The Urban-Rural Differences of Inflation in China

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Abstract For many years, the duality of Chinese economy has segregated the urban and rural markets, and caused urban-rural price differences. With the transition to market economy, the differences between urban and rural price indexes have been reducing, and the price gap shrinking. In the context of rural and urban integration, this shall be a medium- and long-term trend in China. In examining the factors determining the price index differences, the paper found that prior to 1995, policy changes have been the major factor. Afterwards, factors such as urban-rural retail sales of consumer goods, degree of urbanization, and fixed asset investment can explain a significant part of such differences. In addition, there exist notable regional differences in urban-rural CPI gap, which can largely be explained by provincial level per capita GDP, GDP gap and ratio of urban-rural retail sales.

Key Words: dual economy, inflation, regional difference

The Law of One Price specifies that under a perfect market economy, the prices of a commodity should be equal in different countries, given transportation costs, trade barrier and information costs.[1] Accordingly, market segregation will lead to different prices in different regions, and if so, the profit-seeking behavior of market participants will bring the prices in different regions to the same level. Most of the previous studies have focused on the application of the Law of One Price in different countries (Engel & Rogers, 1996), while a few on the law in different cities of one country (Cecchetti, *et. al.*, 2002). Relevant studies on China are few, and Fan & Wei (2003) is one of them which examined price differences of 36 cities in China. Even fewer studies explored price differences between urban and rural areas partly due to data availability (Fu, 2008).

Urban-rural price differences in China calls for more attention, especially in light of the transformation of pricing mechanisms over the past three decades and the

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[1] "New Palgrave Dictionary of Money & Finance" (Chinese translation), Vol. II, p546. Economics Publishing House, Beijing.

enlarging urban-rural gaps in income and growth. Since 1978, China has been transforming from a planned economy to a market economy, at the core of which is pricing mechanism reform. Specifically, China has reformed the planned pricing mechanisms, and established a market-oriented pricing mechanism. Prior to 1978, the prices of 97% commodities and services were determined by the government. By the end of 2007, the prices of 95.6% of retails, 97.1% of agricultural procurement and 92.4% of production material sales are determined by the market (NDRC, 2008). This means that the market has become the main force in resource allocation.

With the deepening of reform, the differences between urban and rural[2] pricing level have also varied[3]. Prior to 1978, the urban-rural price differences are limited as most prices were determined by the government. In the following 15 years, the inflation indexes in the urban areas had been higher than those of the rural areas, meaning that the urban price level increases at a faster pace. Starting 1994, especially after China joined WTO in 2001, rural price indexes have been higher than those in the urban areas, indicating reduced urban-rural price differences.

This paper intends to examine the changes of urban and rural prices, explore the reasons for urban-rural inflation gaps, and provide relevant policy recommendations. The paper is organized as follows. The first section describes the changes and trends of urban and rural inflation indexes, showing that the rural-urban integration has reduced the urban-rural price differences. The second section analyzes the factors for the national and provincial level gaps for urban-rural price indexes. The third section projects the future trends of urban-rural price differences, and provides policy suggestions.

I. Changes of Urban-rural Inflation Differences

Inflation is measured by price indexes. The National Statistics Bureau (NSB) compiles consumer price index (CPI) and retail price index (RPI) to reflect price changes of

[2] In compiling the urban and rural price indexes, urban means provincial-level cities and cities, and rural means counties and administrative regions below counties.

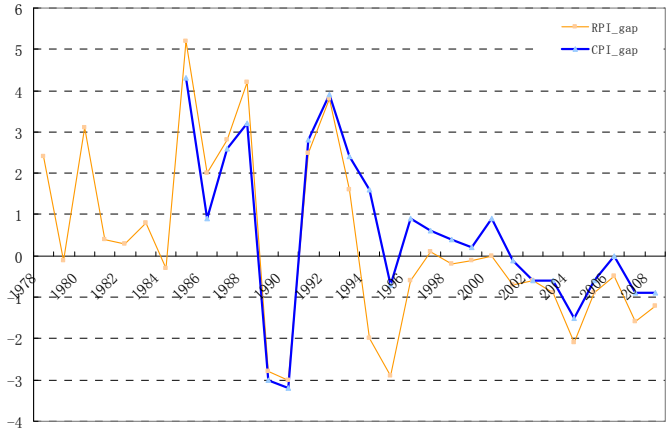
[3] For simplicity, the price level mentioned in the paper is nominal price, not purchasing power parity after taking into consideration of quality of commodities and services as well as income differences.

consumption goods and services as well as retail sales in a certain period. The main difference between CPI and RPI is that RPI does not include services. Prior to 1978, most of the prices were determined by the government, not reflecting market demand and supply. Starting 1978, China has been transforming to a market economy with a series of major reforms in pricing mechanism, attaching more and more market weight to CPI and RPI.

A. Urban price indexes were higher in the early stage, and rural price indexes are higher in the later stage

Over the period of 1978 and 2008, the average urban price indexes (including both RPI and CPI)[4] are slightly higher than those of rural indexes. The gap between urban and rural price indexes was significant in early years; with the deepening of reform and urban-rural integration, the gap has shrunk. Another notable feature is that urban price indexes were higher than the rural price indexes in the early stages, but lower than rural price indexes in the later years (figure 1).

