HONG KONG INSTITUTE FOR MONETARY RESEARCH

INFLATION TARGETING IN CHINA?

Shu-ki Tsang

HKIMR Working Paper No.19/2002

October 2002

Inflation Targeting in China?

Shu-ki Tsang*
Hong Kong Baptist University
Hong Kong Institute for Monetary Research

October 2002

Abstract

This paper looks at the possibility of applying inflation targeting as a policy in China. It argues that despite the appeal of discipline, there is a host of problems concerning the feasibility and optimality of such a policy. Difficulties abound in the transmission mechanisms involving intermediate variables, the reforming and constantly changing institutional setup, uncontrollable price components, regional diversities, as well as the country's multiple objectives in its development strategy. An FCI is proposed instead as a "focus of nominal attention" that may induce behavioural changes in the government agencies and the market participants.

* Tel: (852) 3411 7544/7548, Fax: (852) 3411 5580, Email: sktsang@hkbu.edu.hk, Homepage: www.hkbu.edu.hk/~sktsang

An earlier version of the paper was presented at the *Conference on Monetary and Financial Issues in Asia*, organised by the City University of Hong Kong and the HKIMR, 14 December 2001. The author wishes to thank Ben Fung of the Bank for International Settlements, the discussant of the paper at the Conference, other participants as well as an anonymous referee for useful comments. All remaining deficiencies, omissions and errors are his own.

1. Introduction

Inflation targeting as a policy was pioneered by New Zealand slightly more than a decade ago. It has since spread to Sweden, Australia, Canada, U.K., and more recently to South Korea and Thailand.

It represents a shift of policy emphasis from intermediate variables (e.g. money supply, interest rate, exchange rate) to final monetary outcomes, including inflation (Svensson, 1999), nominal income (e.g. Bean, 1983; Taylor, 1985; McCallum and Nelson, 1999), and monetary or financial conditions index (MCI/FCI) (Artis, Mizen and Kontolemis, 1998).

What does inflation targeting mean? It is basically a choice of inflation as the most important monetary outcome/nominal anchor (over other choices such as nominal income and MCI/FCI). Operationally it requires formal commitments by the monetary authority: declared targets and bands of inflation, inflation forecasts, announced plans to achieve the inflation goals, increase in the transparency of central banking operations etc. (Miskin, 2000).

The major merits include directness and transparency (Svensson, 1999), like the convertibility undertaking under a currency board, although I would argue that it is less committal than the latter. Potential problems include multiple objectives of the authorities, unclear transmission mechanisms from intermediate variables to final monetary outcomes, and underdevelopment of financial markets especially in developing economies (Masson, Savastano, Sharma, 1997). In other words, inflation targeting may not be optimal or feasible, for some countries at least.

2. Is Inflation Targeting Suitable for Transition Economies Such As China?

A prime appeal is that inflation targeting would impose discipline on monetary, fiscal, as well as other economic policies of a reforming economy. That may be important to a developing or transition economy, just like what could result from a currency board system (for some East European countries).

However, inflation targeting seems to many to be a non-starter for China. First, inflation has not been a problem in recent years. Deflation has been the problem, as Chart 1 shows. However, the question is for how long will it remain so.

Second, the People's Bank of China (PBoC) is mandated by law with the multiple objectives of growth and stability. Third, the soft peg since 1994, around RMB8.20-8.70/U.S.$, seems to have been serving China well; and floating is hardly a pressing option without the full convertibility of the Renminbi. McKinnon (2001) also argues that a fixed exchange rate system is a preferred condition for establishing a long-term capital market and overcoming the "original sin" that has stifled the borrowing capability of so many third world countries.

Moreover, there is a lack of monetary instruments to effectively and directly influence the price level in China. Structural problems of a transition economy imply price variations not just a monetary phenomenon: institutional, fiscal and distributive issues (Tsang, 1990, 1991a). And keeping a stable and low inflation rate may not be consistent, or may even be in conflict, with the overall multi-facet development strategy.[1] Anyway, inflation targeting should be symmetrical. Monetary reflation is required in face of deflation. Since 1997-98, China has been caught in deflation doldrums, which some would regard as a modern "liquidity trap", even for broad money, a là Krugman (Chen, 2001). The government tried various measures to stimulate investment and consumption to keep real GDP growth in the 7%-8% range.

So targeting a positive inflation (through unconventional, or even "irresponsible" monetary policy (Krugman, 1998)) may be a desirable policy goal. However, monetary loosening and related measures (continual interest rate cuts, interest tax, saving depositor identification etc.) by the Chinese government have not been very effective in reflating.

Most central banks would incorporate the targeting of inflation as one of its goals, if not the only goal. This arises from the need to have a nominal anchor for the economy, which include (1) the money supply; (2) the exchange rate; (3) the interest rate; or (4) the inflation rate. The nominal anchor is important for economic agents (consumers, investors, the government) to operate and plan ahead at the micro level, in lieu of real information which is often macro in nature.

