

GERMAN INFLATION AND THE MONEY SUPPLY, 1919-1923

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Hyperinflation haunts the dreams of many a central banker. The German experience post World War I is perhaps the most frequently cited example of this inflationary nightmare occurring in reality. In this paper, Dervla Brennan provides some invaluable advice for any burgeoning economist seeking to become the 'next' Alan Greenspan. A number of theories of hyperinflation are extensively discussed. As ever, the difficulty is in separating economic facts from politics. The growth of the money supply is considered to have been the driving force behind the inflationary crisis, but whether the supply was endogenous or exogenous is a major point of contention.

Introduction

'A government can live for a long time, even the German government or the Russian government, by printing paper money...A government can live by this means when it can live by no other'.¹

According to Milton Friedman, 'Inflation is always and everywhere a monetary phenomenon'. Inflation and hyperinflation, by definition and historically, are periods of rapid trend increases in price combined with a decreasing demand for real money balances (Holtfrerich, 1986). In the 1920s the word inflation came to signify money growth rather than a rise in prices (Webb, 1985). Indeed the German inflation from 1919 to 1923 saw an immense increase in the circulation of paper money. By the end of November 1923 there were 400,267,640,302 billion notes in circulation compared with 663,200 billion in August 1923 (Sargent, 1981). This was accompanied by a rapid depreciation of the mark. In

¹ J.M. Keynes. A Tract on Monetary Reform (1923)

July 1919, one US dollar could be bought at 14 marks. By November 1923, the exchange rate was 4,420,000,000,000 marks to the dollar (Berghahn, 1987). It was claimed by the Allies that the Reichsbank was purposely expanding the money supply and thus depreciating the mark in order to indicate their inability to pay reparations. Meanwhile it was claimed in Germany that the currency depreciation, arising from disequilibrium of the balance of payments, had caused the expansion of the money supply and the inflation.

What was the primary determinant of Reichsbank money supply policy? This paper will begin with an examination of the Reich's fiscal policy during and after the war. A summary will then be presented of two competing theories that seek to explain the inflation that existed in Germany at the time: the 'Balance of Payments' theory and the 'Quantity' theory. The crux of this paper concerns Cagan's (1956) seminal work on the demand for money during the hyperinflation in Germany. Cagan's paper reopened the debate on what determined the money supply process in Germany post World War I. Ultimately this leads on to an examination of whether the money supply was exogenous as determined by the Reichsbank, or endogenous as determined by the actions of other agents in the economy, with the Reichsbank playing a passive role.

Reich Fiscal Policy, 1914-1923

Germany relied on printing money instead of levying taxation to finance their participation in World War I. This is the most inflationary form of war finance (Holtfrerich, 1986:107). However, inflation is a form of tax which acts unbeknownst to the public. As Keynes remarks: '[inflation] is the form of taxation which the public find hardest to evade and even the weakest government can enforce, when it can enforce nothing else' (Keynes, 1923: 37). The economic cost of an inflationary tax is the weakening power of the currency to carry out its functions (Holtfrerich, 1986: 121).

Following the war the main economic question facing the German government was whether they should restore the mark to its pre-war value or maintain the value it had obtained by the end of the war (*ibid*). Germany chose the latter, continuing with a policy of price inflation and exchange rate depreciation, and thus also the inflation tax. This particular policy option is reflective of the centrality the budget deficit had come to hold in currency debates after the war (*ibid*). Ideally a tax reform was needed in order to meet the Reich's expenses. However, the government was too weak to ask such sacrifices from its people, especially after having lost the war. Increasing the money supply was the

easiest means of meeting fiscal requirements (Bresciani-Turroni, 1937). Haller remarks: 'If the state did cause the inflation, it did so in self-defence' (Holtfrerich, 1986: 137).

Furthermore, Germany's total financial obligation under the Treaty of Versailles was for a long time unknown, leaving fiscal policy uncertain, and this uncertainty destabilized the value of the mark (Sargent, 1981). Threatened by allied penalties on the one hand and by collapse of the Reich on the other, no German government could have fulfilled the reparation demands in any way other than by printing money (Holtfrerich, 1986). Germans have always cited the terms of the Treaty of Versailles as the reason for the inflation. Indeed both 'Balance of Payments' and 'Quantity' theorists saw reparations as the disequilibrating factor, acting either on the balance of payments or on the fiscal balance, and thereby hastening the inflation and currency depreciation (*ibid*). This prevalent belief prevented any consideration of monetary reform, which may have impeded progress in tackling the inflation.

