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STOPPING HYPERINFLATION: LESSONS FROM THE GERMAN INFLATION EXPERIENCE OF THE 1920s

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ABSTRACT

The special role of money in the hyperinflation process, and particularly in the stabilization phase, has now been reconsidered in a best-selling essay by Sargent. The message is that credible fiscal stabilization is the sine qua non of stopping inflation. This is definitely not viewed as being in conflict with the monetary hypothesis, but it does represent a shift of emphasis. We draw attention to a third aspect of the hyperinflation process, and the stablization, namely exchange rate and interest rate policy. Even though a government may accomplish all the right measures in terms of budget stablization or control of money creation, there remains the problem of making these measures credible and hence being able to actually achieve them. We argue that exchange rate and interest rate policy in the transition have traditionally formed the vehicle for establishing that credibility by a de facto stablization. We make that point by discussing the events of the German hyperinflation. In that case the stablization was a much more diffuse, accidental matter than a reading of the classics reveals with exchange rate policy playing a key role. Immensely high interest rates in the face of a sharply appreciating free market exchange rate wiped out adverse speculation thus helping to establish stablization. The real exchange rate sharply appreciated in the final stage and persisted at an appreciated level well into the post-stabilization phase. It reflects the reverse of the coin of real depreciation in the capital flight phase.

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STOPPING HYPERINFLATION: LESSONS FROM THE GERMAN INFLATION EXPERIENCE OF THE 1920s

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Hyperinflations are the laboratory of monetary economics. It is said that under these extreme rates of depreciation all other considerations that may in normal times obscure linkages between money and prices emerge strongly and obviously, beyond discussion or controversy. Stabilisation of inflation proceeds if and only when the source of inflation, money creation, is brought under control. This is the traditional view endorsed by Keynes (1923) and particularly developed by Cagan (1956) in his classical essay on the German hyperinflation. The special role of money in the hyperinflation process, and particularly in the stabilisation phase, has now been reconsidered in a best-selling essay by Sargent (1982). In Sargent's work primary emphasis is placed on the budget stabilisation rather than on money growth per se. Indeed, he draws attention, as other authors had before, to the very large rates of monetary growth following the actual stabilisation.

Sargent's message is that credible fiscal stabilisation is the sine qua non of stopping inflation. This is definitely not viewed as being in conflict with the monetary hypothesis, but it does represent a shift of emphasis. The two views are not strictly identical because we can imagine a budget deficit financed by domestic or external debt finance in one case or money creation arising from creation of credit

to finance private spending. It is therefore useful to separate the point of emphasis of the two hypotheses even though they overlap in practice.

In this essay we draw attention to a third aspect of the hyperinflation process, and the stabilisation, namely exchange rate and interest rate policy. We argue that even though a government may accomplish all the right measures in terms of budget stabilisation or control of money creation, there remains still the problem of making these measures credible and hence being able to actually achieve them. Since policies are not in fact exogeneous the issue of credibility is paramount. We argue that exchange rate and interest rate policy in the transition have traditionally formed the vehicle for establishing that credibility by a de facto stabilisation. We make that point by discussing the events of the German hyperinflation. The discussion also reveals that the stabilisation was a much more diffuse, accidental matter than a reading of the classics reveals with exchange rate policy playing a key role. Immensely high interest rates in the face of a sharply appreciating free market exchange rate wiped out adverse speculation thus helping to establish stabilisation.

The discussion also draws attention to the behavior of the real exchange rate during stabilisation. The real exchange rate sharply appreciated in the final stage and persisted at an appreciated level well into the post-stabilisation phase. This may well have facilitated the political economy of the stabilisation because of the implicit rise in real wages. It reflects the reverse of the coin of real depreciation in the capital flight phase.

Initial Conditions

In the immediate aftermath of World War I Central Europe resembled Latin America of the past twenty years: political turmoil mixed with economic inequality, precarious democracy and financial instability. Although the German hyperinflation stands out, problems of high inflation or even hyperinflation prevailed in many countries, including Russia, Austria, Poland, and Czechoslovakia. In fact, it is doubtful that there was any country at all that escaped altogether a significant increase in prices during World War I. The main difference is how various countries coped with the subsequent stabilisation effort.

It is interesting to start our analysis well before the hyperinflation got underway and compare Germany with other major countries. Table 1 offers a comparison focussing on the price level and the dollar exchange rate. The benchmark is the United States and the comparison countries are France and the U.K.

The central point emerging from Table 1 is the large war-time price increase everywhere, including the U.S. In the war years prices more than doubled in the U.S. and in the U.K. In Germany and France the increases were much larger, more than 300 percent and nearly 400. But in this respect Germany was not much different from France.

Table 1 Comparative Price Levels and Exchange Rates
(Indices 1914 =1, annual average)

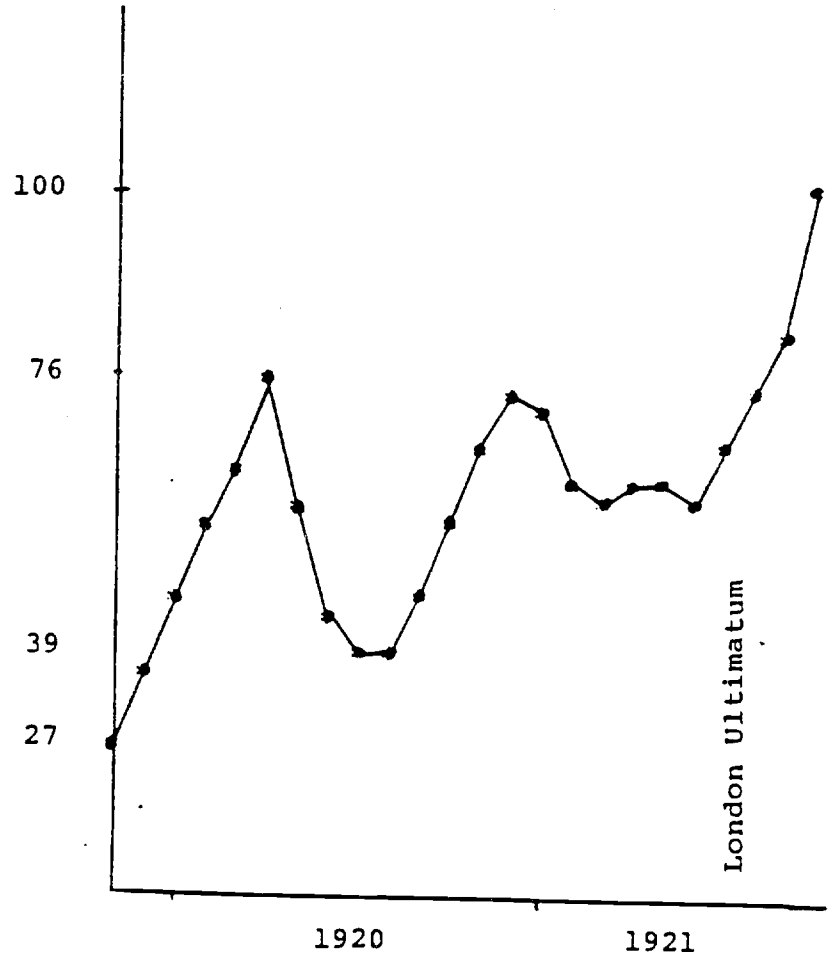
	U.S.	U.K.		France		Germany	
	P	P	e	P	e	P	e
1914	1	1	1	1	1	1	1
1919	2.6	2.5	1.1	3.4	1.4	3.9	7.8
1920	2.6	3.1	1.4	4.9	2.8	14.1	13.5
1921	1.4	2.0	1.4	3.4	2.6	18.1	10.2
1922	1.3	1.6	1.3	3.1	2.4	323.3	101.8

Note: P denotes the Wholessale Price Index, e the index of the local currency price of the U.S. dollar.

