Economic Modelling 28 (2011) 622–629

Contents lists available at ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/ecmod

Inflation persistence, inflation expectations, and monetary policy in China

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ARTICLE INFO

Article history:
Accepted 23 June 2010

JEL classification:
E31
E52
E58
C22

Keywords:
Inflation
Inflation persistence
Inflation dynamics
Structural change
Monetary policy

ABSTRACT

This paper constructs a quarterly series of GDP deflator inflation for China from 1979 to 2009 and tests for a structural break with an unknown change point in the dynamic inflation process. Empirical results suggest a significant structural change in inflation persistence. Employing a counterfactual simulation method, we show that the structural change is primarily attributed to better conduct of monetary policy and the resultant better anchored inflation expectations. This finding implies that the quiescence of inflation in China over the past decade could well be followed by a return to a high inflation era in the absence of a determined effort by the monetary authorities in managing inflation expectations. Therefore, the use of a preemptive monetary policy to anchor inflationary expectations and to keep inflation moderate is warranted in China.

1. Introduction

Since 1979, China has witnessed remarkable changes in the pattern of its inflation process. In particular, the rate of inflation in China is now much lower and less volatile than it was in the 1980s and early 1990s. This change coincides with China's monetary policy reforms since the late 1990s. Significant examples of these reforms include establishments of interbank money markets and bond markets in 1995–1996 and commencement of open market operations in 1998, through which China has changed its monetary policy from direct credit quota control to indirect adjustment with both quantity- and price-based instruments.

These shifts in monetary policy may have induced major structural changes in the dynamic models of the inflation process, as articulated in the famous Lucas critique (Lucas, 1976). In the context of the Chinese economy, these important changes in monetary policy may have induced structural instability in the dynamic process of inflation, and in particular the persistence of inflation. That is, the change in inflation dynamics could reflect the fundamental shift in monetary policy whereby the PBOC now systematically acts to stabilize inflation around a potential long-run target and has gained credibility with the public that it will continue to do so into the future.

Surprisingly, relatively little effort seems to have been devoted to testing the empirical importance of the Lucas critique in terms of China's inflation dynamics and monetary policy. The existing literature focuses particularly on issues relevant in the United States, while little consensus has been achieved. For instance, Estrella and Fuhrer (2003) and Rudebusch (2005) assess the empirical importance of the Lucas critique in US monetary models. Their results suggest that the inflation process with backward-looking descriptions of expectation formation experiences no structural change even when monetary policy changed. However, recent studies by Kim and Kim (2008), Zhang et al. (2008), and Zhang and Clovis (2009a) suggest a link between changes in inflation dynamics and monetary policy shifts, indicating the empirical importance of the Lucas critique.

Notwithstanding these empirical controversies, standard monetary models with inflation dynamics for China assume that the monetary policy regime in China is fixed. For example, Hasan (1999) argues that there is a stable feedback relationship between inflation and monetary growth in China. Guerineau and Guillamont (2005) estimate a dynamic equation of consumer price variations for China over the period 1986–2002, assuming no structural change in monetary policy and the underlying model for inflation dynamics. Zhang (2009) attempts to specify and estimate a price-based (i.e. interest rate) monetary policy reaction function, whilst assuming that monetary policy in China has experienced no structural shift. Recently, Zhang and Clovis (2009b) noted possible changes in China's monetary policy regime, and the parallel change in inflation dynamics. The focus there, however, is on consumer price inflation,

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doi:10.1016/j.econmod.2010.06.009

and no quantitative evidence linking the change in inflation process and the shift in monetary policy is provided.

This paper considers a different and yet (hopefully) more important measure of price inflation in China, namely Gross Domestic Product (GDP) deflator inflation (denoted GDPDI), spanning a relatively long period of time, from 1979 to 2009. We construct a quarterly series of GDPDI by using published data from China's National Bureau of Statistics (NBS) for the growth rate of real GDP and the level of nominal GDP, in conjunction with the estimation method in Abeysinghe and Rajaguru (2004). We then test for structural change in the dynamic models of the inflation process, using structural break tests at unknown break point.

In addition, to quantify the link between the structural break in inflation dynamics and monetary policy changes, we specify a multivariate dynamic model to capture dynamic interactions between the real economy, inflation, and monetary policy, and then work through counterfactual simulations. Our empirical results suggest that the structural change in the dynamic models of the inflation process is attributed to improvements in the conduct of China's monetary policy and the resultant better anchored inflation expectations.

To this end, Section 2 describes the construction of the GDP deflator inflation series. Section 3 specifies alternative models for inflation dynamics and identifies possible structural break in the underlying models. Section 4 documents systematic changes in monetary policy and discusses the corresponding changes in inflation expectations. Section 5 then performs counterfactual simulations to quantify the contribution of monetary policy shifts to the change in inflation persistence. Section 6 concludes the paper.

