



Interest rate, money demand and seigniorage: The Chinese hyperinflation 1946–1949[☆]



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ABSTRACT

The lack of an observable variable measuring inflationary expectation has been a major difficulty in empirical work on hyperinflation. In this paper we propose a direct measure of expectations—the black-market interest rate in Shanghai—and study the behavior of money demand in the Chinese hyperinflation. Although the log–log schedule may provide an accurate description of money demand with relatively low interest rate, the pattern of seigniorage collected in the highest hyperinflation is consistent with the prediction of the semi-log schedule. The comparison of the seigniorage actually collected with the maximum steady state level shows that the economy might be on the increasing side of the Laffer curve except for the concluding stage of the hyperinflation. This suggests that the Chinese hyperinflation has been driven mainly by the government's quest for revenue.

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1. Introduction

It's commonly hypothesized that during the episodes of hyperinflation the demand for real money balance depends on inflationary expectations.¹ However, two major difficulties emerge in incorporating the roles of inflationary expectations in empirical work. One difficulty is the lack of observable variables used in measuring expectations. To deal with this, for instance, Cagan (1956) constructed a time-series of anticipated inflation rates using a specific transformation of the lagged inflation rates under the hypothesis of adaptive expectation. This approach has been commonly used in subsequent empirical work relating to hyperinflation, including the post-World War II Chinese hyperinflation (Hu, 1971; Tallman, Tang, & Wang, 2003). There are two conceptual issues that arise using Cagan's approach: First, the choice of the specific transformation used to generate the series of expectations is to a large extent arbitrary; second, it assumes that expectations about future inflation are based only on past inflation rates, however, under the hypothesis of rational expectations, current expectations should reflect all available information.

The other difficulty is the scarcity of reliable interest rate data. The virtue of the nominal interest rate is that it is not derived from a specific mechanistic formula or the hypothesis of adaptive expectation, but rather, it reflects the expectations of economic agents as

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¹ Cagan has recognized that during hyperinflation, changes in real wealth and real income are likely to be minor compared with changes in nominal variables, as an explanation of the behavior of money demand. As Cagan (1956, p. 25) described, "Hyperinflations provide a unique opportunity to study monetary phenomena... Relations between monetary factors can be studied, therefore, in what almost amounts to complete isolation from the real sector of the economy."

manifested in market prices.² But a major issue has been whether the interest rate series is adequate during turbulent periods of hyperinflation. As Frenkel (1977, p. 668) wrote, “We could have used interest rates in estimating the demand for money (in the German hyperinflation). However, all available interest series were extremely stable up to mid-1922 and were clearly much too low to make any sense.” The same argument is partially applicable to the Chinese hyperinflation of 1946–49, as official interest rates are quite unrealistic under such circumstances. For example, the Central Bank rediscount rate was only one-tenth of the black-market rate or the actual inflation rate (Chang, 1958, p. 266).

In this paper we propose a direct measure of the inflation expectations (and the opportunity cost of holding money) during the Chinese hyperinflation. This is the black-market interest rate in Shanghai. Compared to the classic German hyperinflation, the Chinese hyperinflation offers a unique research opportunity in the sense that inflation expectations are well captured by the black-market interest rate. Several early studies relating to the Chinese hyperinflation have hypothesized that the demand for real balances is a function of the black-market interest rate, but only a short sub-sample period is used due to the lack of information on interest rate. Chang (1958, pp. 266–268) presents the black-market rate in Shanghai, covering the period from January 1946 to June 1948, compiled by the Economic Research Bureau of the Central Bank of China. The same period is used in Hu (1970, 1971) for the analysis of the behavior of money demand. As Hu (1970) wrote, “Due to the lack of information on interest rates, we have to exclude monthly observations before January 1946 and after June 1948.” This is unsatisfactory because of the following two points. First, as Tallman et al. (2003) stated, “the key advantage of the post-World War II Chinese hyperinflation over the post-World War I German data for the study of the money demand behavior is that the Chinese data series contain more observations (40 compared to 30).” This advantage would vanish when the observations after June 1948 were excluded. Second, and more importantly, the highest hyperinflation occurred after June 1948 (as presented in Fig. 1 and Table 1). Before this month, although the inflation rate remained high, an explosive process was not observed and it was not qualified as hyperinflation according to Cagan's (1956) definition.³