The large change, of course, occurs in 1921: The U.S. and the U.K. experience a sharp deflation as prices decline nearly 50 percent, in France prices fall less than 40 percent and in Germany they increase by a factor of 23 or 2300 percent. The U.K. returned to gold at the prewar par in 1925. France stabilized in 1926-28 with a large depreciation and a much higher level of prices, seven times the 1914 level. Germany by contrast underwent a hyperinflation before prices were stabilized in a new currency. Clearly one decisive point is 1921 when other countries moved to deflation while Germany went into inflation.

Germany emerged from World War I with significant losses of territory and with a burden of reparations to be determined by an Allied Commission. The immediate post-war years were overshadowed by expectations of the reparation payments and by domestic political turmoil. There were revolutions and revolts ranging from Soviet Republics in various states, including Bavaria, to rightwing activity

Figure 1 The Dollar Exchange Rate
(Oct.1919- September 1921)



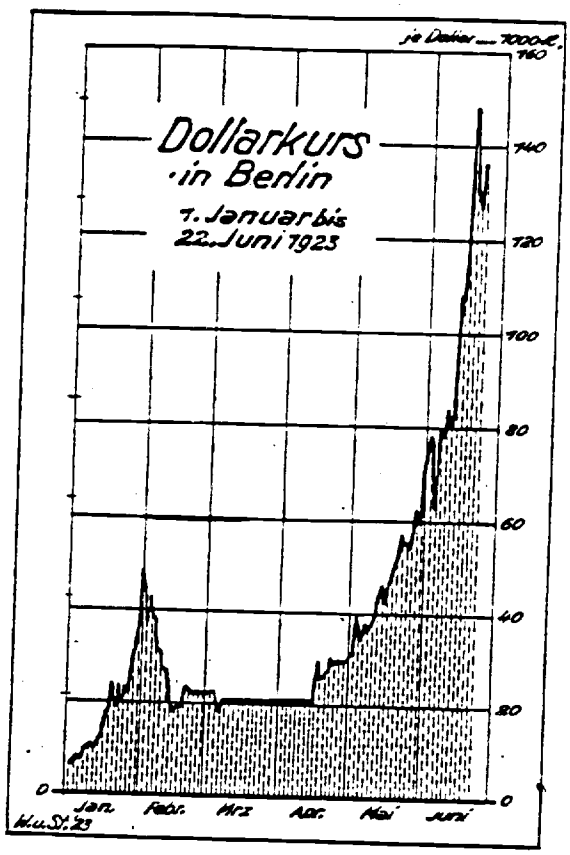
of the demilitarised professional army. It was said that $100 could buy you a minor revolution. Uncertainty about the political and economic future is reflected in the erratic behavior of the exchange rate (Mark/$ U.S.) shown in Figure 1.

In the brief period from October 1919 (the Treaty of Versailles had been concluded in June 1919) to March 1920 the price of the dollar tripled. The depreciation was a reflection of the uncertainty in Germany, but it fed back to prices and fuelled the turmoil. The sharp collapse in spring 1920 was one of the few points of potential return. Several factors helped create a moment of stability. The Erzberger fiscal measures strengthened the budget, the right-wing Kapp Putsch had been suppressed, and many other countries perhaps did not look that much better. But these improvements did not last, in part because of a sharp deterioration in the external balance.

A definite deterioration in the inflation outlook occurs in late spring 1921 and relates to reparations. The terms fixed by the Reparations Commission required Germany to pay 2 milliard gold marks (2 billion in U.S. terminology) a year, plus 26 percent of German exports in addition to occupation expenses. The London Ultimatum of May 1921 required a front end payment of 1 milliard gold marks by August 1921 in foreign exchange, and a second slice of 500 million gold mark by November 15th of that year. The 1.5 milliard payment amounts to about half of total tax revenue. Using 1925 data a payment of 2 milliard gold mark plus 26 percent of exports would amount to about 6 percent of GNP.

Figure 2

The Dollar Exchange Rate in 1923



Further complications of the political climate arose when the League of Nations imposed the separation of Upper Silesia from Germany. Germany's foreign policy in respect to reparations and other peace terms was a "policy of fulfillment". At least as a matter of policy, if not in the full delivery, Germany sought to implement the terms of the London ultimatum. While the 1921 payments were in fact met in early 1922, Germany protested her inability to fulfill these stiff terms and in June 1922 suspended all payments. The French and Belgium troops in response occupied the Ruhr area. The occupation was met by German "passive resistance", the financial costs of which completely outstripped any chance of price stability.

The Hyperinflation

The prelude to the hyperinflation is the first part of 1923 when, in the face of the Ruhr occupation, the government attempts to stabilize the exchange rate. Figure 2 shows the official dollar exchange rate. Following the collapse in January, at the time of the occupation, the rate recovers and is stabilized between mid-February and mid-April. Inflation that had run at 28 and 89 percent per month in December and January, rises to 111 percent in February and in March. After the stabilisation of the exchange rate, there is actual deflation of 17 percent and only 7 percent inflation in April. As soon as the exchange rate support is abandoned, because of huge reserve losses, the hyperinflation gets underway.

Table 2 shows the dollar exchange rate (paper mark per gold mark as well as the monthly rate of depreciation and of inflation for the critical period in 1923. During the Ruhr occupation in January and February 1923, prices had doubled each month as did the dollar rate. But in March and April there was a brief reprieve with falling prices and currency appreciation. The episode is explained by significant Reichsbank intervention in the exchange market. By May inflation and depreciation accelerate and for the rest of the year the German economy disintegrates as inflation rates reach at the peak nearly 30,000 percent per month, or just above 20 percent per day. At 20 percent per day inflation, the price level doubles in less than four days!