Figure 1. Urban-rural price index differences (1978-2008)



Source: CEIC, author's calculation

During 1978-2008, the average urban RPI was 104.99, higher than that of rural RPI (104.77). The year 1994 is the watershed year for the urban-rural RPI gap. In the 16 years between 1978 and 1993, rural RPIs were only higher than urban RPI in 4 years (1979, 1984, 1989 and 1990); afterwards, rural RPIs have been higher than or

[4] The paper uses price indexes published by the National Statistics Bureau, which are year-on-year monthly data, not month-on-month data or month-on-month yearly data.

equal to urban RPI in all other years except 1997. The maximum of urban-rural gap were 5.2 ppt in 1985, and the minimum occurred in 1995 (-2.9 ppt).

During 1985-2008[5], urban CPI averaged 106.9, higher than rural CPI (106.375). The year 2001 is a turning point with CPI changes over the past 24 years. CPI averaged 108.58 prior to 2001, significantly higher than the average afterwards (102.375). Between 1985 and 2000, urban CPI averaged 109.275, 1 ppt higher than that of rural CPI. During the period, rural CPI were higher than urban CPI only in 1989, 1990 and 1995. Starting 2001, rural CPI average (102.8) has been higher than that of urban CPI (102.15).

The urban-rural price index gap and its changes reflected the urban-rural integration process in China. Prior to mid-1990s, urban price indexes were higher than those of rural indexes, showing that the speed of urban price increases had been faster than that of the rural, and the urban-rural price gaps were increasing. With urban-rural integration and the rural income reaching a certain level, such gaps were reducing with rural price index higher than urban price indexes. Note that the higher rural price index did not mean relatively lowered rural living standards to the same degree with regards to urban living standards. To compare the gap between urban and rural real income, we need to take purchasing power parity into consideration (Center for China Economic Research, Peking University, 2006).

While we compare the changes of urban and rural price indexes, we should takes consideration of development stage, institutional set-up, and issues in statistical compilation. For the past 30 years, there has been notable price subsidies or monopoly in certain areas (CASS, 2000), which distorted the sensitivity of quality and quantity of urban and rural commodities and services to demand and supply. However, the price indexes have not been adjusted to reflect such distortions. Besides, there have also been defects in sampling and statistical methods, which have dampened the accuracy of price indexes.

There have been many debates over the residence subcomponent of CPI, especially its weight in CPI and differences in urban and rural contexts. The weight of

[5] China officially started CPI compilation in 1985.

the residence subcomponent in CPI has been mostly lower than 15%, which does not reflect the residents' expenditure structure. Moreover, urban and rural residence expenditures differ significantly in their structure. The residence subcomponent includes material for building and decoration, rent, self-occupancy and utility costs. Material for building and decoration accounts for a large proportion in rural residence price indexes, while rent is the main force in urban residence price indexes (NDRC, 2004). However, rent is calculated based on interest rates on mortgage loans. As interest rates on mortgage loans are relatively stable, rent changes in CPI may differ greatly from actual rent changes. The above shows that the urban and rural residence price indexes may not reflect the accurate changes.

To evaluate the impact of residence price index, the paper constructed a new index excluding the residence subcomponent. The weights of CPI subcomponents varied overtime, but such weights are not publicly available. The paper used subcomponent weights in 2003 CPI obtained, and simulated the weights of CPI subcomponents using urban and rural consumption structure indicators (table 1). The CPI indicator excluding the residence subcomponents demonstrate several interesting features. First, urban CPIs have been lower than rural CPI after 1995. Second, the gap between urban and rural CPI enlarged by an average of 1.03 ppt, and the gap has been increasing overtime. During 2005-2008, the gap has been more than 2 ppt, much larger than the gap of unadjusted urban-rural CPI. We also tried to use consumption weights are CPI weights, and found that after excluding residence subcomponent, the urban-rural gap increased by 0.33 ppt.

Table 1. Impacts of residence on urban-rural CPI differences (1995-2008)

	Urban CPI	Rural CPI	CPI			CPI excl. residence subcomponent		
			Urban	Rural	Gap	Urban	Rural	Gap
1995	112.9	108.6	116.8	117.5	-0.7	116.0	118.0	-1.98
1996	118.4	107.1	108.8	107.9	0.9	107.0	107.3	-0.21
1997	113.0	104.7	103.1	102.5	0.6	100.4	100.5	-0.14
1998	105.0	98.8	99.4	99.0	0.4	97.2	97.2	0.06
1999	103.4	99.9	98.7	98.5	0.2	96.2	96.4	-0.21
2000	106.7	102.8	100.8	99.9	0.9	97.4	97.5	-0.14

	Urban CPI	Rural CPI	CPI			CPI excl. residence subcomponent		
			Urban	Rural	Gap	Urban	Rural	Gap
2001	101.7	100.3	100.7	100.8	-0.1	100.4	100.7	-0.31
2002	99.9	100.1	99	99.6	-0.6	99.0	99.4	-0.43
2003	102.8	101	101	101.6	-0.6	100.7	101.7	-1.03
2004	104.3	105.8	103.3	104.8	-1.5	103.2	104.8	-1.61
2005	105.6	105.2	101.6	102.2	-0.6	100.8	102.9	-2.06
2006	104.7	104.6	101.5	101.5	0	100.8	103.2	-2.42
2007	104.5	104.4	104.5	105.4	-0.9	103.7	107.5	-3.83
2008	104.3	108.2	105.6	106.5	-0.9	104.9	108.0	-3.05

Source: CEIC, author's calculation

B. Shrinking gap between urban-rural price indexes reflects urban-rural integration

For many years, the duality of Chinese economy has caused major urban-rural differences in investment, income and other areas. Moreover, the prices of agricultural products have been lower than their value, while the prices of industrial products have been higher than their value. As a result, there have been unequal exchanges of agricultural and industrial products. Since 1978, major efforts have been made to reform pricing mechanisms. However, as long as the economic duality persists, so are the gaps between urban-rural price level and their changes.

