling that occupation would make the Germans pay, the German government was also gambling that

<sup>51</sup> The increased deficit in the first quarter of 1923 (see Table 2) resulted from the stabilization that began in February, not from the invasion in January. Webb, "Revenue and Spending."

<sup>52</sup> *Reichskanzlei, Kabinett Cuno*, pp. 139.

<sup>53</sup> *Ibid.*, p. 399.

<sup>54</sup> *Vossische Zeitung*, Feb. 11–15, Finanz- und Handelsblatt.

TABLE 3  
REAL CURRENCY BALANCES AND INFLATION RATES WEEKLY IN 1923

Date	Real Currency (million goldmarks)	Percent Change (since previous date)	
		Exchange Rate	Wholesale Prices
Jan. 6	672.20	15%	5%
15	519.20	28	22
23	353.80	52	35
31	172.60	90	41
Feb. 7	262.10	-29	25
15	589.60	-63	-8
23	584.50	15	-2
28	657.00	0	-1
March 7	794.30	-10	-3
15	867.40	1	-6
23	1003.70	0	1
29	1112.50	0	0
April 7	1127.90	0	1
15	1168.70	0	3
23	937.00	26	11
30	932.10	8	7
May 7	758.10	23	7
15	713.80	12	10
23	580.30	27	19
31	522.70	22	22
June 7	496.50	13	21
15	428.90	30	28
23	455.90	12	27
30	472.80	24	27
July 7	485.50	13	33
14	575.10	8	25
23	383.90	61	35
31	167.50	115	88
Aug. 7	79.90	110	97
15	183.80	-20	41
23	234.10	63	63
31	282.00	71	46
Sept. 7	98.00	164	90
15	151.50	66	142
22	338.70	17	49
30	751.80	42	49
Oct. 6	337.40	130	110
15	141.10	172	164
23	47.60	270	277
31	300.30	26	52

TABLE 3—continued  
 REAL CURRENCY BALANCES AND INFLATION RATES WEEKLY IN 1923

Date	Real Currency (million Goldmarks)	Percent Change (since previous date)	
		Exchange Rate	Wholesale Prices
Nov. 7	373.80	216	176
15	458.70	139	110
23	941.30	49	120
30	1487.80	0	-2
Dec. 7	1810.70	0	-7
15	1958.50	0	-5
22	2131.10	0	-2
31	2273.60	0	-4

Notes: Currency includes official Notgeld and Rentenmarks, but is mostly Reichsbank notes until late October.

Percent Changes are logarithmic.

Wholesale Prices are interpolated log-linearly from thrice-monthly and weekly averages.

Sources: *Zahlen zur Geldentwertung*, 1923, pp. 10, 18, 47-49.

passive resistance and the stabilization of the mark would demonstrate to the other Allies and to the French public that the French government had overplayed its hand. Then the French would evacuate the Ruhr and agree to delays and reductions in the reparations. Although it was always a long shot, for a while it seemed possible that Germany could win the showdown, and the French franc fell in the foreign exchange market.<sup>55</sup> In April, however, a joint Belgian-French reaffirmation of their determination to outlast the Germans (along with the failure of an issue of gold-indexed German government bonds) emboldened speculators against the mark.<sup>56</sup> Since deflation in February and March and unchecked budget deficits had raised the real value of money above that of the Reichsbank's gold stock, the speculators could force the Reichsbank to abandon the stabilization on April 19 and let the hyperinflation resume. (See Table 3.)

From the end of April through July 1923, inflationary expectations rose, as France increased the economic sanctions, as the Ruhr industrialists demanded more liberal subsidies for the passive resistance, and as more transactions were conducted with alternative monies.<sup>57</sup> In summer 1923 the Reichsbank intervened sporadically and half-heartedly on behalf of the mark in the foreign exchange market, which had no discernible effect except to use up about half of the gold reserve.

<sup>55</sup> Gerald D. Feldman, *Iron and Steel in the German Inflation, 1916-1923* (Princeton, 1977), pp. 352-58; *Vossische Zeitung*, March 2, 20, 24, 28, 1923, p. 1.

<sup>56</sup> *Vossische Zeitung*, April 16, 1923, p. 1; *Reichskanzlei, Kabinett Cuno*, pp. 399-400, 424-25.

<sup>57</sup> Feldman, *Iron and Steel*, p. 371-79; Holtfreich, *Die deutsche Inflation*, p. 309-10.

