Hong Kong Monetary Authority

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MEASURES OF CORE INFLATION IN HONG KONG

Key Points:

- *The "headline" inflation based on the Consumer Price Index (CPI) may not be a good indicator of "underlying" inflation. This is because the CPI often includes components the prices of which are not determined primarily by monetary conditions of the economy, but are associated with supply disturbances or government policies.*

- *Core inflation measures separate short-term fluctuations in the headline inflation from the underlying, or core, rate of inflation. As such, they may be more relevant in analyzing the inflation process, such as the interactions between interest rate, economic activity, and inflation.*

- *In this paper, a variety of measures of core inflation for Hong Kong based on two widely used approaches are compiled. The most straightforward approach is the exclusion-based approach, which excludes certain volatile price components from the overall CPI basket. An alternative approach is to employ statistical techniques to estimate the central tendency of general price inflation.*

- *The comparative analysis indicates that the core inflation measure based on the 48th percentile price change of the CPI basket has superior properties than other core inflation measures. However, the headline inflation rate and various core inflation measures show broadly similar trends, and do not differ significantly in terms of volatility. This suggests that the headline inflation rate is a good indicator of the underlying inflation rate in Hong Kong.*

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I. INTRODUCTION[1]

Over the past decade, an increasing number of central banks have explicitly adopted inflation targets as their primary objectives. The targets have often been expressed in terms of the rate of change in the Consumer Price Index (CPI).[2] However, the "headline" CPI inflation rate may not necessarily be a good indicator of "core" or "underlying" inflation in an economy, and may sometimes give a misleading impression of the general trend of prices. This is because the CPI often includes components whose prices are not determined primarily by monetary conditions of the economy, but are associated with supply disturbances or government policies. The drawbacks of the headline CPI as an indicator of general inflation pressures have given rise to a number of studies on the definition and measurement of alternative inflation indicators.

Measures of core inflation attempt to remove the distortionary influence of outlier price changes. Typically, "distortions" to the aggregate inflation rate are attributed to the influence of particularly "volatile" prices—such as petroleum and fresh food prices—that are largely determined by supply-side factors; and the effects of infrequent price adjustments. These most often involve prices set directly by the public sector or heavily influenced by government regulations or infrequently adjusted excise taxes and levies.

Because of the currency board arrangement, Hong Kong does not have an independent monetary policy. Nevertheless, core inflation may be of value as a guide for inflation expectations, and thus, for wage and price determination. Furthermore, core inflation measures may be more relevant in analyzing the interactions between interest rate, economic activity, and inflation.

In this paper, a variety of measures of core inflation for Hong Kong are compiled and evaluated. The rest of the paper is organized as follows. The next section reviews two major concepts of core inflation. Section III discusses various approaches to compile core inflation measures for Hong Kong. Section IV sets out a few evaluation criteria, and examines the core inflation measures with reference to these criteria. The last section presents the concluding remarks.

II. CONCEPT OF CORE INFLATION

Core inflation can be defined in terms of two broad concepts. One concept views core inflation as the *persistent* component of measured inflation. Steady or persistent component of measured inflation is distinguished from intermittent or transient inflation, which are usually associated with supply-side disturbances.[3] The other concept

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1 This paper is a follow-up work of the SEACEN Workshop on CPI Inflation Characteristics and Measures in SEACEN Countries, held in Kuala Lumpur, 9-11 May 2001. Ms Marion Chan from the Hong Kong Census and Statistics Department participated in the workshop.

2 These economies include Australia, Canada, New Zealand, and the United Kingdom.

3 Milton Friedman (1963, page 1) defines inflation as a steady and sustained increase in the general price level.

views core inflation as a *generalized* component of measured inflation, which is to be distinguished from relative price changes. A common strand in these two concepts is to associate core inflation with expectations and demand-driven components of measured inflation, and exclude supply-side disturbances that cause transient changes in inflation or relative price changes. Thus, the conceptual difference may be less of an issue than the variety of empirical approaches in measuring core inflation. We examine a few commonly used measures in the next section.

III. MEASURES OF CORE INFLATION

There is a lack of consensus on the best way to measure core inflation. The most straightforward, and probably most widely used, approach is the so-called exclusion-based approach, which excludes certain volatile price components from the overall CPI basket. An alternative approach is to employ statistical techniques to estimate the central tendency of general price inflation.[4] The remainder of this section provides core inflation measures for Hong Kong based on both approaches.