The process of urban-rural price integration should be accompanied by the increase of relative rural income, strengthening of rural infrastructure, and in turn, the reduction of rural information and transaction costs. This will also continue to be a process of China's economic development and urban-rural integration. In the process, the rural price will initially increase slower than the urban price, and then faster than the urban price until the two integrates. And we have observed such changes over the period of 1978-2008. To test whether the differences between urban and rural price indexes are stable, we conducted ADF unit root tests[6] over the urban-rural gaps of

[6] Unit root test use the followings self-regressive model of price differences: $d\pi_t = \mu + \sum \alpha_j \Delta\pi_{t-j} + \varepsilon_t$. In the above formula, $d\pi_t$ stands for the price index differences at time t, μ is a constant, j=1～k and are lag period, ε_t is white noise. The papers uses Eview5 to calculate unit root, and the lag period were selected according to Schwartz Info criteria.

RPI, CPI and their subcomponents[7]. If the results reject the unit root tests, then we can conclude that the urban-rural price index gap are stable, and such gaps will converge to its long-term equilibrium level after a shock. Otherwise, such gaps are random and unstable.

Tables 2 and 3 demonstrate that, except for the residence subcomponent of CPI, the ADF unit root values of all other urban-rural gaps are below the critical value of 1% or 5% confidence interval. This is to say, with the exception of the residence subcomponent of CPI, the gaps of urban-rural RPI, CPI and their other subcomponents reject the unit root test and are stable series.

Table 2. ADF unit root tests of urban-rural gaps of RPI and its subcomponents

	Unit root value	*Critical value (1% confidence interval)*	*Critical value (5% confidence interval)*
RPI	-3.670014**	-3.679322	-2.967767
Food	-4.798003***	-3.679322	-2.967767
Clothing	-3.345526**	-3.67017	-2.963972
Culture	-4.21993***	-3.679322	-2.967767
Fuel	-2.97578**	-3.67017	-2.963972
Medicine and healthcare products	-3.013735***	-3.67017	-2.963972
Miscellaneous	-3.76264***	-3.67017	-2.963972

Note: ** means significant at 5% level, and *** means significant at 1% level.

Table 3. ADF unit root tests of urban-rural gaps of CPI and its subcomponents

	Unit root value	*Critical value (1% confidence interval)*	*Critical value (5% confidence interval)*
CPI	-3.56173**	-3.769597	-3.004861
Food	-4.304978***	-3.769597	-3.004861

[7] Currently, the subcomponents of CPI include food, tobacco & liquor, clothing, household equipment & services, medicare & personal items, transport & communication, entertainment, education & culture, and residence; the subcomponents of RPI include food, clothing, fuel, residence, medicare, culture, entertainment & sports, and miscellaneous items.

	Unit root value	*Critical value (1% confidence interval)*	*Critical value (5% confidence interval)*
Clothing	-3.648615**	-3.769597	-3.004861
Home appliance & services	-4.951995***	-3.808546	-3.020686
Entertainment, education & culture	-3.65226**	-3.752946	-2.998064
Transport & communication	-3.832521***	-3.808546	-3.020686
Residence	-2.104324	-3.769597	-3.004861

Note: ** means significant at 5% level, and *** means significant at 1% level.

To test whether there is a trend of urban-rural market integration and the urban-rural price levels convergence, we adopted an error correction model (ECM) to examine the cointegration between urban and rural CPIs. Without considering the purchase power parity, we treat the year 1978 as the base year and CPI in that year equals 100. The urban price level using 1978 as the base year (ucpi_78) can be obtained from the NSB, and in 1985, the number equals 134.2. To make up for the lack of rural CPI data prior to 1985, we apply the rural RPI for the period of 1978-1985 to simulate the changes of rural CPI. The result shows that the rural CPI using 1978 as the base year (rcpi_78) is 124.

The error correction model has two steps: (1) use cointegrated regression to produce a residual series; and (ii) use the residual series as an independent variable (*ecm*), and apply OLS to estimate its coefficient. The ADF unit root test shows that, the log forms of ucpi_78 and rcpi_78 are stable, and the OLS has produced the following outputs：

$$\ln(ucpi\_78) = -0.273163 + 1.075413*\ln(rcpi\_78) + ecm$$

$$t = (-4.624172) \quad (103.8034) \qquad R^2=0.997962$$

Using the residual series (*ecm*) from the above model, we can establish the following error correction model：

$$\Delta \ln(ucpi\_78_t) = ß_0 + ß_1 \Delta \ln(rcpi\_78_t) + \alpha\, ecm_{t-1} + \varepsilon_t$$