*Anticipating Stabilization*

Because the real government deficits were too large for inflationary finance to be stable, a major reform with concessions from all sides was essential. By summer 1923 all sides—the French and other Allies abroad, labor and business at home—agreed on their distaste for inflation in Germany, if nothing else. They would make concessions only if the reform would bring Germany back to a stable-price scenario. Putting together the reform and getting at least preliminary assent from all major parties took time, from mid-July to mid-November 1923.

Monthly inflation rates rose to triple digits in August—continuously compounded—but the real value of debt increased and the forward exchange discount fell, indicating lower expected inflation (see Tables 1 and 3). Cagan's adaptive expectations predict considerably lower real money balances than those observed in the last three months of the hyperinflation. He suggests that expectations of a currency reform probably caused the discrepancy.<sup>58</sup> Real money balances probably could never have fallen to the level Cagan's equation predicts, as long as the government paid its expenses with paper marks and required people to accept them as legal tender. From August to November, the real value of money balances was typically about the same as the real value of the government deficit for *one week*.

Flood and Garber argue that extreme acceleration of money growth made people believe stabilization was imminent, because if the acceleration had continued, rational expectations would have driven prices to infinity so fast that the money would have become worth nothing. With such an acceleration, the supply of money is not "process consistent."<sup>59</sup> No doubt the extremity of hyperinflation in summer 1923 convinced people that it could not go on much longer, but their expectations of reform did not fluctuate (positively) with the weekly variation in the rate of acceleration of money growth.<sup>60</sup> Steady money growth at 500 percent per week would be process-consistent, but not politically tolerable, even by the standards of Weimar Germany. Furthermore, the end of hyperinflation would not necessarily take the form of stabilizing prices in paper marks at a finite level, as Flood and Garber assume. If a big political upheaval occurred, the new government (or regional governments) might simply repudiate the old debt and money. Expectations became optimistic only as political events increased the

<sup>58</sup> Cagan, "Monetary Dynamics of Hyperinflation," pp. 55–57.

<sup>59</sup> Flood and Garber, "Monetary Reform."

<sup>60</sup> From July 7 to November 15, changes in Flood and Garber's index of process consistency of the currency is correlated  $-.19$  with changes in the log of the real value of currency. This relation has the predicted sign but is statistically insignificant ( $R^2 = .037$  for 18 observations). The real currency value was computed with the exchange rate, because it is available for the same days as the currency stock and because it reacted swiftly to expectations. *Zahlen zur Geldentwertung*, p. 47–49.

chances for the German government to survive and run surpluses in terms of paper marks or some new currency linked to them.

August 1923 brought major fiscal news, some bad and some good. The bad news was the large increase in real government outlays, especially for railroad subsidies, emergency relief to the Ruhr, and unemployment compensation. The good news pertained more to the government's attitude toward the inflation. A new government came to power in mid-August and took actions that raised real revenues in spite of the dramatic acceleration of inflation.<sup>61</sup> It indexed railroad rates and passed several emergency levies, which accounted for the majority of all tax revenues in fall 1923. It issued some small-denomination, dollar-indexed debt, which circulated as currency. The treasury began to index firms' tax liabilities in gold value as of the day the liability was incurred and to impose penalties for delays in payment. At last the government put time on *its* side in the tax collection game.

The Reichsbank also signaled the coming (although not yet the arrival) of a new policy regime, which would not meet every credit demand of big firms and the government. In August they refused to discount commercial bills of more than a month in duration, and they began pressuring firms to take only loans that were indexed in gold values.<sup>62</sup> By this time there existed little if any private market for bills, so the Reichsbank's limitations on what they would accept strictly constrained the debt that firms could issue.

The most dramatic action of the Reichsbank was not publicly known. A memorandum to the government on August 18 announced that the Reichsbank would not accept any more government debt after the end of the year.<sup>63</sup> Since May 1922, at the insistence of the Allies, the Reichsbank had had legal autonomy from the government. Now for the first time they threatened to use it. Although the newspapers never reported that the Reichsbank took this position, it was known at least in the upper circles of the business community that sat on the Direktorium and Aufsichtsrat of the Reichsbank. These industrialists and bankers backed up Reichsbank President Rudolf Havenstein when Chancellor Stresemann tried without success to force him out for his firmer stance against government deficits.<sup>64</sup> Havenstein's successor, Hjalmar

<sup>61</sup> The new government was headed for the first time by someone from the relatively conservative Deutsche Volks Partei, Gustav Stresemann, and was composed of parties that, also for the first time, stretched from the Social Democrats to the Deutsche National Volks Partei. The Reichstag granted emergency powers to the new government.