Table 2 The German Hyperinflation in 1923
(Percentage Change From Previous Month)

	Wolesale Prices	Exchange Rate
May 1923	57	95
June	137	131
July	286	221
August	1162	1307
September	2432	2035
October	29586	25957
November	10133	8462

The stories of life in the most dramatic stages of hyperinflation are well known. Keynes reports how people would order two beers at a time because the beer would grow warm and stale more slowly than the price was rising. Taxis were preferred to streetcars because you paid

at the end of the trip. Other accounts include stories on how firms made payments of workers by furniture van. Schacht (1927) reports that the demand for notes was so immense that 133 printing firms produced notes for the government on more than 1783 machines with 30 paper factories working full time for the government needs.

In July the inflation rate was still 3.5 percent per day. In August it rose to 6.5 percent per day, in September to 11.2 percent, and finally to an average of 20.9 percent in November. In the final stages of the inflation, prices and exchange rates became closely tied because even weekly reports on the cost of living or wholesale prices were far out of line with current developments. Quotations of the exchange rate and thus of the gold mark became the central pillar for calculating prices. The shift to gold mark or foreign exchange based pricing led to a big upsurge in inflation via, the once and for all, elimination of lags. Perhaps it is this shift to foreign exchange sed pricing that is the ultimate element in the shift toward hyperinflation. Clearly, in September-November prices were changed more than once a day, and ultimately all and any inertia disappeared in a process that Pazos (1978,p.93) has described as follows:

> "The reduction of intervals [for setting wages and prices] to their shortest possible duration and the pegging of wage adjustments--both upward and downward--to the freely fluctuating quotation of foreign currency give hyperinflation a mechanism different from that of intermediate inflation. The day to day adjustments of all contracts puts an end to all connections between the value of transactions in successive periods..."

The Stabilisation

Elements of the stabilisation occurred even before the extreme explosion got underway. Three pieces were particularly significant: First, on the political front the Streseman government, formed in August 1923, put an end to passive resistance in October. Second, an "empowering law" was passed that allowed the government to pass regulations and laws even suspending the constitution wherever the national economic interest so required. Third, as early as August 1923 the government had issued a 500 million gold mark loan, in part in small denominations. These bonds had started circulating and had come to be accepted as hard currency even though they carried no backing other than the government's promise to redeem in gold. Where the political improvement offered the prospect of budget improvement the acceptance of the gold mark bonds (for which convertibility in gold was certainly not assured) had paved the way for a new monetary instrument. In fact the gold mark loan bonds served as backing for gold mark liabilities issued by municipalities and other government bodies.

Plans for stabilisation focussed on two alternatives: a Gold Bank or a Roggen (Rye) Bank. In the end the idea of a Roggen Bank won out, although in a somewhat different form, as the Renten (mortgage) Bank. The key institutional elements of the stabilisation were three:

* Legislation in mid-October introduced the Renten Bank as a semi-public body with capital represented by fictious claims on industry and land. The assets of the bank were to be claims on the government and credit to the private sector. The total loans were not to exceed 2400 million Renten or gold mark, half to the government, half to private borrowers. Of the government part 300 million were to be set aside to retire the government floating debt held by the Reichsbank.

* The liabilities of the Renten Bank were the Renten Mark. They had a convertibility feature that linked them to the successful gold mark loan: upon request 500 Renten Marks could be converted into a bond having a nominal value of 500 gold marks, thus establishing the 1:1 link between the Renten Mark and the circulating gold mark loan certificates. Because these certificates were accepted as hard currency the convertibility linkage of the Renten Mark could readily take advantage. But the Paper Mark remained legal tender, and the Renten Mark had the only claim that it had to be accepted by government bodies in payment.

* The same legislation instituted the rule that the Reichsbank would no longer be entitled to discount government bills. Reichsbank note issue had to be backed at least one-third by gold and the remainder by commercial paper.

On November 15th the Rentenbank came into operation and issue of the Renten Mark started. Prior to the actual issue the government had already issued at the end of October a small denomination gold mark

loan. The loan was issued to cope with the cash crisis, namely the fact that the real money supply had declined to levels so low that the payments mechanism had substantially collapsed. Queues at the commercial banks and the Reichsbank trying to obtain paper money grew longer and more and more of the demand for paper money went unsatisfied. Depreciation and inflation wiped out the real value of money much faster than the government, municipal authorities and practically anyone could create paper money.

Within a month price and exchange rate stability had been restored. Extra taxation and the sharply increased real value of tax collection in January 1924 and beyond eliminated fiscal difficulties as a source of inflationary deficit finance. But there remained a different threat, namely Reichsbank commercial lending. During December 1923 and in early 1924 credit expanded so rapidly that a risk of renewed inflation and depreciation in March 1923 had to be checked by a credit crunch.

One of the striking features of the stabilisation that is often emphasized is the comparative stability of prices and exchange rates in the face of rapidly expanding money and credit. Between the date of stabilisation, November 15th, and the end of the year Reichsbank credit increased fourfold. Over the same period the quantity of Reichsbank notes outstanding nearly doubled.

Why Did Stabilisation Succeeed ?

There is no single obvious explanation for the successful

stabilisation of the German currency. The standard explanations are five, involving in each case a combination of a gain in confidence based on one or more of the following fundamental factors:

* monetary stabilisation via the discounting restraints imposed on the Reichsbank and the Rentenbank.

* fiscal stabilisation

* exchange rate stabilisation

* political stabilisation through the end of passive resistance and the appointment of an expert group of the Reparations Commission.

* the reduction in the real value of money.

The question of how stabilisation was achieved is not exactly the same as that of why hyperinflation occurred in the first place. But the latter question provides a good starting point. There are broadly two schools of thought: One emphasizes the budget and money creation as active sources of the hyperinflation. Adherents of this theory would make exchange rate adjustments passively respond to the domestic inflation developments along Purchasing Power Parity (PPP) lines. The alternative theory is the balance of payments approach. This theory claims that adverse balance of payments developments force exchange depreciation which then deteriorates inflation and with that, budgetary performance. In a setting of passive money, exchange rate disturbances then cause inflation. Political disturbances fit in either setting as the proximate sources of disruption. For the monetary-fiscal approach they initiate deficit finance. For the balance of payments approach reparation payments are the source of

extraordinary foreign exchange demands which force depreciation of the currency which then spreads to domestic inflation and a widening of the budget deficit.

For either of these schools the consolidation of the political events via an end of passive resistance and the improved prospect of stabilisation loans was thus an important ingredient. But beyond that there are differences on what is the essential element in gaining stability.

Sargent (1982, p.83) attributes the stabilisation to the institutional limit on monetisation of deficits and the resulting need for fiscal correction. The limit on government credit from the Rentenbank and the prohibition of discounting of government debt by the Reichsbank combined to separate completely deficit finance and the monetary system. He notes that the government was forced into budget balance and thus the objective conditions for inflation were removed "by a series of deliberate, permanent actions to raise taxes and eliminate expenditures." He refers in particular to the cuts in employment in the public sector.

The success of fiscal stabilisation is seen in the budget shown in Table 3.

Table 3 The Budget
(Millions of Goldmark)

	1922	1923*	1924	1925
Expenditure	3951	5278	7220	7444
Receipts	1508	588	7757	7334
Budget Deficit	2442	4690	-537	110
Receipts/GNP				10.4%

*To October 31. Fiscal year April-March.

