International Review of Economics and Finance

Does inflation cause growth in the reform-era China? Theory and evidence

CrossMark

Qichun He [a,*], Heng-fu Zou [a,b]

[a] Central University of Finance and Economics, No. 39 South College Road, Haidian District, Beijing 100081, China
[b] World Bank, Washington, D.C., USA

A B S T R A C T

The government reaps seigniorage revenue from higher rates of money growth, hiring away more workers from entrepreneurs (the *government crowding-out effect*). There is also a positive *seigniorage effect* when part of the revenue goes to entrepreneurs, acting as a subsidy to R&D. When the government retains a larger share of the revenue, the *government crowding-out effect* dominates, and inflation retards growth. When entrepreneurs get the larger share, the *seigniorage effect* dominates, and inflation increases growth. Both OLS (ordinary least squares) and IV (instrumental variable) regressions using time-series data during 1979–2014 in China show that differenced inflation (to ensure stationarity) has a significantly positive effect on growth. When we use the level of inflation, we find that a 1 percentage point increase in annual inflation would bring a 0.53 percentage point increase in annual growth of per worker real GDP. The robust, causal effect of inflation on growth in China provides support for our theory.

© 2016 Elsevier Inc. All rights reserved.

1. Introduction

There exists a theoretical debate on how inflation affects economic growth — one fundamental issue in monetary economics (see, e.g., Tobin, 1965; Sidrauski, 1967; Stockman, 1981; Gomme, 1993; Jones & Manuelli, 1995; Marquis & Reffett, 1994; Funk & Kromen, 2010; Chu & Ji, 2012; Chu & Lai, 2013; Wang & Xie, 2013; Chu & Cozzi, 2014). In our paper, we revisit this issue by examining whether inflation may foster economic growth if the monetary authority does not rebate the seigniorage revenue as a lump-sum transfer to households, but rather use it to subsidize the entrepreneurs instead. The seigniorage channel – the amount of resources allocated to entrepreneurs' R&D affected by seigniorage – is an overlooked, yet important mechanism for inflation to positively affect economic growth.

The traditional approach in monetary economics concerning the seigniorage revenue from steady inflation is to rebate it as a lump-sum transfer to households (see Wang & Yip, 1992, and references therein). Recent monetary new growth models (NGMs) a la Romer (1990) or Aghion and Howitt (1992) maintain this traditional assumption (e.g., Chu and Cozzi (2014), and references therein). By contrast, our study builds on monetary NGMs, but we depart from the prototypical setup. If one were to follow the traditional approach in NGMs, growth would inevitably be decreasing in inflation (welfare may not be so). That is why most monetary NGMs still predict a negative effect of inflation on growth. By contrast, according to our assumption, when government rebates part of the seigniorage revenue to entrepreneurs, it would act as a subsidy to entrepreneurs. Therefore, more innovations would be forthcoming and would yield a positive effect of inflation on growth.

---

* Corresponding author at: CEMA, Central University of Finance and Economics, No. 39 South College Road, Haidian District, Beijing 100081, China.
   E-mail addresses: qichunhe@gmail.com, heqichun@cufe.edu.cn (Q. He), hzoucema@gmail.com (H. Zou).

Our approach is motivated by how the government spends the seigniorage revenue.[1] In real world situations, it is unclear how the government spends seigniorage revenue, but the importance of the money injection rules has been noticed by authors such as Lucas (1972), as discussed in Wang and Xie (2013). Seigniorage revenue is argued to be used by the government to finance its spending in developing countries (see De Haan & Zelhorst, 1990). This is possible given the fact that the central bank generally comes under direct control of the minister of finance in developing countries. China is a perfect example of a country without central bank independence. In China, the autocratic government is able to direct funds both to itself and to other specific sectors of the economy. It is more likely that the Chinese government either uses the seigniorage revenue to finance its own expenditures or to subsidize entrepreneurs because they have never rebated the seigniorage revenue in a lump-sum transfer to the households.

The theme of our paper is general because many developing countries share similar institutional features with China. Moreover, seigniorage is also important in developed countries. Obstfeld and Rogoff (1996, p.527) illustrate the importance of seigniorage revenues for a select group of industrialized countries between 1990 and 94. In Sweden, seigniorage revenue amounted to 1.52% of GDP and >3% of total government spending. For both the United States and Germany, seigniorage revenues amounted to >2% of total government spending. Obstfeld and Rogoff further state that seigniorage revenues can be much higher for developing countries. For instance, the average annual growth of M2 was 18.3% during the period 2003–2011 in China, and therefore, seigniorage revenue in China amounted to 17% of total GDP annually.[2] Although our calculation may over-estimate the importance of seigniorage revenue in China, the autocratic government of China can reap much larger seigniorage revenues than democratic countries with central bank independence.