<sup>62</sup> Bundesarchiv, Koblenz (BAK), Reichskanzlei R 43 I/666, B1. 58; BAK, Finanzministerium R2/1974; ZSa, Reichswirtschaftsministerium RWM/711, B1. 55; ZSa, Reichsbank RB/ 6339, B1. 242-44.

<sup>63</sup> BAK, Reichskanzlei R43 I/666, B1. 17-23; see also *Reichskanzlei, Kabinett Fehrenbach*, p. 449, for an early mention of this deadline.

<sup>64</sup> Heinz Habedank, *Die Reichsbank in der Weimarer Republik: Zur Rolle der Zentralbank in der Politik des deutschen Imperialismus 1919-1933* (Berlin, 1981), pp. 20-21, 90-91.



Schacht, wrote, "There can be no doubt that this declaration strengthened the pressure on the government to take in hand the financial reforms."<sup>65</sup>

After mid-September, the news carried more immediate portents of stabilization. On September 26 the government declared an end to passive resistance. That lowered expenditures immediately and opened the way for compromises to cut the Gordian knot of reparation demands, Ruhr occupation, and foreign credits. France would discuss nothing until the passive resistance stopped. Table 3 shows the positive response in the market's valuation of money balances in the last week of September. On October 26 the French agreed to the formation of a new committee of experts to reconsider reparations. The committee, chaired by American general Charles Dawes, produced a plan in 1924 that gave Germany long-term loans and rescheduled reparation payments.<sup>66</sup> Although the German policy of fulfillment had failed in 1921–1922 to reduce reparation demands to a level consistent with stable prices, it ultimately succeeded.

Debate on currency reform became more specific and more heated in October. The backing for the new currency (Rentenmarks) would be first mortgages on 5 percent of the value of all German business and agriculture. The security induced by this arrangement was not entirely illusory, for the interest on the mortgages was in effect a tax that would help the government balance the budget. The government would get only one loan of 1,200 million Rentenmarks to tide it over until it could balance the budget.<sup>67</sup> On October 15 the government announced its plan to open the Rentenbank one month hence. The fall of real money balances in mid-October (see Table 3) reflects either disappointment that reform would not come sooner or fear that the government would be unable to carry through any reform. In late October revolts broke out in the Rhineland, Saxony, and Bavaria. The most serious revolt in Bavaria, which culminated in Hitler's abortive beer-hall putsch, was not suppressed until early November.

Until November 15 the government continued to borrow for most of its expenses. Anticipating the end of deficit spending, some government agencies tried to borrow extra to build themselves a cushion. But Schacht, newly appointed as special Currency Commissioner, cooperated with the Reichsbank to veto most such efforts.<sup>68</sup> Even the deficits to meet current expenses were enough to accelerate the growth of money, because government wages and salaries were now indexed

<sup>65</sup> Hjalmar Schacht, *The Stabilization of the Mark* (London, 1927), p. 117.

<sup>66</sup> Stephen A. Schuker, *The End of French Predominance in Europe: The Financial Crisis of 1924 and the Adoption of the Dawes Plan* (Chapel Hill, 1976), pp. 181–86.

<sup>67</sup> Of the 1,200 million goldmarks, 300 were earmarked to pay off the government's debt to the Reichsbank.

<sup>68</sup> Schacht, *Stabilization of the Mark*, p. 118.

almost instantaneously. Because fiscal news created reform expectations, however, the higher inflation tax rate could raise more real revenue.

### *Permanently Stabilizing*

When the Rentenbank opened on November 15, the public did not know what the new currency would be worth in paper marks, for the Rentenbank charter did not specify the relation. Schacht, who at that point effectively controlled both the Rentenbank and the Reichsbank, guided central bank policy according to his plan to establish a stable-valued fiat money.<sup>69</sup> On November 20 the Reichsbank pegged the paper mark at 4.2 trillion ( $10^{12}$ ) per dollar (a trillionth of prewar parity) and one trillion per Rentenmark. Speculators pushed the dollar price up to 11.7 trillion paper marks in French-occupied Cologne. But the Reichsbank held the new par rate in Berlin and burned the speculators as the Cologne price dropped to par by December 10.<sup>70</sup> By December the Rentenmarks were circulating alongside the paper marks, perfectly substitutable at a trillion-to-one ratio, and they traded under moderate exchange controls at prewar parity with the dollar.