The inflation rate is arguably the most important nominal anchor as it directly bridges the micro and the macro levels, because it is the "deflator". The (floating) exchange rate is the cross-border deflator and the interest rate is the present value discount deflator.[2] But in some countries the inflation rate may be the crucial factor in that it dominates the other two variables.

Hence it may pay to have an explicit inflation target for the monetary authority, in the sense that the exchange rate and the interest rate become intermediate instruments and the inflation rate the "final" outcome.

Given the fact that China is in a process of profound institutional and structural transformation, can a case be made that the Chinese monetary authority should target monetary outcome directly instead of relying on intermediate variables as policy instruments?

---

1 For example, an open economy development strategy may incur the Balassa-Samuelson effect. A higher inflation rate seems to be the inevitable cost. This is the case for East European countries (including currency board regimes such as Estonia and Bulgaria) aspiring to join the euro-zone. Of course, as Amato and Gerlach (2001) argue, the effect may simply justify a higher inflation target in emerging market economies. The problem is that the estimation of the "inflation premium" could be a problem of controversy, e.g. that between the European Central Bank and East European currency board regimes (see UNECE, 2001). In the case of China after WTO accession, technical difficulties may compound for any econometric attempts.

2 There is a relatively large literature on interest rate targeting since Barro's (1989) paper. See for example Rudebusch (1995) and Balduzzi, Bertola, Foresi and Klapper (1998).

3. The Hazards of Using Intermediate Variables in China

Let us look first the problems associated with macroeconomic control or fine-tuning through intermediate variables in China.

Money supply targeting since 1996 has apparently been a case of failure, as indicated by Table 1, i.e. the discrepancies between targets and actual growth rates of M1 and M2 (Xia and Liao, 2001).

The failure of monetary targeting should not be strange given the soft peg. In other words, monetary targeting is in serious conflict with the quasi-fixed exchange rate regime. No wonder the monetary base has moved erratically: +14% in 1997; -2.3% in 1998; and +7.3% in 1999 (Xia and Liao, 2001, p.36). Moreover, both the money supply and money demand functions are subject to a lot of unstable influences. As Wen and Xu (2001) argue, the money supply has become increasingly "endogenised" in China. Tsang (1991b) has explored other reasons for the endogeneity of the money supply in China in earlier years.

The utilisation of the interest rate as an instrument also poses difficulties. Interest rates have been liberalised in the past few years, thanks to the rapid increase in government securities, which provide banks with interbank liquid funds and the PBoC an instrument to perform open market operations (Xie, 2000). The interbank interest rates could potentially serve as benchmarks for deposit and lending rates. However, various problems exist. (1) The public securities market is segmented. (2) The yield curve is not complete (Zhou, 2001). One of the reasons is the practice by the Chinese Ministry of Finance to issue chunks instead of slices of bonds. (3) There are conflicts between fiscal and monetary considerations, e.g. that of minimising cost of funding and that of controlling inflation. Hence interest rates cannot be used for effective monetary control.

Moreover, the relationship between interest rate and monetary outcome may be "perverse" given the particular financial structure in China where a troubled banking sector coexists with an unstable equity market. Because of the difficulties in the reforms of state-owned enterprises, the lowering of interest rates has an uneven impact on productive investment (weak) and the stock market (strong). This is captured in a stylised model of Xia and Liao (2001) along the line of Barro and Gordon (1983):

$$L = a_1(\pi - \pi^*)^2 + a_2(E - E^*)^2 \qquad 0< a_1, a_2 <1 \qquad (1)$$

$$E = a_3(\pi - \pi_e) - a_4(i_m - i_e) \qquad 0< a_3, a_4 <1 \qquad (2)$$

$$i_m = a_5\pi + a_6 r_s \qquad 0< a_5, a_6 <1 \qquad (3)$$

$$r_s = a_7 CHIBOR^{-1} \qquad 0< a_7 <1 \qquad (4)$$

L represents the social loss function. π^* and E^* are the optimal inflation rate and full employment rate whereas π_e and i_e are the expected inflation rate and equilibrium interest rate. $CHIBOR$ is the Chinese interbank offered rate and r_s the expected rate of returns in the stock market.

Substituting equations. (2), (3) and (4) into (1), re-arranging and minimising social loss, the first order condition that shows

$$CHIBOR = (a_4 a_5 a_6)/[(a_3 - a_4 a_5)\ \pi + a_4 i_e - a_3 \pi_e - E^*]$$

Assuming $(a_3 - a_4 a_5) > 0$, and other simplifications, Xia and Liao (2001) arrive at the ironical conclusion that to minimise social loss, *CHIBOR*, which represents the opportunity cost (or funding cost) of playing in the stock market for institutional investors, has to be increased in face of declining inflation rate!