Figure 3 shows the value of tax receipts in gold marks. The figure makes apparent the erosion of tax revenue in the hyperinflation and the very rapid recovery of real revenue once price stability returns.

The monetary-fiscal view would certainly be reinforced by three further facts. First, the change in personnel, when in December, Schacht, a self-confessed gold standard man, becomes central banker replacing Havenstein, who thought of the monetary problem as being that printing could not proceed fast enough. Graham (1930) is quoted by Yeager (1981, p.59) as writing of Havenstein's death "a demise which cannot be thought of as other than opportune".

An institutionasl feature worth recording is the extreme difficulty of putting Rentenbank notes into circulation: a printer's strike was taking place at the very time the Renten mark was to be issued. As a result the printing was delayed and the note issue proceeded very slowly. Accordingly, at no time in the early stabilisation did the Renten mark lose in scarcity.

Two further facts were the following: in November-December 1923 there was an outright credit crunch. The Reichsbank had ceased discounting government paper, which had been the chief source of credit expansion. The increase in circulation from the Rentenbank issue and expansion of commercial credit by the Reichsbank were not sufficient to keep up with the increase in real money demand. Interest rates went sky high. Pfleiderer (1976, p.192) notes the following interest rates on paper mark credits, following the stabilisation:

November 21,1923	6%	per day
November 27	10%	
December 11	3%	
December 31	1%	

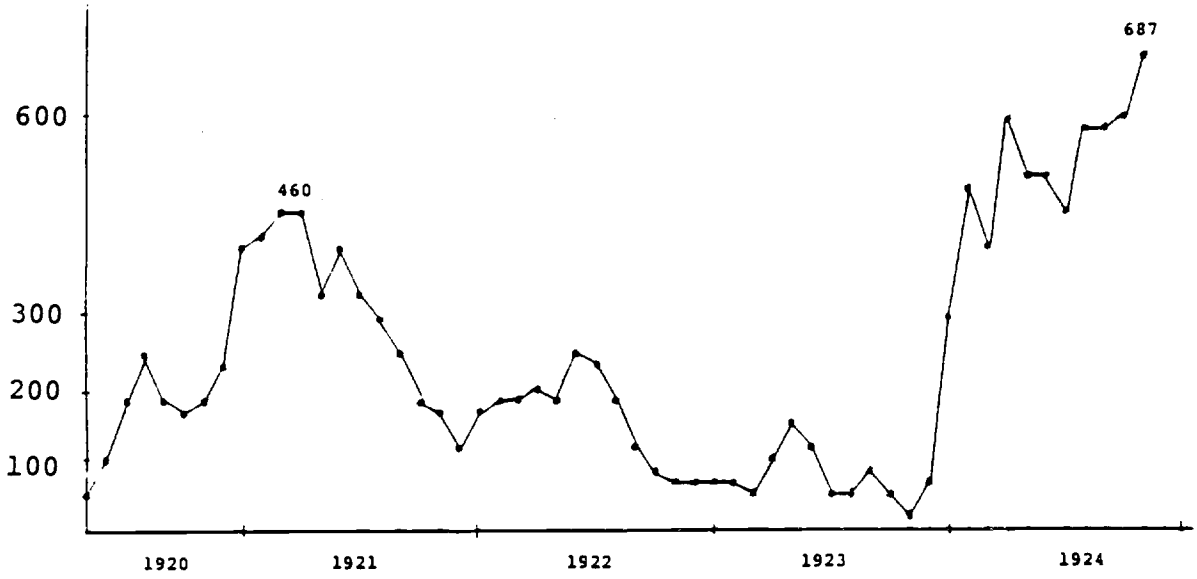
The Reichsbank maintained an interest rate of 90% per year (and daily charges) until the end of January 1924. Since between November 20th and the end of December prices were constant, or actually falling, realized real interest rates were extremely high.

A further factor, as already discussed above, was the effective implementation of the monetisation restriction: The Reichsbank was prohibited from discounting government paper. When the Finance Minister turned in December to the Renten Bank, he could not secure credit and had instead to raise emergency taxes, anticipate taxes and issue gold mark bonds.

Credibility

The monetary-fiscal stabilisation is, of course, a central part of the stabilisation and indeed the fundamental factor. But this does not really answer the more basic question: How does a government that plans to do all the right things and, indeed, puts them on paper secure the credibility that then makes it possible to live with the policies? It surely is not the case that there is an objective way of doing things right which, when hit upon, always and invariably yields instant public recognition and success. Observers of the time (as opposed to say Sargent's analysis) recognized this deeper problem.

Figure 3
Tax Receipts in Gold Mark
(Mill. G.M.)



They were sensitive to it because they had seen earlier attempts in Germany and in other countries that started off right, but then fell apart because they were not supported by stabilizing speculation. A case in point might be the first Poincare stabilisation of 1924 which evaporated while the second, in 1926, stuck. Where is the difference?

Students of the German stabilisation were keenly aware of the issue. Bresciani-Turroni (1930) refers to the stabilisation as a "miraculous event" and notes (p.355):

> "The stabilisation of the German exchange showed, as did that of the Austrian crown, this characteristic: The exchange was stabilized before there existed the conditions (above all the equilibrium of the Reich Budget) which alone could assure a lasting recovery of the situation."

Of course, one would argue today that the fact of stabilisation is immaterial, what counts is the firm expectation. With the expectation of reduced money creation and inflation, there is growth in real money demand which will be split between the transitory blip due to the Renten Mark issue and a fall in prices. But that, once again begs the question of the certainty about the budget. Various observers note that it was the very fact of the cessation of inflation which provided the stabilisation of the budget via increased real values of tax collection. This argument makes the termination of inflation a precondition for fiscal stabilisation rather than the other way round. That argument, however, is not completely right. The fiscal stabilisation had, in fact, four elements:

* the increase in the real tax collection that came from the end of inflationary erosion of the tax yield caused by collection lags.

* the elimination of the real value of the longterm government debt in the hands of the public via the hyperinflation..

* the elimination of part of the floating debt in the hands of the Reichs Bank by the substitution of the (interest-free) Renten Mark credit, and

* the creation of new taxes and cuts in outlays.

The important part, in respect to timing, concerns the longterm public debt. The service of the debt amounted at the end of the war to more than half the budget outlays. By 1924 it was less than 3 percent. To achieve that result there was a need for a sufficently large cumulative increase in prices before the other three factors could complement the real debt reduction to stabilize the budget. In this sense the timing of the stabilisation is not altogether indeterminate. This point is certainly reinforced by the fact that the reduction in outlays associated with the end of passive resistance was a precondition for financial stability.