A. Exclusion-based approach

The objective of the exclusion-based approach is to remove the influence of unrepresentative or outlier price movements from the aggregate inflation. However, a disadvantage is that, by excluding a portion of the expenditure-weighted CPI basket, it may deviate from a cost-of-living concept, which may be of greater concern to the general public. We present below two core inflation measures based on the exclusion-based approach for Hong Kong.

CPI excluding food, energy and administered prices (CPIxFEA)

A commonly used core inflation measure is to exclude basic food, energy and administered prices. The prices of food and energy are often volatile, and are likely to be associated with supply shocks. The prices of alcoholic drinks and tobacco, and water and sewage charges are heavily influenced by government tax policies or regulations.[5] The aggregate price index is recomputed by placing a zero weight on the excluded components, and proportionally increasing the weights of the remaining components.

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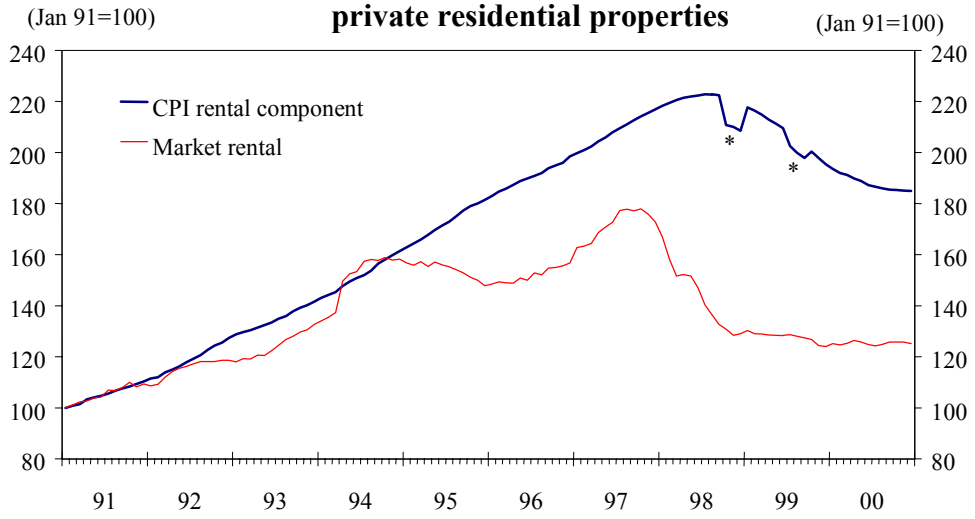
[4] Roger (1998) discuss in details the pros and cons of a range of alternative empirical approaches to measuring core inflation.

[5] The CPIxFEA excludes 20.3% and 15.4% of the total CPI basket for the 1989-90 and 1994-95 expenditure weights respectively. Basic food refers to "food, excluding meals bought away from home", as "meals bought away from home" is less volatile.

CPI excluding food, energy, administrated prices and rent (CPIxFEAR)

This measure excludes an additional item, namely the rental component, which accounts for roughly one-quarter of the total weight in the CPI basket.[6] This component is a lagging indicator of market rentals, as it comprises new and existing rental contracts.[7] For example, in the wake of the Asian financial turmoil, market rents started to decline from the last quarter of 1997 in line with the drop in property prices, but the rental component continued to increase until the third quarter of 1998. Subsequently, the market rent has stabilized since the fourth quarter of 1998, but the lagged effect continued to place downward pressure on the rental component, and hence, the overall CPI (Chart 1). Considering that core inflation should be forward looking in some sense, we have derived a measure that excludes also the rental component.

Chart 1. CPI rental component and market rent for private residential properties



* Due to the rate rebate and the 50% rates concession in the fourth quarter of 1998 and the third quarter of 1999 respectively.[8]

Application to Hong Kong

Table 1 reports the average annual inflation rates and the standard deviations of changes in inflation rates for the above exclusion-based core inflation measures and the headline inflation.[9] It is observed that the standard deviations of various measures are not significantly different from that of the headline inflation during the

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6 The weight of rental component for private and public housing together accounts for 22.3% and 26.3% in the 1989-90 and 1994-95 CPI baskets respectively. The rental component includes also the rates—which are the indirect taxes levied on properties and are charged at a certain percentage of the estimated annual rental value of a property—and covers both rented and owner-occupied dwellings.

7 Rental contracts for private residential properties in Hong Kong usually last for two years.

8 Following the Asian financial turmoil, the Hong Kong government implemented in 1999 some measures to help ease the public's burden, which included a rebate and 50% concession of rates for the fourth quarter of 1998 and the third quarter of 1999 respectively. It was estimated that the rates rebate and the 50% rates concession have lowered the overall inflation rate by about 1.4 and 0.7 percentage points in the respective quarters.