Given the institutional setup concerning the distribution of seigniorage revenue in China and the large magnitude of seigniorage revenue, the Chinese experience constitutes a suitable case for an empirical test of our model. Using the Chinese data between 1979 and 2014, we find that differenced inflation (to ensure stationarity) has a significantly positive effect on growth in OLS (ordinary least squares) estimation. The result holds up in the IV (instrumental variable) estimation that employs the M2 growth in the US and Japan's inflation rates as instruments for China's inflation. The robust, causal effect of inflation on growth in China provides strong support for our theory.

Our approach also provides a plausible explanation for the empirical findings of a positive effect of inflation on growth. Empirical studies also debate on the effect of inflation on growth (Kormendi & Meguire, 1985; Barro, 1995; Bullard & Keating, 1995; Bruno & Easterly, 1996; Fischer, 1993; Ahmed & Rogers, 2000; Chu, Furukawa, & Ji, 2014; Chu, Kan, Lai, & Liao, 2014).[3] Authors such as Bullard and Keating (1995) and Ahmed and Rogers (2000) have found zero or a positive correlation between inflation and growth in industrialized economies with low inflation. There are also studies that could predict a positive effect of inflation on growth (e.g., Jones & Manuelli, 1995; Chu & Lai, 2013; Wang & Xie, 2013). For instance, Chu and Lai (2013) also theoretically show that if the elasticity of substitution between consumption and the real money balance is less (greater) than unity, then R&D and output growth would decrease (increase) in inflation. Wang and Xie (2013) incorporate labor market friction in capital accumulation models to allow inflation to positively impact real activities. By contrast, we focus on the seigniorage channel in monetary NGMs.

As discussed, our study related to the traditional approach in monetary economics that rebates the seigniorage revenue from steady inflation as a lump-sum transfer to households. Authors follow this approach in capital accumulation models (e.g., Sidrauski, 1967; Wang & Yip, 1992), and in endogenous growth frameworks such as Gomme (1993) and Jones and Manuelli (1995). In these models, where the source of long-run growth is not from entrepreneur's R&D as in NGMs, relaxing this traditional assumption is trivial. The distribution of the seigniorage revenue would not change money superneutrality in capital accumulation models, and it would not change the main predictions in endogenous growth frameworks, either. Jones and Manuelli, for instance, focus on the labor-leisure trade-off for inflation to affect growth. In their model the source of growth is nonconvex technology that combines hours and human capital to produce effective labor. The steady state number of hours supplied to the market is determined by the relative prices of consumption and leisure, which is affected by inflation. The distribution of the seigniorage revenue is irrelevant in their model because it would not distort the relative prices of consumption and leisure.

Specifically, in order to illustrate our mechanism, we incorporate money demand via a cash-in-advance (CIA) constraint on consumption into a Schumpeterian quality-ladder model following Chu and Cozzi (2014). Our results are robust when we use a monetary expanding variety model (available upon request). To avoid confusion, we focus on the Chinese case where the government controls the banking system, there is no central bank independence, and the central bank has to work under the command of the government (denoted government-bank). The government-bank (the monetary authority) controls the money supply. Employment in the government-bank sector represents the total employment in both the government sector and the banking sector. Labor is mobile across sectors.

---

[1] The same approach is used in He (2016a) to study how central bank independence affects the marginal effect of inflation on growth, and He (2016b) on the optimality of Friedman Rule (Friedman, 1969).

[2] According to the data provided by the China Statistical Yearbook (2012), the average annual inflation rate was 5.8% during the period 2003–2011, and the average annual growth of M2 was 18.3% during 2003–2011 in China. We can rewrite the seigniorage revenue $\frac{M_t - M_{t-1}}{P_t}$ as $\frac{M_t - M_{t-1}}{M_{t-1}} \frac{P_{t-1}}{P_t} \frac{M_{t-1}}{P_{t-1}}$. Using the data, we find that seigniorage revenue in China during 2003–2011 amounted to 17% ($\approx \frac{18.3\%}{1+5.8\%}$) of total GDP annually. Our simple calculation may over-estimate China's seigniorage revenue. Zhang and Zhang (2009) focus on calculating China's seigniorage revenue. According to Zhang and Zhang, the China's monetary seigniorage revenue is as low as 0.92% of GDP in 2000 and as high as 5.03% of GDP in 1993.

[3] Although many empirical studies since the 1980s find a negative effect of inflation on growth (e.g., Kormendi & Meguire, 1985; Chu, Furukawa, & Ji, 2014; Chu, Kan, Lai, & Liao, 2014), there are critics of the findings. For instance, Khan and Senhadji (2001) have identified a threshold effect in the inflation-growth nexus. Barro (1995) finds that there is no relationship between pooled decade averages of growth and inflation in economies with annual inflation below 15%. Bruno and Easterly (1996) find that the results are sensitive and depend on outliers with episodes of high inflation.