A very interesting suggestion comes from the analysis of Keynes (1923, p.46-48) and Bresciani-Turroni (1931). The argument is that the rise in velocity, because of hyperinflation, ultimately reduces the real value of cash balances to so negligible a level that two factors are at work. First <u>any</u> sort of external loan will be sufficent to place the entire currency outstanding on a gold cover, making it possible to implement convertibility. Second, the extreme rise in

velocity is not sustainable (furniture vans delivering daily payments). As Keynes (1923, p.47), writing before the actual stabilisation, puts it:

> "... a minimum is reached eventually from which the least favorable circumstance will cause a sharp recovery...When the old value of the currency has fallen to a very low figure, it is easy for the government, if it has any external resources at all, to give sufficient support to prevent the exchange from falling further for the time being. And since by that time the public will have carried their attempts to economise the use of money to a pitch of inconvenience which it is impracticable to continue, even a moderate weakening in the degree of their distrust of the future value of money will lead to some increase in their use of it; with the result that the aggregate value of note issue will tend to recover."

Comparison of a number of stabilisation programs highlights this critical aspect of exchange rate stabilisation. It appears invariably as the key step in a program. It is not sufficient by itself--this is shown by the February-March 1923 attempt to stabilize, but it is the critical step that coordinates expectations, at least temporarily, around a new trend of prices and thus gives a chance to fiscal stabilisation via the revenue effects. It might be argued that stabilizing private speculation, in the face of the right kind of objective evidence, would perform the same function. It might well, but it would be difficult to disagree that to entice private speculators to perform the stabilisation might require even more monetary-fiscal overkill than if the government itself takes the steps.

It is quite clear that the government was aware of the need to establish a sound base of departure for the stabilisation. Schacht (1927) makes a point that between November 14th, when the Renten Mark was about to be issued, and November 20th the government devalued by 333 percent so as to raise the value of reserves relative to the quantity of Reichsmark outstanding. With money issue practically ceasing, at least for a while, this meant a huge contraction of the money stock in terms of foreign exchange and also in terms of domestic prices. The devaluation was also designed to move the official rate more in line with the free market rate observed in the occupied territories. The quotations for the official rate in Berlin and the free Cologne rate are shown in Table 4. Figure 4 shows the same fact using the Berlin and Amsterdam rates.

Table 4 Official and Cologne Exchange Rate
(Billion Marks/$U.S.)

	Official	Cologne
Nov. 12	.630	3.90
Nov. 13	.840	6.85
Nov. 14	1.26	5.80
Nov. 15	2.52	6.50
Nov. 20	4.20	11.70
Nov. 20	4.20	11.00
Nov. 30	4.20	7.80
Dec. 6	4.20	4.90
Dec. 10	4.20	4.20

Source: Schacht(1927)

The exchange rate data make the point that the stabilisation was not an immediate, obvious set of measures reflected instantly in the exchange rate in the free market. Even by November 30th, when prices had stopped rising, the free market rate still exceeded very significantly the official now fixed rate of 4.2 gold mark per $ U.S. Only toward the middle of December, a full month after stabilisation, did the market accept the policy. And as early as February-March, because of excessive commercial credit expansion of the Reichsbank, a new depreciation of the free rate ensued.

The exchange market was perhaps slow in recognizing the viability of the policies merely because they could prove themselves only over time. The request of the Finance ministry for accommodation, in late December 1923, really shows that there was at best a potential stabilisation, with institutions that were there on paper and on probation.

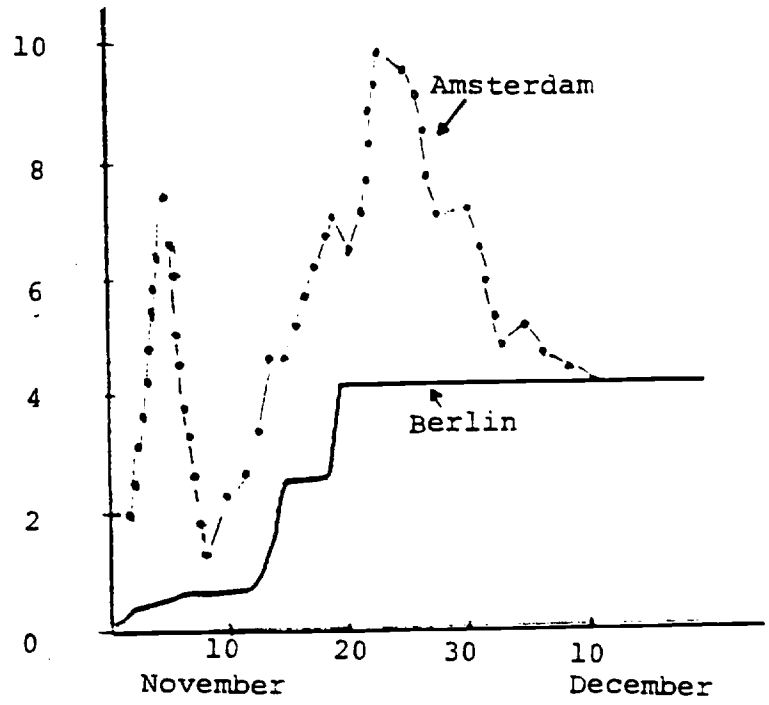
Quotations from the weekly report of the Economist's reporter in Berlin read as follows:

> November 27th, 1923:
> "The currency question continues to be in a mixed condition and it is very dangerous to predict how things will develop".(p.968)
>
> December 4, 1923:
> "The finances continue to be in a hopeless condition and as the provisional Renten mark currency reform, which is at best doubtful, cannot possibly succeed without budget balancing the general situation is gloomy."
>
> December 16th, 1923:
> "The currency condition has distinctly improved, owing to the price-fall now followed by a relative stability which creates the impression in the public mind that the Renten

Figure 4

Official and Free Market Exchange Rates

in late 1924



> mark, gold loan currency and even the paper mark are, for some reason not known to the science of currency, really stable. This view cannot be held. The dominating influence is that for the moment the same views seem to be held abroad (as far as there is any dealing in German currency) and that so long as foreign Bourses do not depress the mark, causing a paper mark price-rise ... the stability will be maintained."

In that perspective a major credit for de facto stabilisation must go to the actual fixing of the official exchange rate combined with super tight credit. An interest rate of 3% per day, as prevailed in November-December, after the stabilisation, amounts to a monthly cost of credit of nearly 150 percent. In the face of an official exchange rate that remained fixed the mere postponement of a resumption of hyperinflation and hyperdepreciation by a few days meant dramatic capital losses for foreign exchange speculators. The fact of a depreciation of the dollar by nearly 100 percent, combined with the huge cost of credit, operated as a dramatic stabilising device. It brought gold into the central bank, thus further supporting the ability to hold the rate, <u>for the time being</u>. In this view stabilisation was de facto, just as it had happened in February-March. Except that this time, in February-March, when the depreciation got underway once more, another credit crunch immediately put off thoughts of nearterm depreciation and thus sustained stability.