9 The sample period is split into two sub-periods, 1991-1995 and 1996-2000, as they are under different baskets of expenditure weights.

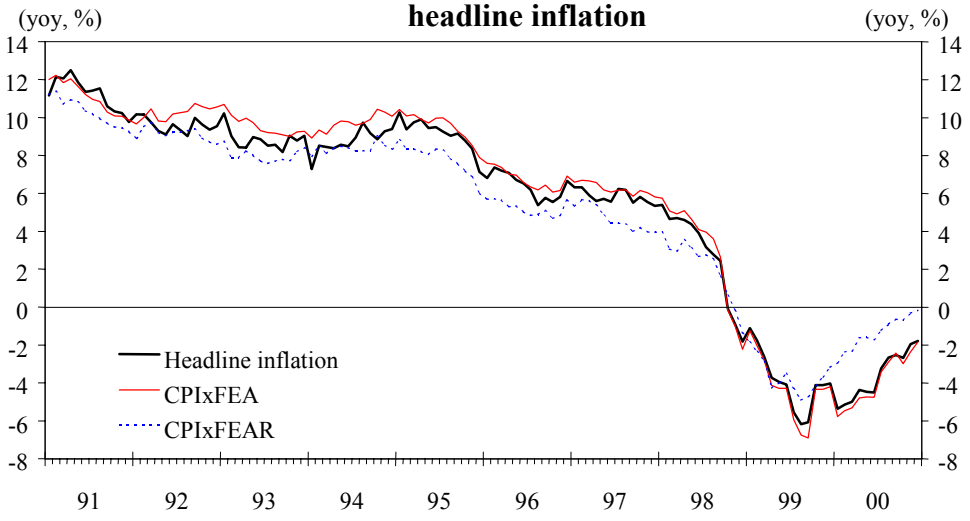
whole sample period of 1991-2000.[10] Chart 2 shows that the inflation rate based on the CPIxFEA was very close to that of the headline CPI during the last decade. On the other hand, the CPIxFEAR inflation rate was consistently below the headline inflation rate between 1991 and the third quarter of 1998, and higher than the headline inflation rate since the third quarter of 1999.

Table 1. Volatility of exclusion-based measures and headline inflation

Sample period	Inflation measure	Average annual inflation rate, %	Standard deviation of change in inflation rate	
			Monthly[1]	Quarterly[2]
1991-1995	Headline	9.5	0.6	0.6
	CPIxFEA	10.0	0.3	0.5
	CPIxFEAR	8.7	0.3	0.4
1996-2000	Headline	1.5	0.7	1.3
	CPIxFEA	1.6	0.7	1.5
	CPIxFEAR	1.4	0.5	1.0
1991-2000	Headline	5.5	0.6	1.0
	CPIxFEA	5.8	0.6	1.1
	CPIxFEAR	5.1	0.4	0.8

1/ Calculated based on month-on-month change of annual inflation rate.
2/ Calculated based on quarter-to-quarter change of annual inflation rate.

Chart 2. Exclusion-based core inflation and headline inflation



[10] Statistical tests suggest that the hypothesis of equal variances between headline inflation and various exclusion-based core inflation measures cannot be rejected at 5% level of significance for quarterly series.

B. Statistical approach

Exclusion-based measures of core inflation directly identify and explicitly exclude "distortionary' changes in components of inflation. Statistical measurement, on the other hand, uses standard statistical techniques to filter out large and influential price movements in order to ascertain the trend of the generalized component. The key element of this approach is to think of the distribution of price changes in the CPI basket as being a particular sample drawn from a population distribution of price changes. The basic idea behind this approach is to define a measure of central tendency that is likely to be relatively unaffected by the sample distributions of price changes. To determine the best way for measuring core inflation, the behavior and characteristics of the distribution of price changes in the CPI basket need to be examined.

Characteristics of the cross-sectional distribution of price changes

This section examines the cross-sectional distribution of monthly price changes in Hong Kong's CPI basket.[11] Charts 3-6 show the first four moments (mean, standard deviation, skewness and kurtosis) of the distribution of the CPI component price changes in each month. The average values of the moments are summarized in Table 2. These coefficients provide a summary of the shape of the distribution, which suggests that the distribution of monthly changes of Hong Kong's consumer prices tends to be highly leptokurtic, and are not systematically skewed toward either side of the tails.