The estimation of the model are as follows:

$$\Delta \ln(ucpi\_78_t) = 0.088 + 1.038\Delta \ln(rcpi\_78_t) - 0.562ecm_{t-1} + \varepsilon_t$$

$$t = (1.310182)\ (17.9725) \qquad (-1.28336) \qquad R^2 = 0.943876$$

In the above error correction model, the coefficient of rcpi_78 (1.075413) obtained from the first step shows that over the past 24 years (1985-2008), the urban price level is higher than the rural price level using 1978 as the base year. The first differentiation getting from the second step reflected the short-term urban price variation. Such a variation can be divided into two parts. First, the impacts of rural price level variation. From the t value, we can see significant same direction impact of rural price variation on urban price. Second, the impact of variation from long-term equilibrium level. The estimated coefficient (-0.562) shows that, when the short-term variation goes beyond long-term equilibrium level (i.e., $\ln[ucpi\_78_{t-1}] - 1.075413 * \ln[rcpi\_78_{t-1}] > 0$), the adjustment coefficient will bring it back to equilibrium with an adjustment force of -0.562. The results coincide with our intuition. That is, after 2001, the rural price increases are faster than that of urban price, meaning a reduction in urban-rural price gap, and a process of urban-rural integration. If we exclude residence subcomponent in CPI, such conclusion can hold starting 1994.

II. Reasons for Urban-rural Inflation Differences

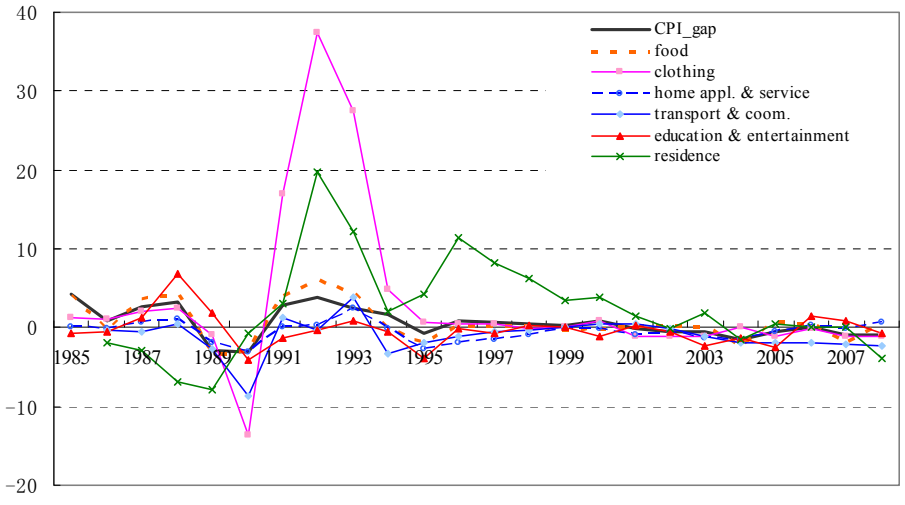
There are many reasons for the gaps between urban and rural price indexes, which include, among others, policy measures, development levels, and consumption structure. And such changes in the gap between urban and rural CPIs should also be considered in the context of urban-rural integration. In this section, we compare the urban-rural gaps of all subcomponents of CPI, and then explore the factors behind such gaps using econometric models.

A. Urban-rural gap of CPI subcomponents

As CPI and RPI share similar subcomponents and are highly correlated with correlation value above 99%, the paper only focuses on the urban-rural gaps of subcomponents of CPI (figure 2, table 4). Data shows that, between 1985 and 2000, higher urban clothing and residence price indexes are the main reasons for higher

urban CPI. During the period, urban clothing price index averaged 110.43, much higher than that of the rural areas (105.36); while the average urban residence price index was 110.58, 3.59 ppt higher than rural residence price index. As for other subcomponents, the average rural CPIs for home appliance and services, transport & communication, entertainment, education and cultural are all above those of the urban CPIs. After 2001, all rural CPI subcomponents are higher than those of the urban indexes, with transport & communication, and medicare and personal items showing the most significant differences. For transport & communication price index, China observed an annual contraction of 0.22 ppt in the rural areas, as compared to 1.63 ppt in the urban areas, yielding a difference of 1.41 ppt. For medicare and personal items, the rural CPIs averaged 1.33 ppt higher than the urban CPIs. Also though we don't have data on medicare and personal items for 1985-2000, we can use the RPI medicine and healthcare subcomponent as a close simulation. During the period of 1985-2000, the average annual urban CPIs increase was 108.19, while the figure for the rural areas was 107.78, this contrasts with the post-2001 data.

Figure 2. Urban-rural differences of CPI subcomponents (1985-2008)



Source: CEIC, author's calculation

Table 4. CPI and its subcomponents (1985-2008)

		CPI	*Food*	*TL*[1]	*Clothing*	*HAS*[2]	*HPA*[3]	*MHI*[4]	*TC*[5]	*REC*[6]	*RE*[7]
1985-2008		106.5	108.1		103.5	102.9		104.7	104.4	102.3	107.0
1985-2000	*rural*	108.2	108.8		105.4	104.8		107.5	107.9	103.0	107.0
	urban	109.3	109.9		110.4	104.3		108.0	107.0	102.8	110.6
2001-2008	*rural*	102.8	105.8	100.7	99.1	100.0	101.5	99.4	99.8	101.7	103.7
	urban	102.2	105.5	100.8	98.2	99.5	100.2	99.0	98.4	101.0	103.5

Source: CEIC, China Statistics Almanac (1994) and author's calculation.