The fact that stabilisation was not an obvious, ready event is best appreciated from day to day interest rate data immediately following the stabilisation and well into 1924. The data make clear

Table 5 Interest Rates on the Berlin Bourse
(Percent per Day)

15.	Nov.	1923	5— 7% vormittags, 10—12% mittags, 15—20% nachmittags, bis 35% gefragt,
16.	„	1923	nach Börsenschluß 10—15% geboten,
17.	„	1923	20% morgens, 20—28% später,
18.	„	1923	—
19.	„	1923	5—10%,
20.	„	1923	10— 3%,
21.	„	1923	7— 4%,
22.	„	1923	6—15% und mehr,
23.	„	1923	15—25% anfangs, 8—12% später,
24.	„	1923	18% vormittags, 6% später,
25.	„	1923	—
26.	„	1923	10% vorbörslich gefragt, 8—5% bei Beginn der Börse, 12% in der zweiten Börsenstunde.
27.	„	1923	5—15% je nach Güte,
28.	„	1923	10—15%,
29.	„	1923	8% vormittags, zu 3% im Verlauf der Börse erhältlich.
30.	„	1923	1—2—5% schwankend,
1.	Dez.	1923	½—1%,
2.	„	1923	—
3.	„	1923	1—½—¼%; Berliner Kassenverein verlangte 2%,
4.	„	1923	2— 1—½%,
5.	„	1923	½— 1½%,
6.	„	1923	2— 2½%; Versteifung,
7.	„	1923	1½%; reichlich angeboten,
8.	Dez.	1923	1—1½%; reichl. Angebot,
9.	„	1923	1⅓ —
10.	„	1923	½—1½%.

Source: Prion(1924)

that a return to hyperinflation was not at all excluded. Table 5 shows data on day-to-day money on the Berlin Bourse. The rates are interest rates per day. On the day the Renten mark came to be issued interest rates sharply increased from 5-7% per day to upward of 20% and even ten days later they still were above 5 or 6% per day at least. Only in the first week of December did rates fall to the range of 1.5-2% per day. It is worth noting, of course that in the meantime, as is apparent from Figure 4, the Mark was strongly appreciating thus causing immense capital losses for anyone speculating in goods or free foreign exchange. Schacht (1927) points to these capital losses as essential to establishing an effective stabilisation.

A fact that has received no attention is that this regime of extremely high real interest rates carried through for more than half a year. This is apparent from the dolllar exchange rate, the price level and money market interest rates reported in Table 6.

Table 6 Interest Rates, The Dollar and Prices in 1924

	Interest Rate (% per Year)		Dollar	Prices
	Day Money	Month Money	(Index Dec.= 100)	
Jan.	87.6	28.3	99.6	92.9
Feb.	34.9	22.6	104.1	92.5
March	33.1	30.0	103.2	95.5
April	45.9	44.5	103.2	97.3
May	27.8	44.3	99.5	95.0

Source: Wirtschaft und Statistik, 1925, p.276 and Board of Governors.

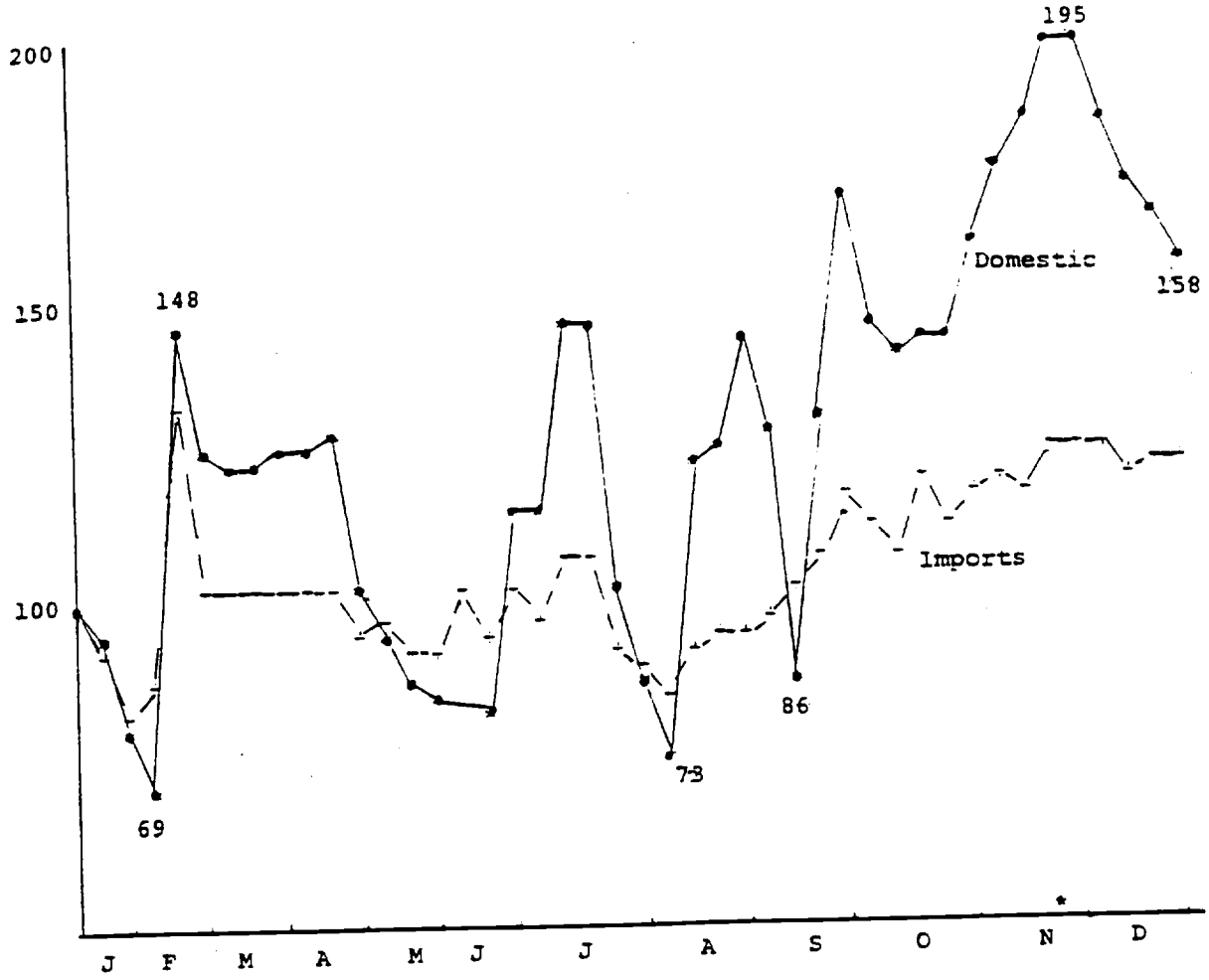
Note that the day-to-day money, for lack of a daily price index is not indexed while monthly loans are indexed. The large difference between the rates in January 1924, a full month after the stabilisation, reflects the ongoing possibility of a resumption of depreciation and inflation. One might ask how, conceivably, interest rates can be so high. Who would borrow and who would not lend? The active margin in all likelihood is foreign exchange. Given earlier experience with stabilisation, and especially in the period February to April 1923, the public had every right to expect that from one day to the next, because of political events, the exchange rate could collapse and hyperinflation might resume. But even the indexed rate is extremely high, in fact it is Latin American. The difference here reflects, in part, the fact that indexation is stated in terms of prices and not the exchange rate. To the extent that a collapse would start with the exchange rate the indexed rate should in fact also reflect somewhat the risk of renewed depreciation.