In November 1923 prices suddenly stopped rising, the mark suddenly stopped depreciating, the government put an end to borrowing from the central bank, the budget swung into balance and consequently the inflation came to an end. Sargent argues that a permanent change in the fiscal and monetary policy regimes was what was required to end the inflation (Sargent, 1981). Indeed the abrupt change outlined above was facilitated by two such simultaneous measures. The monetary reform involved the creation of a new currency; the *retenmark*,² and a new note issuing bank; the *Retenbank*. This bank was restricted both in the total volume of *retenmarks* it could circulate and, more importantly, on the amount of credit it could extend to the government for financing the deficit. The fiscal reform entailed implementing a new tax system and curtailing expenditure. Under the Dawes plan Germany's reparations payments were reviewed and reduced to a more manageable sum (Sargent, 1981). Thus earlier attempts to end the hyperinflation had failed because the government did not revise their fiscal policy of financing the deficit through increments of an unbacked money supply.

Balance of Payments Theory versus Quantity Theory

During the war itself, and especially in the aftermath, a debate broke out in political and academic circles regarding two theories of inflation. 'Balance of

² 1 *retenmark* = 1 trillion paper marks.

Payments' theorists cited the passivity of the German external balance caused by reparations and the other exactions under the Treaty of Versailles as the cause of the depreciation of the mark and the ensuing inflation. The depreciation of the mark was thus not the consequence but the cause of the budget deficit, money supply expansion and the inflation (Bresciani-Turroni, 1937; Holtfrerich, 1986). According to Helfferich:

'First came the depreciation of the German currency by the overburdening of Germany with international liabilities and by the French policy of violence...inflation is not the cause of the rise in prices and of the depreciated currency, but the latter is the cause of the higher prices and of the greater volume in the issue of paper money...' (Laidler and Stadler, 1998: 820).

'Quantity' theorists, on the other hand, saw the continued issues of paper money to finance the budget deficit as the fundamental cause of the inflation and currency depreciation (Bresciani-Turroni, 1937; Holtfrerich, 1986). Robinson argues that theoretical discussion of the German inflation was for some time clouded by political prejudices, with the German writers blaming reparations and the collapse of the exchange rate, and the Allies blaming the budget deficit and creation of money (Robinson, 1938). It is claimed that while the Reichsbank publicly held the 'Balance of Payments' theory as the root cause of the inflation, they essentially adhered to the 'Quantity' theory in their confidential correspondence with the government.

Recent Theories of Hyperinflation

Cagan's 1956 Model

'Hyperinflation provides a unique opportunity to study monetary phenomena' (Cagan, 1956: 25).

In Germany, hyperinflation is defined as beginning in August 1922 and ending in November 1923³. Real cash balances fell over the whole period of hyperinflation but they fluctuated drastically from month to month. Cagan's paper proposes and tests a theory that accounts for this erratic behaviour of real cash

³ Cagan defines hyperinflation as: 'beginning in the month the rise in prices exceeds fifty per cent and as ending in the month before the monthly rise in prices drops below that amount and stays below for at least a year' (Cagan, 1956: 25).

balances (*ibid*). By allowing for lags⁴ and assuming an exogenous money supply, Cagan hypothesizes that variations in the expected rate of inflation⁵ account for variations in real cash balances during hyperinflation. This is the case only where expectations are formed adaptively: that is by extrapolating past rates of inflation into the future. This implies a dynamic process in which the hyperinflation of prices was caused by both past and current changes in the quantity of money. Cagan concludes that: ‘domestic monetary factors alone explain hyperinflation’ (*ibid*: 90). He attributes this tremendous increase in money and prices to the fiscal needs of the government:

‘Issuing money was a method of raising revenue by a special kind of tax – a tax on cash balances...All that is required is to spend newly printed notes. The resulting inflation automatically imposes a tax on cash balances by depreciating the value of money’ (*ibid*: 78).

However, Cagan’s model is incapable of explaining the final months of the German hyperinflation, for which it predicts lower real money balances than those actually observed from August through November 1923.⁶ He offers two explanations that may account for these outlying observations. First, he hypothesizes that rumours of currency reform led people to expect that prices would stop rising after a certain number of months. This encouraged people to hold higher real cash balances than they would otherwise have held in view of the current expected rise in the price level. The second explanation Cagan offers is that he had used the wrong functional form in deriving his money demand function⁷ (*ibid*). Cagan’s seminal paper on the demand for money under hyperinflation has thus triggered an investigation into the German hyperinflation. In particular, various attempts have been made to explain the final months of 1923 when, contrary to conventional theory, real money balances increased despite accelerating inflation (Flood and Garber, 1980).

⁴ ‘The large changes in the balances during hyperinflation correspond to large changes in the rate of price change with some delay, not simultaneously.’ (Cagan, 1956: 88)

⁵ This is equivalent to the rate of depreciation in the value of money or a decline in the purchasing power of nominal money balances.

⁶ The period of maximum inflation and maximum money creation.

⁷ Frenkel (1977) in his study of the German hyperinflation rejects the possibility that Cagan had used the wrong functional form in deriving money demand.