There are complex institutional factors leading to this unusual phenomenon. The continuing weak performance of the state-owned enterprises (SOEs), which have taken the lion's share of loans, has led to a rather cautious attitude by the big banks in recent years, particularly as they have been under tremendous pressure from the central bank to deal with their bad debts and improve their balance sheets. They are also wary of lending to the agricultural sectors which have been facing shrinking demand in recent years, as well as the small- and medium-sized enterprises without government backgrounds. Hence, there has been a lack of profitable lending opportunities and a tightening in credit has occurred.[3]

In contrast, lending to institutions and other speculators to invest in the stock market is usually liquid and collateralised. In many cases, it may represent a better alternative than lending to an enterprise for a risky productive investment project whose viability and ultimate returns would not become clear in the short run. The stock market itself is however not an effective avenue for raising funds for the economy. The number of stocks, slightly more than 1,000, is limited; and the listing and issuance of new shares are under rather restrictive regulations and subjected to a good deal of bureaucratic interference. Total market capitalisation now represents only about 50% of China's GDP, which is far below the level of many countries and economies. Because of the limited supplies, price volatility tends to be very high in China's stock market.

Let us go back to the model. Given the institutional peculiarities, the key is the stock market and its expected return r_s, which drains funds from productive investments under China's idiosyncratic financial environment, as testified by Chart 3. The contrast between retail deflation and financial asset inflation has been dramatic. The Xia and Liao (2001) model is of course a relatively simple one and can be criticised from various angles, but its findings are quite consistent with the observable facts in China. As Charts 2 and 3 show, productive investment has been weakening and stock prices far exceeded retail prices in recent years.

4. The Operational Difficulties of Inflation as a Target in China

Is the inflation rate a suitable nominal "outcome" anchor for China? Potential operational problems are: (1) unpredictable and uncontrollable components; and (2) regional diversities.

---

3 Another indication of the conservatism of the banks is the low volume of trading in state and monetary bonds in the interbank market in China. In 2001, the turnover rate of even "active" state bonds in the interbank market was only 1/10 to 1/6 of that in the centralised exchange. Despite the relatively low yields, banks (and other financial institutions) are treating bonds as high-quality assets to obtain stable returns instead of liquidity instruments.

According to a survey, food (excluding tobacco, beverage and liquors) accounted for 42.04% of the expenditure of an average urban household in 1997. And in the period of January 1994 to September 2001, the standard deviation of the retail inflation (year on year) in 36 major cities was 8.36%, while that of food (excluding tobacco, beverage and liquors) was 13.80%. The predictability and controllability of the RPI are thus in doubt.

Regional diversity in China is also a problem. Ma and Tsang (1999) found that China might not be an optimum currency area (OCA) in 1978-95. In other words, a unified currency for China was not optimal. Nevertheless, high frequency (monthly) data in 1994-2001 show a mixed picture. Regional dispersion in retail and consumer inflation rates among China's provinces and municipalities under central control has exhibited signs of decline, as shown in Charts 4 and 5 based on annual and monthly price data. The coefficients of variation were small anyway. These results are about "snap shot" regional dispersion over time.

The results of the variance analysis and the principal decomposition exercise presented in Tables 2 and 3, consistent with the methodology of OCA research, however are mixed (Tsang, 2002b). Two methods are used, given the constraint of Chinese data: (1) variance analysis; and (2) principal decomposition exercise.

The first looks at regional standard deviation against the national average. The second investigates how the regions react to a common shock, either in a symmetric (positive) or asymmetric (negative) manner, using the methodology of Caporale (1993) extended by Ma and Tsang (1999). The results are about dispersion across regions, within the specified time period.

Regarding the empirics of prices in China, variance seems to be on the decline, when we compare the divergence of regional standard deviations from the Chinese national average in the two tables, between 1985-1999 (Table 2) and January 1994-October 2001. But as shown in Table 3 (that also presents the results of responses to common price shocks), 9 out of 29 Chinese regions still reacted in a negative/asymmetric manner, casting doubt on their membership of a Chinese OCA even given the most recent high frequency (monthly) data.

This means that a unified monetary policy that aims at an inflation target might not be effective over the regions, even from an operational viewpoint. Such an interpretation of the results of the principal components exercise has to be set against the proviso given in Tsang (2002b), and implied by McKinnon (2001) about the two Mundell's models (1961 versus 1973a, b).

In any case, what is the implication for macroeconomic policy in a situation of regional diversity? It simply means that monetary policy (including inflation targeting) is insufficient as a tool. From the perspective of the literature in monetary union (Tsang, 2002a), what is need is either deep capital and credit markets (like in the U.S.) or effective fiscal transfer mechanisms (like in Australia) that smooth out regional divergence, both of which are lacking in China. Nevertheless, with further economic development and integration among Chinese regions in the future, a long-run trend of closer convergence may unfold.