In December 1923 the treasury petitioned the Rentenbank for further credit. With the enthusiastic support of Schacht, the bank denied the request. With big tax increases and modest spending cuts the government balanced its budget and ran surpluses starting in March 1924.<sup>71</sup> In any case, the Reichsbank (and the Rentenbank) would monetize no more government debt, which ended the relevance of fiscal news for predicting inflation.

Pegging the mark to the dollar, ending the monetization of government debt, and balancing the government budget were the largest steps of the final stabilization, but the full change of the policy regime was not completed until summer 1924. At first the Reichsbank continued its traditional practice of freely discounting bills from credit-worthy firms.<sup>72</sup> By this means the nominal and real money balances grew rapidly in late November and December 1923, and more slowly in early 1924. Moderate inflation resumed in February and March, and on markets abroad the mark fell to 10 percent below par. Rather than counteract with higher discount rates, which he considered ineffective

<sup>69</sup> Havenstein was feeble and died on November 20, 1923.

<sup>70</sup> Restrictions on foreign exchange holding by Germans made the arbitrage process sluggish and saved the Reichsbank from needing to use much of its gold reserves.

<sup>71</sup> BAK: Nachlass Luther/667; Thomas J. Sargent, "The Ends of Four Big Inflation," in Robert Hall, ed., *Inflation: Causes and Effects* (Chicago, 1982); *Wirtschaft und Statistik*, 4 (1924), pp. 56–57, 119–21, 180–82, 247–48.

<sup>72</sup> Schacht, *Stabilization of the Mark*, pp. 151–56; BAK, Reichskanzlei R43 I/640, B1. 244–92; Paul McGouldrick, "Operations of the German Central Bank and the Rules of the Game, 1879–1913," in Michael D. Bordo and Anna J. Schwartz, eds., *A Retrospective on the Classical Gold Standard, 1921–1931* (Chicago, 1984).

against speculation on the resumption of a hyperinflation, new Reichsbank president Schacht imposed quantity constraints on discounting.<sup>73</sup> After April 7 the Reichsbank would only discount new bills to the extent that old ones were paid off. The restriction of credit caused high unemployment, many bankruptcies, and deflation that reached an annual rate of 36 percent in June. In that same month the Reichsbank could remove all foreign exchange controls, and the stabilization was complete. The acceptance of depression as a cost of stabilization helped convince people that the Reichsbank would not let inflation resume.

#### IV. SUMMARY AND CONCLUSIONS

Because the expansion of liquidity in Germany in 1919–1923 depended primarily on the previous and the anticipated growth of government debt, it is not surprising that fiscal news was the main determinant of inflationary expectations. Although the government ran deficits in every quarter, political events repeatedly altered the likelihood that it would soon run surpluses. When the surpluses seemed likely, as after the tax reform and defeat of the Kapp Putsch in 1920, prices stabilized at a level roughly consistent with the size of the debt outstanding and the size of the projected real surpluses. When the chances of surpluses soon were only about 50-50—as when Germany was paying and trying to renegotiate reparations, from mid-1921 to mid-1922—prices rose and reduced the real value of the debt. But they did not yet rise so fast as to render the inflation tax ineffective. When surpluses were highly unlikely, as after mid-1922, people wanted to hold so little real value in government liabilities that a steady inflation tax could not raise enough real revenue to cover the real deficit. Ending the deficits was the most important policy change for making the stabilization of November 1923 permanent.

Inflationary expectations were rational at least in that the major turning points corresponded in the predicted direction and with roughly the right timing to the major news about Germany's fiscal future. Expectations about the ability of the government to run surpluses swung so widely in 1919–1923 because widely opposing domestic forces and foreign governments had great sway over German finances and could even challenge the existence of the German state. Putting down those challenges was essential for stabilizing the mark in 1920 and in 1923. Fiscal news was political news, diplomatic news, and especially military news. Demands, promises, laws, agreements—words in Weimar Germany became as worthless as the marks that filled the wheelbarrows. Only the metallic backing of police pistols and French bayonets could restore their real purchasing power.

<sup>73</sup> Schacht, *Stabilization of the Mark*, pp. 156–59; see also Harold James, “Did the Reichsbank Draw the Right Conclusions from the Great Inflation?” (manuscript, Cambridge University).