Flood and Garber: Hyperinflation and Rational Expectations

Flood and Garber (1980) combine Cagan's model of hyperinflation with rational expectations instead of adaptive expectations in order to explain the final months of the German hyperinflation. They extend the standard monetary theory and include observations from August through November 1923. The purpose of this was to test Cagan's hypothesis that agents expected a monetary reform toward the end of the hyperinflation and thus began to hold higher cash balances despite increasing inflation. True to the spirit of rational expectations, Flood and Garber argue that when people anticipated a permanent change in the money supply regime, they changed their expectations of future inflation to reflect the change in monetary policy. They calculated the probability of monetary reform with the following result: '...our measure of the probability of monetary reform...hit its peak during the very week [November 15, 1923] commonly asserted to mark the beginning of the reform' (Flood and Garber, 1980: 48). Thus they conclude that expectations of monetary reform were the factor responsible for increasing real cash balances.

Webb: Endogenous Money Supply

Webb (1985, 1986) asserts: 'the primal cause of the money growth and the whole inflation was the growth of the government debt' (Webb, 1985: 490). In his analysis, Webb treats the money supply as endogenous rather than exogenous. He argues that one should focus on the determinants of money supply rather than money demand. The money supply depended on the government debt and how much of this debt the public decided to monetize. This fraction of the debt to be monetized was in turn influenced by inflationary expectations and on public confidence in German finances. Thus government debt and inflationary expectations indicating an endogenous money supply explain the money supply better than the assumption of exogeneity (Webb, 1986). Webb contends that it was positive 'fiscal news' combined with rumors of monetary reform in August 1923 that increased the possibility that the government would cease to run deficits. A new government came to power mid-August and succeeded in increasing revenue despite the increasing inflation. In September, the government declared an end to passive resistance which further lowered government expenditures (ibid). In addition, from August 1923 it seemed likely that the Reichsbank was planning to institute a new policy regime. The Reichsbank's refusal to discount commercial bills of more than a month's duration was combined with an obligation to repay in terms of gold. They also sent a private memorandum to the government informing them that after the end of the year, the Reichsbank would cease to monetize any more government debt. This was the first time the national bank threatened to use its supposed autonomy

from the government. While this announcement was not made public, Webb contends that it must have been known in the upper circles of the business community that sat on the Direktorium and Aufsichtsrat of the Reichsbank (ibid). Thus both signals of fiscal reform and monetary reform played a role in lowering inflationary expectations towards the end of the hyperinflation.

Tullio's Dynamic Model

The debate at this point rests on the question of whether the money supply during the inflation was exogenous or endogenous. Tullio (1995) develops a dynamic model of the German hyperinflation, simultaneously explaining prices, the exchange rate, and money supply. In his model the money supply is partially endogenized, and expressed as a function of nominal income and of the deviation of actual from potential output. The stability of the model indicates that the German inflationary process was primarily caused by fiscal deficit and excessive monetary growth (Tullio, 1995). Tullio argues that there is some evidence indicating that the Reichsbank passively financed increases in prices at times of low economic activity in order to avoid a recession, allowing for the partial endogeneity of the money supply (ibid). This partial endogeneity implies the cause of the inflation was at times from prices to money. These results support the hypothesis that the Reichsbank followed this real-bills doctrine, passively financing increased demands for money and credit. In 1991, Cagan himself returned to the topic and concluded:

‘the money stock cannot be treated as exogenous. A plausible way to endogenize the money stock is to model the revenue needs of the government for an inflation tax’ (Laidler and Stadler, 1998: 822).

Conclusion

The growth of the money supply is a prominent feature in every account of the German inflation. While money growth was frequently cited as a consequence and sometimes as the cause of inflation, recent models of inflation, and in particular hyperinflation, treat the growth of money as an immediate and often as an exogenous cause of inflation. In these models inflationary expectations have come to play an important intermediary role (Webb, 1985). Inherent in these formulations is a denial of the possibility that inflation has a momentum of its own. Rather it is the long-term government policy of persistent budget deficits and high rates of money creation which gives momentum to the inflation rate (Sargent, 1981). However, these models that accord a role to expectations in the

inflationary process are by no means perfect. There is, as yet, no ideal way to model expectations. While the rational expectations formulation is certainly useful, it is based on very strong assumptions and so comes with certain limitations.

Kiguel (1989) notes that there was an element of bidirectional causation during the inflation. High rates of inflation decreased the real value of government revenues, thus increasing their financial requirements. The Government then financed this deficit in revenue by increasing the money supply, reinforcing the inflationary process (Kiguel, 1989). Thus at times the inflation did run from prices to money. What is certain is that the inflation was caused by the acceleration of money growth to finance the large accumulation of government debt. This relentless printing of money was the only means of survival for a weak republican government burdened with the charge of having accepted the humiliating Treaty of Versailles. The exact nature of the money supply still remains a topic of debate. However, contentions of an endogenous money supply are dubious in the German case. The Weimar government made a conscious decision to finance the budget deficit by printing money, thus implying an exogenous money supply.

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