5. Expectations and Price Asymmetry

One economic "puzzle" in China is that tight monetary policies were effective in bringing down inflation from mid-1993 onwards, but loose monetary policies were notably less effective in pushing up inflation and demand. Other than a possible "liquidity trap", there are institutional factors at work. The deepening of the reforms into state-owned enterprises, housing, social welfare, medical care and retirement benefits has led to a significant change in people's expectations (Chen, 2001).

They are reluctant to spend much now for the fear of higher future outlays and/or job and income insecurity. This is despite the fact that the saving rate in China is already the highest in the world. Hence the government has to resort to a combination of fiscal, monetary and income policies to boost demand, as well as "innovative methods" like 5-day workweek, long holidays for key occasions and promotion of service consumption such as domestic tourism.

6. An FCI for China

In any case, one might argue that the PBoC does need a nominal anchor and operates in a more transparent and rule-based manner. Instead of inflation targets, with all the problems discussed, it may be useful for the PBoC to compile a suitable financial conditions index (FCI) for China, with three or four components:[4]

(1) the inflation rate;
(2) the interest rate (interbank rate and/or market bond yield);
(3) the exchange rate;
(4) the stock market index.

Monetary conditions indexes (MCIs) have been compiled by a number of countries including ones that have adopted explicit inflation targeting, e.g. Canada (see www.bankofcanada.ca/en/backgrounders).

The main difference between MCIs and FCIs is that the latter also incorporate indicators about the financial markets, typically the stock market. Weights are assigned according to the relative effects of the variables on aggregate demand (e.g. the Canadian weights to the interest rate and the exchange rate are 3:1 in its MCI).

In the case of China, given the peculiar role that the stock market plays, it may be justified to have an FCI instead of an MCI. The FCI or MCI can be used as an indicator or an operational target. "However, problems with the use of MCI... (have) been increasingly recognised, primarily because the exchange

4 This somewhat unconventional formulation is in response to a comment by a participant in the conference that all the components in my original paper were "asset prices" (as I excluded the inflation rate, following international "good practices"). As an indicator that concentrates the attention of the authorities, I do not see why the inflation rate cannot be included in an FCI for China. However, I leave the choice of the final components as well as their relative weights open. It is something to be studied, and probably monitored and modified over time, by the PBoC and other government departments.

rates are affected by a variety of factors in addition to monetary policy actions." (HKMA, 2000). Artis, Mizen and Kontolemis (1998) also discuss the advantages and disadvantages of using an index of monetary conditions. New Zealand, for example, has given up compiling and using its MCI (Svensson, 2001).

In any case, for the Chinese economy still in a process of reforms and gradually relaxing capital controls, the exchange rate is arguably also an important policy instrument or operational target.

Should the FCI be used as an indicator or an operational target in China? Because of all the problems with using intermediate variables and targeting final monetary outcomes that I described above, I guess that the benefits for using the FCI as an indicator first, before committing to any bandwidth of the index, would outweigh the cost and risk. Instead of serving directly as a "nominal anchor", it actually serves as a "focus of nominal attention".

It is highly likely that the FCI has to be changed and improved in the light of the developments in the Chinese economy. The FCI is meant to be an indicator that induces policy adjustments and responses from not just the monetary authority - the PBoC, but also the Ministry of Finance and other government agencies. They have to modify their behaviour and rules of operation. Market participants will have to adapt to the more transparent environment as well. Without a focus, these government agencies might just continue with their own idiosyncratic operational patterns; and market participants will be submerged in informational uncertainty.

A transition period commensurate with the progress of the economic reform is obviously necessary before an informed decision can be made on the question of whether and when it is advisable to turn the FCI from an indicator to a target.

7. Conclusion

Based on the above empirical and policy considerations in the context of the Chinese economy, inflation targeting is presently not a viable or optimal choice for China. In the long run, there should hopefully be a convergence of regulatory and market behaviour. A clearer and more effective monetary rule may emerge, and it will then be worthwhile to revisit the issue.

References

Amato, Jeffery D. and Stefan Gerlach (2001), "Inflation Targeting in Emerging Market and Transition Economies: Lessons after a Decade," HKIMR Working Paper No.13/2001.

Artis, M, P. Mizen and Z. Kontolemis (1998), "Inflation Targeting: What Can the ECB Learn from the Recent Experience of the Bank of England?" *The Economic Journal*, 108: 1810-25.

Balduzzi, P., G. Bertola, S. Foresi, and L. Klapper (1998), "Interest Rate Targeting and Dynamics of Short-Term Interest Rates," *Journal of Money, Credit and Banking*, 30: 26-50.

Barro, Robert (1989), "Interest Rate Targeting," *Journal of Monetary Economics*, 23: 3-20.

Barro, Robert and David B. Gordon (1989), "A Positive Theory of Monetary Policy in a Natural Rate Model," *Journal of Political Economy*, 91: 3-20.

Bean, Charles R. (1983), "Targeting Nominal Income: An Appraisal," *The Economic Journal*, 93: 806-19.