Note, too, the credit squeeze in April as the Reichsbank fights a tendency toward renewed inflation by a sharp tightening of credit. With prices falling and the stabilisation established the nominal rate now falls below the indexed rate. Table 6 thus suggests that only a few month after the stabilisation, and after repeated denmonstration of the new rules was the reform, in fact, established. In the meantime of course, realized real interest rates had been very large thereby creating a burden on real activity that was reinforced by the strong real exchange rate.

Figure 5

Domestic and Import Prices

(Index 1923:1 = 100)



Note: All prices measured in gold mark using the current official exchange rate.

The view that emerges in this rendition does recognize the importance of institutions (no government discounting, fiscal correction, printers' strike), but goes further to argue that these measures must, in fact, be made sustainable by actual success. Huge real interest rates and a stop to capital gains on the exchange market are the way to bring hyperinflation to a screeching halt.

Exchange Rates and Inflation

The discussion of the German hyperinflation, and of other inflation explosions, invariably brings up the question whether the exchange rate depreciation is the "source" of inflation. The argument is immediately rejected on the ground that without validating monetary policy the depreciation could not be sustained. But that argument may be too cheap once it is recognized that money creation is certainly endogeneous via the budget, and that the budget may be affected by the rate of inflation and by the real exchange rate.

Consider Figure 5 where we show at ten day intervals the prices of domestic goods and of imports in gold mark, that is paper mark prices translated into foreign exchange at the going official exchange rate. A rise in the gold mark price of domestic goods thus represents a rise in inflation relative to depreciation and conversely for a decline in the gold mark price. It is quite obvious from the figure that there are huge shifts in the relative rates. During periods of exchange rate stability, in early 1923 and in late 1923 prices are stable or declining. By contrast, following an exchange rate collapse as in

April 1923, July 1923 and August 1923 there is an outburst in inflation. It is this sequence running from exchange rate collapse to domestic inflation that motivates the balance of payments approach.

The justification relates to the budget. If a large part of tax collection is not indexed, or if spending and taxes are indexed respectively to the exchange rate and domestic prices, then exchange rate depreciation opens up a budget gap that needs financing and thereby validates the depreciation. The argument can simply be made in terms of a simple model of real money demand and inflationary finance of the budget. Monetary equilibrium is described by the equality of real balances, m, and the demand for real money balances L:

$$(1) \qquad m = L(p)$$

where p is the rate of inflation. Deficit finance implies that the growth rate of money be equal to the real government deficit per dollar real balances, or:

$$(2) \qquad gm = d(p) \quad , \qquad d' > 0$$

where g is the growth rate of nominal money and d is the real budget deficit which is an increasing function of the rate of inflation because of a lack of complete tax indexation.

The model is completed by an inflation equation which states that the rate of inflation is equal to the growth rate of nominal money (which is d(p)/m)) plus an influence stemming from stock disequilibrium in the money market:

$$(3) \qquad p = d(p)/m + a(m - L(p)), \qquad -d'/m + a < 0$$

Figure 6 shows the possibility of instability. The schedule BB shows equation (3). The dynamics arise from the gradual adjustment of real balances. An increase in the rate of depreciation eliminates tax revenue and therefore calls for an increased inflation tax. But real money demand adjusts to the higher inflation rate thereby eroding the inflation tax base and raising inflation still further.

The model can obviously be complicated to multiple equilibria. More realistically one might want to recoggnize that there is the possibility of adjustment in taxation to inflation. Specifically there might be a longrun tax function which is inflation proof, but a shortrun one which responds negatively to inflation. This extension is worth considering because it responds to the obvious problem that a shift to more rapid inflation, for a while at least takes the tax system by surprise. It ties in with the exchange rate issue precisely because exchange rate collapse would be the kind of surpise to the fiscal authorities that causes them for a while to be catching up and printing money.

Given the instability of the model, fixing the exchange rate (and the rate of depreciation consistent with stable inflation) is simply a socially acceptable form of price control that arrests the inflation process.

The exchange rate issue enters the analysis in still another way. One of the striking features of many stabilisations is the sustained real appreciation. Figures 7 and 8 show the case of Austria and Germany in the 1920s. The same is true for Poincare's stabilisation in 1926-28. One explanation is that the exchange rate is driven by the portfolio holders decision to move out or into a currency. In the phase of economic and political instability there is capital flight which leads to real depreciation (and hence sharply accelerating inflation). In the stabilisation phase, there are net capital inflows and stabilisation loans that allow current account balance or deficits and hence a real appreciation. This fact is important because it helps explain, in part, the success of stabilisation since it raises real wages. But it also explains the immediately following "stabilisierungskrise"-- the decline in activity that comes from the combination of tight money and overvaluation.