Note: 1. TL = tobacco & liquor; 2. HAS = household facilities, articles & services; 3. HPA = healthcare & personal articles; 4. MHI = medicine & healthcare items. Because lack of comparable data on healthcare indexes in CPI subcomponent over the two different periods, the medicine/healthcare item used here are from RPI; 5. TC = transportation & communication; 6. REC = recreation, education, & culture; 7. RE = residence.

Table 5. Urban-rural consumption structure (1985-2008)

	Food	*Clothing*	*HAS*[1]	*MIP*[2]	*TC*[3]	*REC*[4]	*RE*[5]	*MIS*[6]
urban								
1985	52.2%	14.6%	8.6%	2.5%	2.1%	8.2%	4.8%	7.0%
1990	54.3%	13.4%	10.1%	2.0%	1.2%	11.1%	7.0%	0.9%
1995	49.9%	13.5%	8.4%	3.1%	4.8%	8.8%	7.1%	4.3%
2000	39.2%	10.0%	8.8%	6.4%	7.9%	12.6%	10.0%	5.2%
2005	36.7%	10.1%	5.6%	7.6%	12.5%	13.8%	10.2%	3.5%
2006	35.8%	10.4%	5.7%	7.1%	13.2%	13.8%	10.4%	3.6%
2007	36.3%	10.4%	6.0%	7.0%	13.6%	13.3%	9.8%	3.6%
2008	37.9%	10.4%	6.2%	7.0%	12.6%	12.1%	10.2%	3.7%
rural								
1985	57.8%	9.7%	5.1%	2.4%	1.7%	3.9%	18.2%	1.1%
1990	58.8%	7.8%	5.4%	3.3%	1.4%	5.4%	17.3%	0.7%
1995	58.6%	6.9%	5.2%	3.2%	2.6%	7.8%	13.9%	1.8%
2000	49.1%	5.7%	4.5%	5.2%	5.6%	11.2%	15.5%	3.1%
2005	45.5%	5.8%	4.4%	6.6%	9.6%	11.6%	14.5%	2.1%
2006	43.0%	5.9%	4.5%	6.8%	10.2%	10.8%	16.6%	2.2%
2007	43.1%	6.0%	4.6%	6.5%	10.2%	9.5%	17.8%	2.3%
2008	43.7%	5.8%	4.8%	6.7%	9.8%	8.6%	18.5%	2.1%

Source: China Statistics Almanac, China Finance Almanac

Note: 1. HAS = household facilities, articles & services; 2. MIP = healthcare & personal articles; 3. TC = transportation & communication; 4. REC = recreation, education, & culture; 5. RE = residence; 6. MIS = Miscellaneous & services

The paper assumes that the defects in CPI compilation and computation have similar impacts on urban and rural areas, and don't affect the comparison of urban and

rural CPIs. However, even though the NSB has taken the residents' consumption structure (table 5) into considering while determining the weights of each subcomponent, the weights deviate from the actual consumption structure[8].

(1) Food. The proportion of food expenditure for rural residents is much higher than that of the urban residents, but the gap between rural and urban food price indexes are small. For proportion of rural food expenditure averaged 8.25 ppt higher than that in the urban areas, of which the differences surpassed 10 ppt during 1999-2001. This means that the food price changes will have a much more significant impact on rural price level than on the urban price. However, because the food supply means national safety, the government set the prices for main grain products and put relatively strict control for the prices of grains and other kind of food. This has helped to reduce urban and rural food price index gaps. Prior to 2001, the government has increased prices for grains and other types of food many times; yet because part or a large part of foods are self-sufficient for rural residents, they are less affected by the price changes. During the period, urban food price index averaged higher than the rural index by 1.1 ppt. After 2001, the food prices have been stable, with rural food price index averaged moderately higher than that in the urban areas by 0.28 ppt.

Table 5. Urban-rural residence price index (1994-2008)

	Residence price index	*of which:*			
		Private housing	Building & building decoration material	Rent	Utility
1994-2008					
urban	107.31	106.84	100.49	115.23	108.16
rural	104.79	103.03	101.45	110.44	107.33
1994-2000					
urban	111.70	111.97	99.40	126.33	111.40
rural	106.04	104.23	100.96	117.67	109.09
2001-2008					
urban	103.48	101.71	101.57	104.13	104.91
rural	103.70	101.83	101.94	103.20	105.57

Source: CEIC, author's calculation

[8] The weights of subcomponents of CPI varies each year, but data are not public. Wind Database listed the weights for 2003 as follows: food (33.6%), tobacco and liquor (4.5%), residence (13.6%), medicare and personal items (9.4%), transport and communication (9.3%), clothing (9%), home appliance and services (6.2%), and entertainment, education and culture (14.4%).

(2) Residence. According to the NSB, the proportion of residence expenditure in total consumption has increased from 4.8% in 1985 to 10.2% in 2008 for the urban residents, while slightly reduced in the consumption expenditure for the rural residents. Over the observed period, the urban residence CPIs averaged 2.3 ppt higher than that of the rural, of which most of the differences come from self-occupancy and rent index with the urban be 3.8 and 4.8 ppt higher than that of the rural, respectively. Prior to 2001, the urban residence price index averaged 3.59 ppt higher than the rural index; after 2001, rapid price increase of building and building decoration materials has pushed up the rural residence price index, yielding a lower urban residence price index than the rural one by 0.22 ppt.