Caporale, G.M. (1993), "Is Europe an Optimum Currency Area? Symmetric versus Asymmetric Shocks in the EC," *National Institute Economic Review*, 144: 95-103.

Chen Zhanyun (2001), "On the Application of China's Interest Rate Lever from the 'Liquidity Trap'," *Economic Research Journal*, February, pp. 38-42 (in Chinese).

HKMA (2000), "A Monetary Conditions Index for Hong Kong," Quarterly Bulletin, November, pp. 56-70.

Krugman, Paul (1998), "Japan: Still Trapped," online article posted on author's page, http://www.wws.princeton.edu/~pkrugman/japtrap2.html.

Ma, Yue and Shu-ki Tsang (1999), "Do China and Hong Kong Constitute an Optimum Currency Area?" mimeo.

Masson, P.R., M.A. Savastano, and S. Sharma (1997), "The Scope for Inflation Targeting in Developing Countries," IMF Working Paper WP/97/130.

McCallum, Bennett and Edward Nelson (1999), "Nominal Income Targeting in an Open Economy Optimising Model," *Journal of Monetary Economics*, 43: 553-78.

McKinnon, R. (2001), "After the Crisis, the East Asian Dollar Standard Resurrected: An Interpretation of High Frequency Exchange Rate Pegging," HKIMR Working Paper No.4/2001.

Miskin, F (2000), "Inflation Targeting in Emerging Market Countries," National Bureau of Economic Research, Working Papers No.7816.

Mundell, R. (1961), "The Theory of Optimum Currency Areas," *American Economic Review*, 51: 657-65.

Mundell, R. (1973a), "Uncommon Arguments for Common Currency," in H.G. Johnson and A.K. Swoboda (eds.), The Economics of Common Currencies, Allen & Unwin, pp. 114-32.

Mundell, R. (1973b), "A Plan for a European Currency," in H.G. Johnson and A.K. Swoboda (eds.), The Economics of Common Currencies, Allen & Unwin, pp. 143-72.

Rudebusch, Glenn D. (1995), "Federal Reserve Interest Rate Targeting, Rational Expectations and the Term Structure," *Journal of Monetary Economics*, 35: 245-74.

Svensson, Lars E.O. (1999), "Inflation Targeting as a Monetary Policy Rule," *Journal of Monetary Economics*, 43: 607-54.

Svensson, Lars E.O. (2001), "Independent Review of the Operation of Monetary Policy in New Zealand: Report to the Minister of Finance," February, http://www.rbnz.govt.nz/monpol/review/index.html.

Tsang, Shu-ki (1990), "Controlling Money During Socialist Economic Reform: The Chinese Experience," *Economy and Society*, 19: 217-42.

Tsang, Shu-ki (1991a), "Is the Quantity Theory of Money Relevant to China," posted on author's web page, http://www.hkbu.edu.hk/~sktsang.

Tsang, Shu-ki (1991b), "The Endogeneity of the Money Supply in China: An Empirical Test," BRC Paper Series CS91008, Hong Kong Baptist College; also posted on author's web page, http://www.hkbu.edu.hk/~sktsang.

Tsang, Shu-ki (2002a), "From "One Country, Two Systems" to Monetary Integration?" HKIMR Working Paper No.15/2002.

Tsang, Shu-ki (2002b), "Optimum Currency Area for Mainland China and Hong Kong? Empirical Tests," HKIMR Working Paper No.16/2002.

Taylor, John B. (1985), "What Would Nominal GNP Targeting Do to the Business Cycle?" *Carnegie-Rochester Series on Public Policy*, 22: 61-84.

UNECE (United Nations Economic Commission for Europe) (2001), "Economic Transformation and Real Exchange Rates in the 2000s: The Balassa-Samuelson Connection," Economic Survey of Europe, No. 1, Chapter 6; downloadable from http://www.unece.org/ead/pub/011.

von Hagen, J. and M.J.M. Neumann (1994), "Real Exchange Rates within and between Currency Areas: How Far Away Is EMU," *Review of Economics and Statistics*, 126: 236-44.

Wan, Jieqiu and Xu Tao (2001), "The Endogeneity of Money Supply and the Efficiency of Monetary Policy," *Economic Research Journal*, March, pp. 40-5 (in Chinese).

Xia, Bin and Liao Qiang (2001), "Money Supply Is No More Suitable to be Taken as an Intermediary Goal of Monetary Policy in Present China," *Economic Research Journal*, August, pp. 33-43 (in Chinese).

Xie, Duo (2000), "The Conduct of the Open Market Operations and the Shift of Monetary Policy Instruments," *Economic Research Journal*, May, pp. 31-38 (in Chinese).

Zhou, Chengyue (2001), "PRC Government Securities Market: Reform and Development," Seminar on "China's Government Securities Market in the New Century", jointly organised by the Chinese Ministry of Finance, the Hong Kong Monetary Authority, and the World Bank, 19-20 November, Hong Kong.