We bring new monthly time series of the black-market interest rate in studying the money demand behavior. The virtue of this new data over those used in the existing literature is that our interest rate series span an entire hyperinflation episode from January 1946 to April 1949. We also provide some evidences to endorse the adequacy of using this rate in estimating the demand for money. This is a significant advantage of the Chinese hyperinflation over empirical studies on the famous Weimar hyperinflation, as markets for short-term loans operated as usual in the Chinese hyperinflation, even though political instability and inflation uncertainty precluded long-term lending. As claimed by Campbell and Tullock (1954), the black-market interest rates primarily discounted anticipated inflation in the Chinese hyperinflation period, thus high interest rates did not constitute the insuperable barrier to investment.

We also calculate the seigniorage revenue actually collected and the maximum steady state level based on the estimates of money demand functions. There have been a few studies on Chinese hyperinflation, but they focus exclusively on the behavior of money demand (Hu, 1970, 1971; Tallman & Wang, 1995; Tallman et al., 2003). There is a paucity of research on the revenues collected by the government. We calculate the seigniorage actually collected, and compare it with the steady state level implied by the two popular and competing money demand specifications: the semi-log schedule and the log–log schedule. This provides an empirical way to investigate the plausibility of the semi-log and the log–log specifications to characterize the behavior of money demand observed during a regime with extremely high interest rates.

We begin with a brief description of the Chinese hyperinflation, as well as the data description (Section 2). Section 3 studies the behavior of money demand. Section 4 compares our results with those on hyperinflations in the existing literature. Section 5 deals with the issue of inflationary finance. Section 6 contains some concluding remarks.

2. Backgrounds and data description

2.1. The Chinese hyperinflation: 1946–1949

The abandonment of silver standard and the adoption of fiat money—National Currency (abbreviated NC)—in China in 1935 paved the way for Chinese inflation during the 1940s. The subsequent inconvertibility of the currency enabled the government to cover its expenditures by money creation. An unsound tax system compelled a disproportionate dependence on deficit financing of the Sino-Japanese War, which started in 1937. Furthermore, it was difficult for the government to sell bonds to the private sector as these bonds did not offer a positive real rate of return. Thus the government financed its deficits primarily by monetary expansion. As Kung Hsiang-hsi, Minister of Finance, wrote: “The new system enabled the government to rely on the increase of bank credit as a means of emergency war finance” (Kung, 1945). Even after the end of the Second World War, Chinese military expenditures were still maintained at a high level sufficient to keep the military force strong enough to contain the Communist expansion.

The budget deficit and the resultant increase in currency in circulation were the main driving factors for the Chinese hyperinflation after the Second World War (Chang, 1958, p. 71). For example, government expenditure in 1946 increased by 3 times compared to the previous year, resulting in a huge deficit. During 1946–48 military outlays stood at around 60% of total government expenditure (see Chang, 1958, p. 71 and p. 155). Government revenues increased also during this period, but they continued to fall far short of expenditure and the deficit grew to large proportions. The Nationalist government's deficit approximately doubled the tax revenues after 1946. The deficit was covered to a large extent by printing money. The government continued to resort to direct borrowing

² If ex ante real interest rates are constant and the market is efficient, then the nominal interest rate equals an expected inflation plus a constant. Thus the nominal interest rate can be used as a proxy for the expected inflation rate (Fama & Schwert, 1977).

³ The average monthly black-market interest rate and inflation rate over thirty months, from January 1946 to June 1948, were 18.6% and 23%, respectively.

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