Chart 3 shows the mean of seasonally adjusted monthly price changes of various components in the CPI basket. It is worth noting that the monthly changes are quite volatile. In particular, the sharp falls in October 1998 and July 1999, and the large spikes in January 1999 and October 1999 were the results of the rates rebate and the 50% rates concession granted in the fourth quarter of 1998 and the third quarter of 1999 respectively.[12] The large movement in consumer prices in January and February 1993 was mainly due to the effect of Chinese New Year.[13] In any case, monthly changes in the CCPI tend to be volatile. The large standard deviation illustrated in Chart 4 also demonstrates the significant dispersion of monthly price changes.

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[11] In this paper, the analyses of the cross-sectional characteristics of the distribution of consumer price changes are carried out using the seasonally adjusted month-on-month changes of the Composite Consumer Price Index covering the period from 1991 to 2000 at the group level of aggregate. For the period from 1991 to 1995, 96 commodity/service groups and weights based on the 1989-90 expenditure survey are used. For the period from 1996 to 2000, 98 groups and the 1994-95 expenditure weights are used in the analysis. The seasonally adjustments were performed in EViews, using X-11 multiplicative adjustment factors.

[12] See footnote 9.

[13] The Chinese New Year usually falls in February but sometime in January, and therefore, the seasonal effects may not be fully eliminated by the conventional seasonal adjustment.

Chart 3. Mean of monthly price

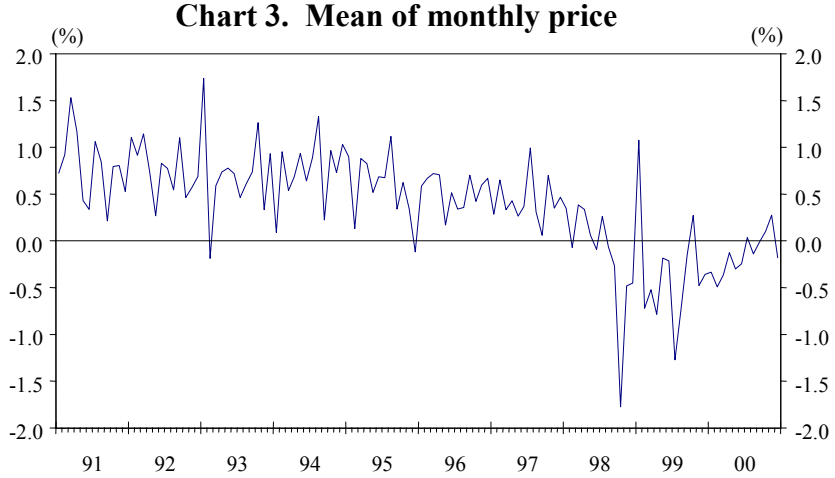
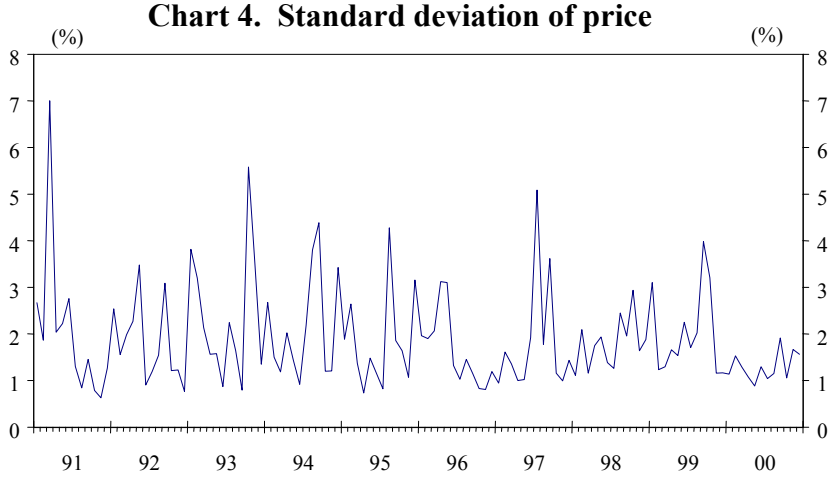