(3) Clothing. Because the urban residents have higher income and living standards, their proportion of expenditures on clothing have been nearly 5 ppt higher than that of the rural residents, and such gaps been stable over the 24 years. However, prior to 2001, urban clothing price index averaged 5.07 ppt higher than rural clothing price index. During 1991-1993, the gaps were 16.9, 37.4 and 27.4 ppt, respectively, and such tremendous differences can only be explained by policy measures. After 2001, urban clothing price indexes have been lower than the rural indexes (by 0.86 ppt) mainly as a result of market adjustment.

(4) Household facilities, articles and services include durable consumer goods, and daily sundry articles, whose proportion in total rural consumption expenditure averages 2.67 ppt lower than that in urban consumption expenditure, and the gaps are shrinking. In an economy featured by shortage in supply, this type of expenditures accounted for a relatively large proportion in residents' consumption, and the urban-rural gap was large. With the increasing supply, the prices for household facilities, articles and services have been reducing, and their proportion in total urban consumption expenditures reducing. Meanwhile, with the increase of rural income, the Household facilities, articles and services have become necessities, and their proportion in total consumption expenditure increasing.

(5) Recreation, education, and culture articles. Of all observed years, the

proportion of rural recreation, education, and culture expenditures have been lower than that of the urban areas by an average of 2.94 ppt. Meanwhile, rural recreation, education, and culture price indexes have also been lower than that of the urban indexes. Prior to 2001, the gap was 0.18 ppt; afterwards, the gap increased to 0.61 ppt. This is mainly because of low rural income level, and pricing policies. Prior to 2008, the prices for urban and rural education have been determined by different government schemes.

(6) Transportation and communications include transportation facility, incity and intercity traffic fares, using and keeping fare, as well as communication facility and service, a large portion of which belong to public services. The increase of this type of expenditures in both urban and rural consumption have been most significant, from 2.1% and 1.8% respectively in 1985 to 13.6% and 10.2% respectively in 2007. Nevertheless, the urban price index for transportation and communications have been lower than that of the rural index, of which the gap averaged 0.91 ppt during 1985-2000 and 1.4 ppt during 2001-2008, indicating that urban residents benefit more from the public investment. More specifically, the urban-rural gap in communications is larger than that in transportation. During the period of 1994-2008, the urban-rural transportation price index gap was only 0.07 ppt, while the gap in communications averaged 1.54 ppt. Both rural and urban residents have benefited from public investment in transportation, although the urban price indexes on fuels and parts, using and keeping fare and intra-city traffic fare have been larger than those of the rural. However, urban residents have benefited more as is reflected in lower urban public transportation price index whose contraction averaged 1.7 ppt more than that of the rural index. Moreover, the average urban intracity traffic fare index has been lower than that of the rural index by 2.57 ppt. In terms communications, urban index contraction has been more significant than that of the rural with an annual average contraction of 4.56%, which is 3.1 ppt more than that of the rural index. Among others, the contraction of communication facility price index has been the most notable, with an average 19.83% in the urban areas, and 11.26% in the rural areas. This is because the urban communication markets are by far larger than the rural ones, and both

public investment and commercial costs are biased towards the urban areas.

(7) The proportion of health care in rural residents' consumption expenditures exceeded that in urban consumption prior to 1996, afterwards, the gap between the two reduced. Because there is no data for this subcomponent for comparison purpose, we substitute with data on the medicine and healthcare subcomponent in RPI. During the period of 1985-2000, the urban medicine and healthcare price index had been higher than that of the rural residents by 0.43 ppt. During the period of 2001-2008, the trend reversed with the urban index lower than that of the rural by 0.47 ppt. Although the proportions of medicine and healthcare in total rural and urban consumptions have been similar, price changes have different impacts on urban and rural price indexes. Since 2000, the government has reduced the prices for medicine while increased the prices for medicare services. However, because the rural demand for medicare services is sticky and farmers normally use low cost medicine, they benefit less than urban residents from reduced medicine costs. As a result, urban medicare price indexes fluctuated, while the rural medicare price indexes have been increasing (NDRC, 2004).

B. Models on urban-rural price index differences

While reviewing the history of the pricing mechanisms reform and the evolution of CPI compilation, we found that, prior to 1995, policy is the main factor for large and unstable urban-rural price index gap; afterwards, the market has played a more visible role in determining the urban-rural CPI gap.

The Law of One Price is the theoretical base for our exploration of urban-rural CPI gap. The Law assumes that the different prices are caused by factors such as transport costs, trade barrier, information costs, and the like. Applying the Law to China's case, we can make the following hypothesis: the direct factors behind urban-rural price index gap include the relative urban-rural transport costs, information costs, retail sales scale, and income. At the same time, indirect factors showing the integration of urban-rural markets such as urbanization, trade dependence should be positively related to the changes of urban-rural CPI gap.

The paper assumes that the above-mentioned factors are given at the beginning of

the observed period, and their changes in urban and rural areas affect the changes of urban and rural CPI. First, the rural areas have relatively weak infrastructure, goods will incur higher transport costs to reach rural residents, especially for non-agricultural goods. Second, the rural information intermediaries are less developed and more costly than those in the urban areas. This, combined with farmers' less education and less knowledge in prices than those urban residents, have increased information asymmetry in the rural areas. As a result, the rural areas have higher information costs. Third, the scale of retail sales in the urban areas is far above that in the rural areas, adding to the downward pressure on retail price in the urban areas. In 1995, 55% of retail sales incurred in the urban areas; in 2008, the figure increased to 68%. Such kind of economies of scales in the urban retail sales are also reflected in the more extensive urban commercial network, leading to more intensive competition among urban sellers. This helps to reduce information costs, and thereby the urban retail prices. Fourth, because of lower rural income level, the quality of rural retail goods is likely to be lower than those in the urban areas, which means lower rural price level. Fifth, urbanization promotes integration of urban and rural markets, and so does increased trade dependence.