Table 1: Targets and Actual Outcomes of Money Supply in China

	M1		M2	
	Target (%)	Actual (%)	Target (%)	Actual (%)
1996	18	18.9	25	25.3
1997	18	16.5	23	17.3
1998	17	11.9	16-18	15.3
1999	14	17.7	14-15	14.7
2000	14	16.0	14	12.3

Table 2: Variance Analysis of Annual Consumer Inflation Rates of 31 Regions of Mainland China: 1985-1999

	Standard Deviation	%
Beijing	7.20183	(-7.6)
Tianjin	7.14495	(-8.3)
Hebei	7.59895	(-2.5)
Shanxi	8.12294	(+4.2)
Inner Mongolia	7.23054	(-7.2)
Liaoning	7.58141	(-2.7)
Jilin	6.88741	(-11.6)
Heilongjiang	6.73242	(-13.6)
Shanghai	7.41358	(-4.9)
Jiangsu	8.09019	(+3.8)
Zhejiang	8.43098	(+8.2)
Anhui	8.09748	(+3.9)
Fujian	9.01376	(+15.7)
Jiangxi	8.43222	(+8.2)
Shandong	7.28668	(-6.5)
Henan	8.41227	(+8.0)
Hubei	8.21113	(+5.4)
Hunan	8.69503	(+11.6)
Guangdong	10.19353	(+30.8)
Guangxi	9.64259	(+23.7)
Hainan	10.97083	(+40.8)
Sichuan	8.11725	(+4.2)
Guizhou	7.97265	(+2.3)
Yunnan	7.77936	(-0.2)
Shaanxi	8.20216	(+5.3)
Gansu	7.92466	(+1.7)
Ningxia	6.89820	(-11.5)
Xinjiang	7.47776	(-4.0)
Mainland China	7.79257	
Hong Kong	3.86385	(-50.4)

Notes: The figures in parentheses represent the percentage divergence of the standard deviation from China's national average (excluding HK). Due to data problems, Chongqing, Tibet and Qinghai are not included in this analysis.

Table 3: Variance and Principal Components Analyses of Monthly CPI Changes of 31 Regions of Mainland China and Hong Kong: Jan 1994 to Oct 2001

	Standard Deviation	%	Shocks Decomposition		
			Symmetric	Asymmetric	Total
Beijing	8.32052	(-9.3)	51.94	48.06	100.00
Tianjin	8.91273	(-2.8)	44.21	55.79	100.00
Hebei	8.69736	(-5.1)	88.92	11.08	100.00
Shanxi	9.56989	(+4.4)	57.15	42.85	100.00
Inner Mongolia	8.68264	(-5.3)	62.49	37.51	100.00
Liaoning	9.15874	(-0.1)	21.34	78.66	100.00
Jilin	8.22365	(-10.3)	15.91	84.09	100.00
Heilongjiang	8.87036	(-3.2)	57.11	42.89	100.00
Shanghai	9.02286	(-1.6)	35.91	64.09	100.00
Jiangsu	8.74842	(-4.6)	37.90	62.10	100.00
Zhejiang	9.11258	(-0.6)	58.06	41.94	100.00
Anhui	9.73434	(+6.2)	26.91	73.09	100.00
Fujian	9.48341	(+3.4)	66.62	33.38	100.00
Jiangxi	10.04992	(+9.6)	70.02	29.98	100.00
Shandong	9.02014	(-1.6)	33.50	66.50	100.00
Henan	10.02207	(+9.3)	62.86	37.14	100.00
Hubei	10.33905	(+12.8)	44.39	55.61	100.00
Hunan	9.79174	(+6.8)	84.40	15.60	100.00
Guangdong	8.32534	(-9.2)	64.90	35.10	100.00
Guangxi	10.69942	(+16.7)	66.88	33.12	100.00
Hainan	10.07712	(+9.9)	37.59	62.41	100.00
Sichuan	9.45067	(+3.1)	77.76	22.24	100.00
Guizhou	9.53190	(+4.0)	69.75	30.25	100.00
Yunnan	8.78699	(-4.2)	53.01	46.99	100.00
Shaanxi	10.41146	(+13.5)	75.92	24.08	100.00
Gansu	9.77560	(+6.6)	65.77	34.23	100.00
Qinghai	8.45225	(-7.8)	62.26	37.74	100.00
Ningxia	9.10428	(-0.7)	66.63	33.37	100.00
Xinjiang	10.26641	(+12.0)	58.34	41.66	100.00
Mainland China	9.16951				
Hong Kong	4.76923	(-48.0)	40.26	59.74	100.00

Notes: The figures in parentheses represent the percentage divergence of the standard deviation from China's national average. Due to data problems, Chongqing and Tibet are not included in the analyses.