2. Data descriptions

The inflation series considered in this paper are chosen to provide relations that are of most relevance for monetary policy analysis and to represent general inflation in an overall economy. The rate of inflation based on the consumer price index (CPI) appears to be the most closely watched economic barometer in China. Yet in recent years, as the public and the media have paid considerable attention to monthly CPI announcements by China's NBS, more and more economists as well as the public have expressed their dissatisfaction with the way the CPI measures inflation in China, especially in its treatment of the cost of housing.

The GDP deflator, by contrast, is a broader measure of price changes than the CPI, as it averages prices of all goods and services in the economy. Since the "market basket" of the GDP deflator is essentially the whole production of the nation, the GDP deflator inflation reflects general price changes in the overall economy more accurately. Therefore, this paper aims to characterize the nature of China's inflation dynamics in terms of the broader measure, namely the GDP deflator inflation.

Since there are no published data available for the GDP deflator series with quarterly frequency, we need to first construct quarterly data for the GDP deflator. Note that we do not use annual data because with annual data most economic relationships are likely to become simply contemporaneous due to temporal aggregation. In China, quarterly data of nominal GDP in levels and real GDP in growth rates (year-on-year) are available from the NBS since 1992Q1. These are used to construct a quarterly real GDP series with 1997 as the base year.[1] Using the quarterly nominal and real GDP series we can derive the GDP deflator for 1992Q1–2009Q4.

Prior to 1992, however, China's GDP data (both levels and growth rates) are mostly available only on an annual basis. To address the problem of low frequency, we first convert the annual data of the nominal GDP over 1978–1991 (published by the NBS) into quarterly data by averaging annual figures, and then employing estimation results from Abeysinghe and Rajaguru (2004) for growth rates of real GDP (year-on-year) over 1978Q1–1991Q4 to derive the quarterly real GDP series. The nominal and real GDP series of quarterly frequency are then used to obtain the GDP deflator series.

Note that the methodology in Abeysinghe and Rajaguru (2004) is effectively the Chow–Lin estimation method in the spirit of Chow and Lin (1971). The basic idea is to find the GDP-related quarterly series and derive a forecasting equation by running a regression of annual GDP on annual related series. Quarterly figures of the related series are used to forecast the quarterly GDP series which are adjusted to match the annual aggregates. The estimated quarterly real GDP series based on this method appears to match the officially published annual data quite convincingly.

Using the GDP deflator series over 1978Q1–2009Q4, we then calculate the year-on-year growth rate of the underlying series and obtain the corresponding GDP deflator inflation (i.e. $\pi_t = (P_t/P_{t-4} - 1) * 100$), where π_t denotes GDP deflator inflation and P_t denotes the GDP deflator series. The resultant quarterly GDP inflation series is depicted in Fig. 1.

The plot of the time series data in Fig. 1 suggests that since the commencement of economic reforms in the late 1970s, inflation in China witnessed its first distinct increase during the period 1979–1981, followed by spikes in 1983 and 1985. The two most striking peaks occurred in the late 1980s and the middle 1990s. Since the late 1990s, however, inflation in China has been relatively low and stable, even witnessing three years of deflation (1997–2000). Despite the two notable peaks of inflation occurring in 2004–2005 and 2007–2008 due to transitory demand shocks (e.g. shock to real estate market) and supply shocks (e.g. shock to food and energy prices) respectively, the most recent decade may be characterized as a low inflation era.

The evolution of the GDP deflator inflation over the past three decades reflects the corresponding historical changes in the mechanism of price formation in China, accompanied by changes in monetary policies. To be specific, it is well known that prices of most commodities in China were administered by government agencies and changed infrequently until the end of the 1970s. Since the start of economic reforms in 1978, however, the government-set prices were gradually liberalized. In particular, the central government of China officially initiated a so-called "adjustment and reform" policy in 1979, in order to promote quicker growth in the industrial and agricultural sectors. It was under this background that the old system of administered prices was increasingly liberalized. Consequently, prices of both agricultural products and industrial products increased considerably in the early 1980s, which inevitably passed through the production chain and generated high inflation.

In conjunction with growing inflation, the growth rate of real output in the early 1980s was also accelerating. Countercyclical macro policies, however, were not implemented in a timely and effective manner. Despite a transitory drop in 1982, growth rates of both M2 and domestic credit in China exhibited an upward trend in late 1982, with unprecedented accommodative levels of 40% in 1985 and nearly 50% in 1986. As a result, there was evidence of overheating, with inflation peaking in 1985–1986. The tightening of credit controls in 1986 dampened inflation, but it was effective for only a very short period of time. Due to further liberalization and deregulation of prices in 1987, inflation rebounded to a high of 25% in 1988. In response to the extraordinary inflation, the central government tightened money and credit supply and reduced fixed investment substantially. These tighter monetary policy conditions towards the end of the 1980s successfully curbed inflation.

Although the tightening macro policy in the late 1980s had the effect of cooling down inflation (and economic growth), it proved to be too constrictive. Due to the strict credit control in 1988 and 1989,

[1] Note that 1997 is chosen as the base year because growth rates of nominal and real GDP for 1997 are roughly the same. This choice is also consistent with the treatment in Abeysinghe and Rajaguru (2004), whose results are used to obtain quarterly real GDP series for China over 1978–1991 in the present paper.