We construct a simple OLS model, with urban-rural CPI gap (UR) as the dependent variable. The independent variables include urban-rural retail sales ratio (UR_retail), ratio of urban to rural fixed asset investment in the previous period (UR_FAI[-1]), highway length per thousand people (highway_pp), railway length per thousand people (railway_pp), ratio of urban to rural income changes (UR_dincome), degree of urbanization (urbanization), and trade dependence ratio (trade_dep). Among all independent variables, urban-rural retail sales ratio represents the economies of scale. Due to the lack of data on transport costs and information costs, we use the ratio of urban-rural fixed asset investment, per capita highway length and per capita railway length to simulate. The larger the ratio of urban-rural fixed asset investment, the lower the relative urban transport and information costs. Meanwhile, the higher the per capita highway length and per capita railway length indicate higher degree of urban-rural market integration, and therefore the reduced price gap between the two.

We use the ratio of urban to rural income change in the model, the larger the urban-rural income change means relatively higher urban prices. Besides, higher degree of urbanization and higher trade dependence help to reduce the gap between urban and rural price levels. At the current stage, this means higher rural CPI than urban CPI. To reduce autocorrelation of the dependent variable, we added its lagged form (UR[-1]) in the models.

Table 7. Results of urban –rural CPI gap models

Dep. variable: UR	*Model 1*	*Model 2*	*Model 3*	*Model 4*
C	3.079215* (0.0531)	4.775068*** (0.0076)	3.755473** (0.0377)	4.263119** (0.0306)
UR(-1)	-0.213773 (0.4626)	0.065468 (0.8132)	-0.228818 (0.4181)	-0.29554 (0.3217)
UR_retail	-1.859952** (0.0403)	-4.270995 (0.045)**		
UR_FAI(-1)		0.624554 (0.2755)		
UR_dincome		0.020885 (0.5846)		0.027884 (0.3804)
Urbanization			-10.43862 (0.0295)**	-11.91714 (0.0245)**
No. of Observation	13	13	14	13
R-squared	0.376252	0.732094	0.407094	0.453136
Adjusted R-squared	0.262843	0.598141	0.299293	0.289076
Durbin-Watson stat	1.271786	2.126382	1.333042	1.429289

Note: numbers in the brackets are p value; * means significant at 10% level, ** means significant at 5% level, and *** means significant at 1% level.

The models show that (table 7) the ratio of urban-rural retail sales is an important explanatory variable, significant at 5% confidence interval in models 1 and 2. This means that the larger the relative urban retail sales, the larger the economies of scale, the lower the relative urban price, and as a result, the smaller the urban-rural CPI gap. The impact of urbanization on urban-rural CPI gap is similar to that of the ratio of

urban-rural retail sales. That is, the higher the degree of urbanization, the more rapid increase of rural price in relation to that of urban price. Also note that the correlation coefficients between the degree of urbanization, urban-rural fixed asset investment ratio, per capita highway length and per capita railway length are 0.96, 0.88 and 0.98 respectively, meaning that urbanization is accompanied with infrastructure enhancement. However, per capita highway length and per capita railway length are insignificant in all models mainly because of such high correlation have caused multicollinearity. Besides, the lag form of urban-rural FAI ratio and urban-rural income increase ratio are both useful explanatory variables for urban-rural CPI gap; nevertheless, these variables are not significant.

Table 8. Results of urban–rural CPI gap (excluding residence subcomponent) models

dependent variable: UR_xre	*Model 5*	*Model 6*	*Model 7*	*Model 8*
C	4.415945*** (0.0013)	1.062731 (0.1124)	5.340797*** (0.0009)	2.277299** (0.016)
UR_xre(-1)	0.568639*** (0.0013)	-0.183815 (0.5599)	0.479896*** (0.0052)	0.011996 (0.9564)
UR_retail	-2.74378*** (0.0009)			
Urbanization			-15.48649*** (0.0006)	
Highway_pp		-0.0015** (0.0125)		
Trade_dependence				-7.255397*** (0.0032)
No. of Observation	13	14	14	14
R-squared	0.896303	0.633899	0.449906	0.709498
Adjusted R-squared	0.875564	0.567336	0.349889	0.65668
Durbin-Watson stat	2.389687	1.53108	1.531846	1.525489

Note: numbers in the brackets are p value; ** means significant at 5% level, and *** means significant at 1% level.

The outputs of models 1-4 led us to use urban-rural CPI gap excluding the residence subcomponent (UR_xre) as the dependent variable to test additional explanatory variables. The results are clear (table 8), the same explanatory variables have become more significant, and the explanatory power of the model (R^2) have increased significantly. This also proved, albeit indirectly, that the debates over the residence subcomponent have some merits. Model 5 shows that the ratio of urban-rural retail sales has significant impacts on urban-rural CPI gap. Comparing model 5 and model 1 also reveals that model 5 carry much higher explanatory power (R-square). Model 6 shows that per capita highway length is relatively strong in explaining the changes of urban-rural CPI gap, meaning that strengthening of infrastructure will negatively affect the urban-rural CPI gap. The main explanatory variable in Model 8 is trade dependence ratio. The result shows that the higher the trade dependence, the more integrated the domestic and international markets, and at the same time, the higher degree of domestic urban and rural markets. As a result, the gap between urban and rural CPI will be smaller.