Chart 1

Chart 2

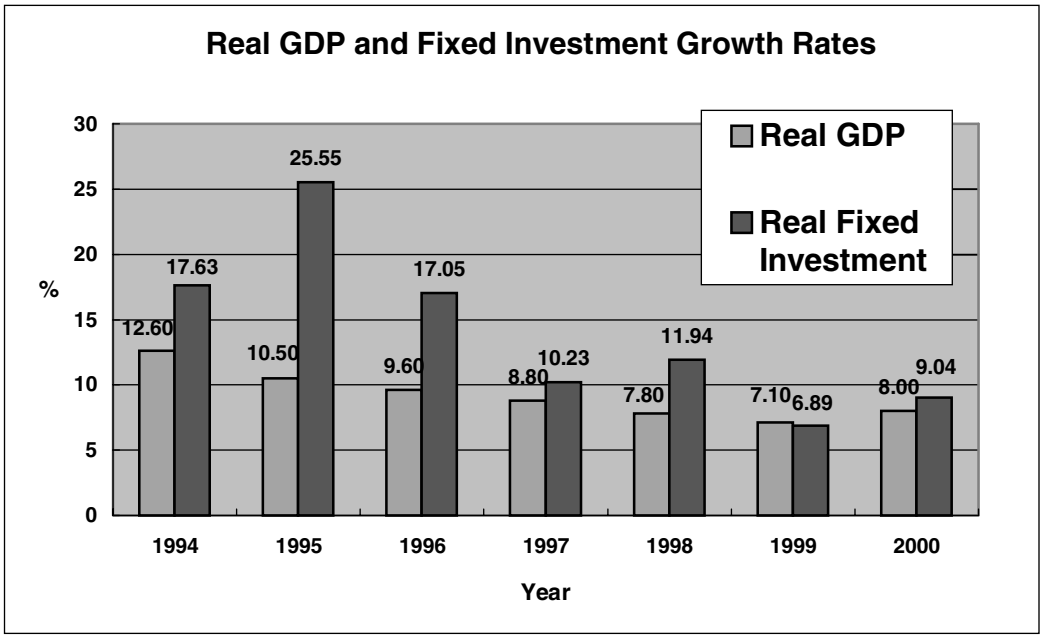


Chart 3

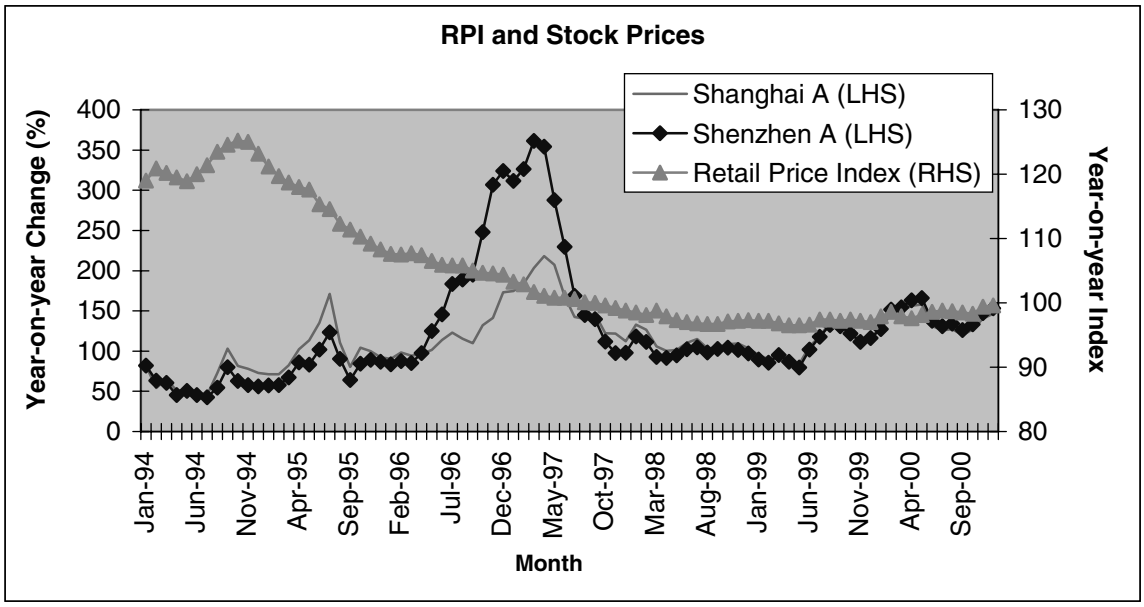


Chart 4

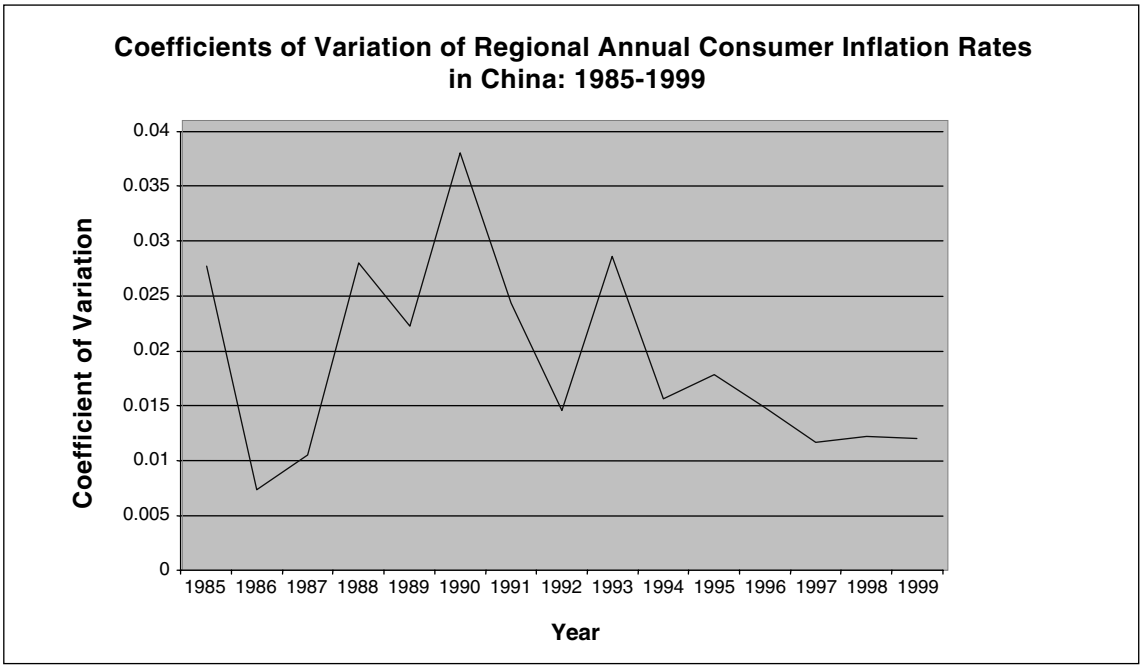
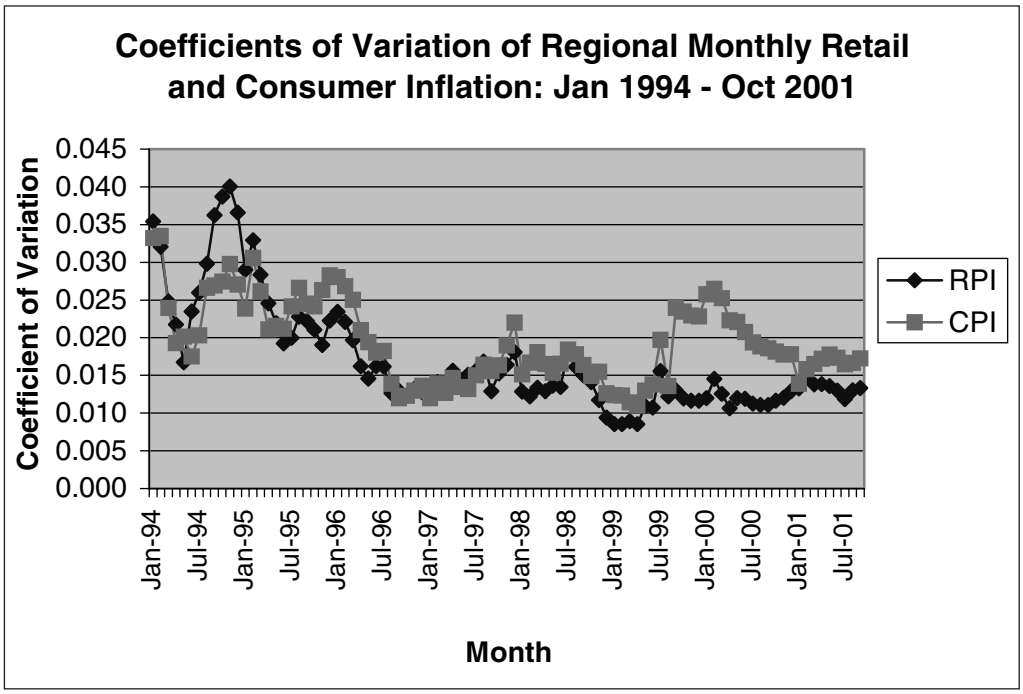


Chart 5


Coefficients of Variation of Regional Monthly Retail and Consumer Inflation: Jan 1994 - Oct 2001
Coefficient of Variation
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Jan-94
Jul-94
Jan-95
Jul-95
Jan-96
Jul-96
Jan-97
Jul-97
Jan-98
Jul-98
Jan-99
Jul-99
Jan-00
Jul-00
Jan-01
Jul-01
Month
RPI
CPI