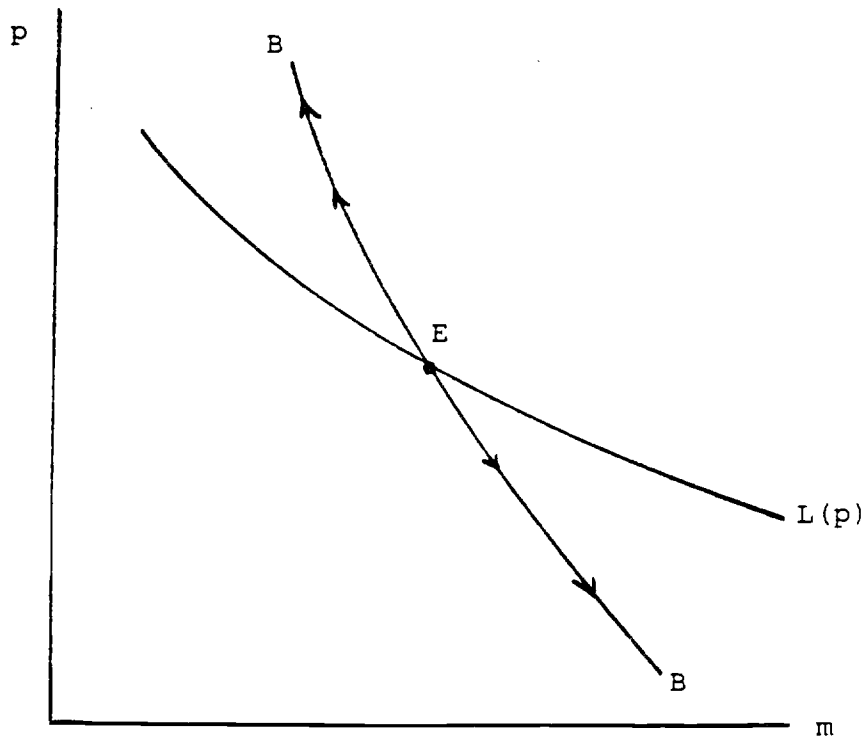


Figure 6
Instability of Inflationary Finance

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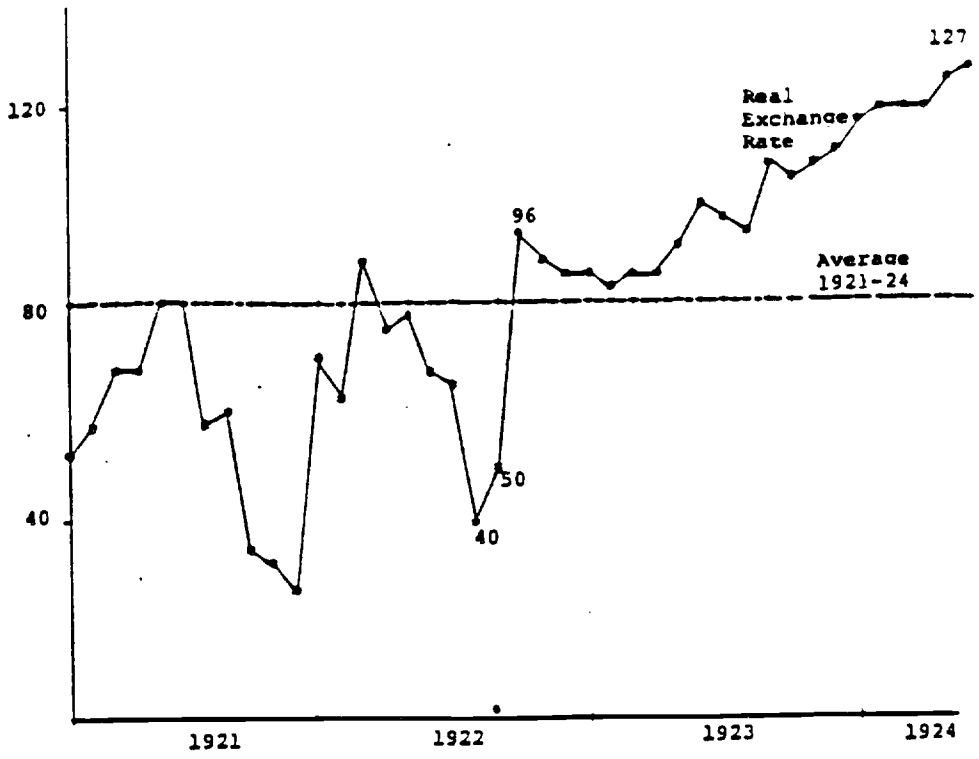

Figure 7
The Austrian Stabilisation

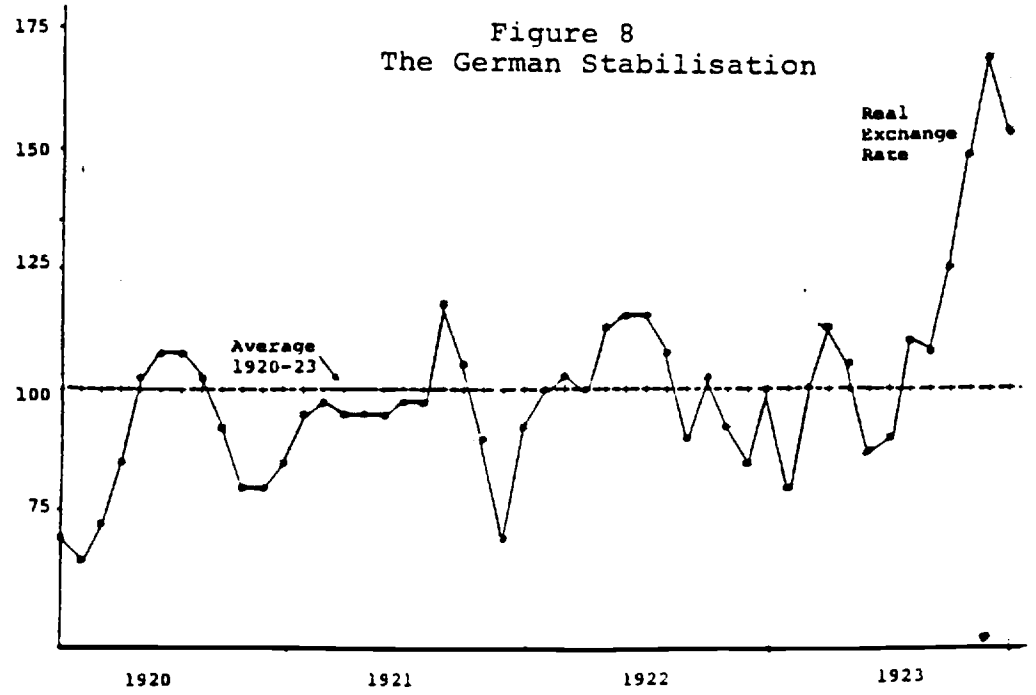

Figure 8
The German Stabilisation

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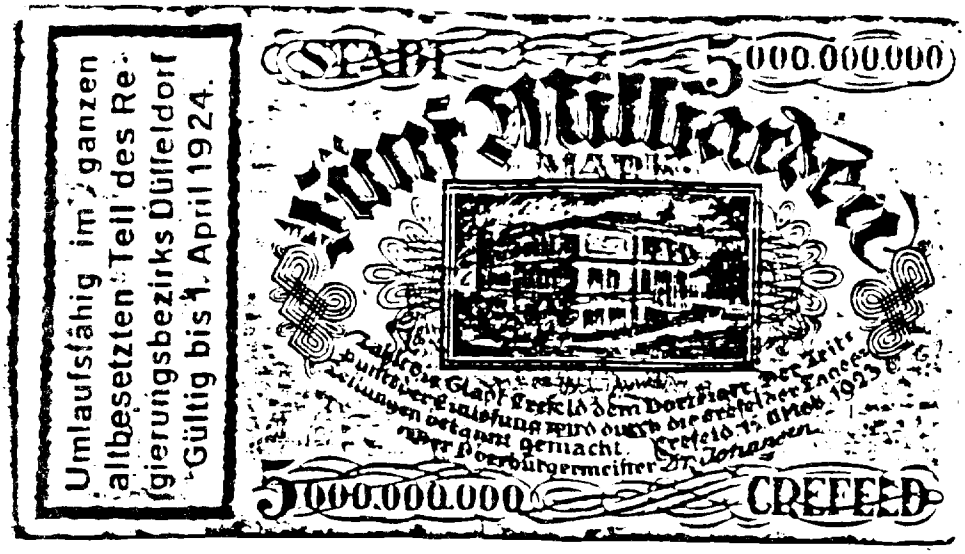

PAPER MARK

GOLD MARK

RENTEN MARK