C. Models on regional urban-rural price index gap

To examine regional differences of urban-rural price index gaps, we constructed panel data over the period of 1985-2008. In addition, we set up models using provincial level urban-rural retail sales ratio (UR-retail), per capita GDP ratio (GDPPC), GDP gap (GDP_gap), as well as regional dummy variables (east, middle, west) and time dummy variables (pre-2000) to explain changes and differences of provincial level urban-rural CPI gap. A few notes on data are as follows: (1) GDP gap is calculated simply as the difference between GDP growth rate in the previous 5 years and the current year; (2) because Beijing, Tianjin, Shanghai and Chongqing are provincial-level cities, they don't have data on urban-rural CPI gap; (3) due to data availability, only some provinces have pre-1995 provincial level urban-rural retail sales ratio. Moreover, models 9-11 are OLS, while model 12 is a fixed effect panel data model. The fixed effect model uses provincial level data as cross section, with

the cross section formulas of $y_i = \alpha_i + x_i\beta_i + \varepsilon_i$. In which, i means different provinces, and independent variables have different impacts on the dependent variable in different provinces.

Table 9. Results of provincial level urban-rural CPI differences models

dependent variable: UR	*Model 9*	*Model 10*	*Model 11*	*Model 12*
C			-1.549488***	-1.087868***
			(0)	(0)
EAST	-0.039129	-0.761706***		
	(0.8532)	(0)		
MIDDLE	-0.394978*	-0.940946***		
	(0.054)	(0)		
WEST	-0.65652***	-1.294229***		
	(0.0003)	(0)		
PRE00	1.17303***	2.079094***	2.093587***	1.478857***
	(0)	(0)	(0)	(0)
UR_RETAIL	-0.195758***			-0.219365***
	(0.0085)			(0.0036)
GDP_GAP		0.189949***	0.1897***	0.113097***
		(0)	(0.0105)	(0)
GDPPC			0.560428***	0.646129***
			(0)	(0.00110)
No. of Observation	414	612	610	400
R-squared	0.213536	0.28673	0.288572	0.270583
Adjusted R-squared	0.205844	0.28203	0.28505	0.263197
Durbin-Watson stat	1.53566	1.695285	1.681838	1.526574

Note: numbers in the brackets are p value; ** means significant at 5% level, and *** means significant at 1% level.

There are a few note-worthy issues from the models 5-8 (table 9). First, prior to 2000, because the CPI compilation in China needed improvement and the economy was volatile, there had been large price index vibration, and urban price index had been around 2 ppt higher than rural price index. Second, the urban-rural CPI gaps are highest in the western region, followed by the middle and eastern region. In fact, the

urban-rural CPI gap in the west is 0.3 ppt higher than that in the middle, and the middle gap is 0.15 ppt higher than that in the east. Such regional differences in urban-rural price index gap can be mainly explained by per capita GDP. Model 11 uses per capita GDP to replace regional dummy variables in model 10, and finds that the less developed region with lower per capita GDP posted higher rural CPI over the urban CPI. That is, the rural price converged at a faster pace. Third, urban-rural retail sales ratio remains a important explanatory variable on the provincial level. Besides, results from panel data with fixed effects are similar to the results in other models.

III. Long-term Trend of Urban-rural Price Gap and Policy Recommendations

The duality of China's economy has segregated the urban and rural markets and made rural development lag behind, which caused urban-rural gap in income, price level and inflation. The models in this study have demonstrated that after 1995, rural retail sales have limited economies of scale comparing to those in the urban areas, competition among sellers in the rural areas is limited, infrastructure weak, and transaction costs relatively higher. On the other hand, increased urbanization and trade dependence have promoted urban-rural integration, which have offset the impacts relatively lower rural incomes, and led to higher rural price indexes. These factors will persist in the long-run, which means that faster rural price increase will be a long-term trend. Economic duality in China can not last forever, and the integration of urban and rural areas is the long-term trend. In the process of the integration, rural price level will converge to the urban price level. That is, over a certain period of time, rural prices will rise faster than urban prices.

Yet, within medium- to short-term, the relative real income of farmers will be much lower if their income increases slower while the rural prices increase faster than those of the urban areas. This not only reflects the deteriorated status of rural residents in price setting, but also destabilizes and impedes the sustained economic development. For this, the government needs to take effective measures to control over rapid rural price increases.

First, reducing the income and consumption gap is at the core to reduce urban-rural price differences. Measures are needed to develop rural economy to increase farmers' income and enhance their ability to consume. This will also improve the rural consumption structure. Second, upgrading rural infrastructure in communication and transportation, electricity, education and entertainment holds the key to reduce information and transaction costs. At the same time, the government should hasten the establishment of rural commercial network to integrate urban and rural markets. This will not only create an enabling environment for rural consumption but also reduce farmer's consumption costs, and thereby, the urban-rural price index gap. Third, subsidizing rural prices in certain categories such as household articles and agricultural products will effectively reduce rural price index at a given level of the rural income.

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