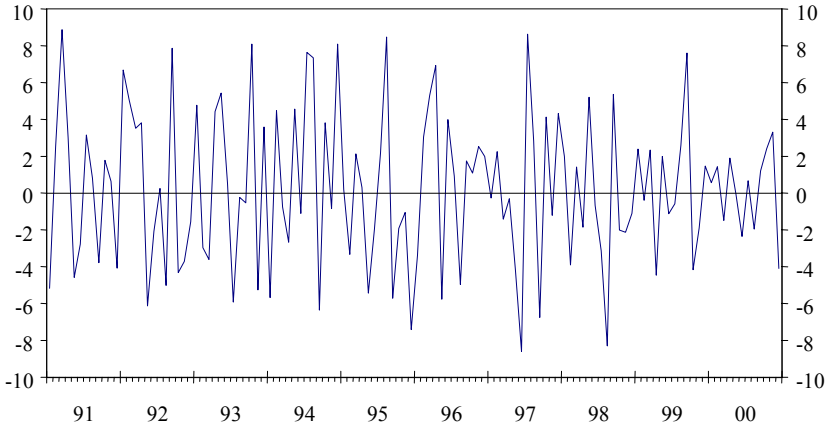
Chart 4. Standard deviation of price



The third moment, coefficient of skewness, is an indicator for the asymmetric property of a distribution. A positive coefficient of skewness indicates the distribution is skewed to the right, that is, the right-hand tail is longer than the left-hand tail. Conversely, a negative coefficient indicates that the distribution is skewed to the left. Chart 5 shows that the coefficient of skewness has fluctuated considerably over time. For the whole sample period, the coefficient averages to a small positive value of 0.24, with 61 out of 120 months having positive coefficients. This would suggest that the distribution is slightly positively skewed.

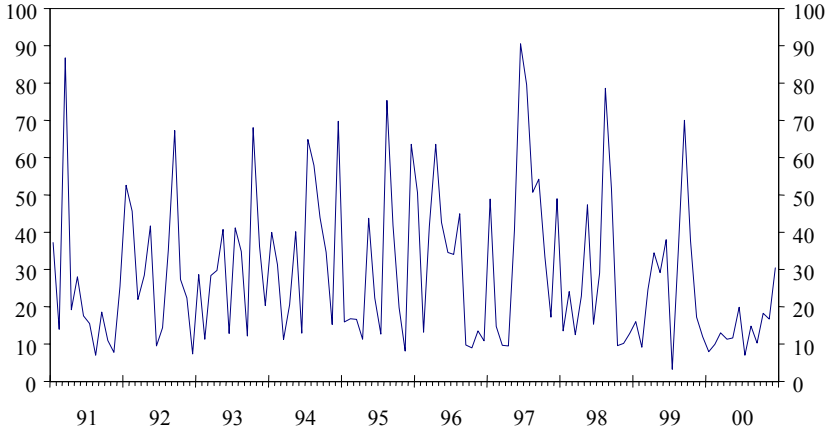
The coefficient of skewness is not the only measure of the asymmetric property of a distribution. An alternative simple diagnostic is to compare the mean and median of the distribution. If a distribution is symmetric, its mean and median will be equal. On the other hand, if a distribution is positively skewed (negatively skewed), its mean will be greater (smaller) than the median. During the whole sample period, the mean of 65 out of 120 months is smaller than the median. This suggests that the distribution is likely to be slightly negatively skewed. The disagreement of the two tests suggests that the distribution of price changes is not systematically skewed toward either side of the tails.

Chart 5. Skewness of price



The fourth moment, kurtosis coefficient, indicates the extent to which the distribution has fat tails or thin tails.[14] The kurtosis value, as showed in Chart 7, is generally very large, suggesting that the distribution is leptokurtic (that is, more fat-tailed than a normal distribution). This also indicates that in a typical month, a large proportion of the CPI basket experienced price changes significantly different from the mean, or in other words, there is higher probability of exceptional price changes.

Chart 6. Kurtosis of price



[14] A distribution has fat (thin) tails relative to a normal distribution if the kurtosis coefficient is greater (smaller) than 3.

Table 2. Moments of the distribution of consumer price changes
(Seasonally adjusted month-on-month change in percent)

Sample period	Mean	Standard deviation	Skewness[1]	Kurtosis[2]
1991-1995	0.72	2.05	0.30	30.27
1996-2000	0.07	1.72	0.18	28.20
1991-2000	0.39	1.88	0.24	29.23

1/ A distribution is symmetric if the skewness coefficient is zero.
2/ A distribution has fat (thin) tails relative to a normal distribution if the kurtosis coefficient is greater (smaller) than 3.

Trimmed median approach

In the measurement of central tendency of a population, if the samples are from a Normal distribution, the arithmetic mean will be the most accurate. However, if a symmetric distribution is characterized by high kurtosis value, then the sample median is likely to be a more efficient and robust estimator of the population mean.[15] This is because the median places less weight on extreme price changes, and hence, is much less affected by extreme price movements than the mean.

In a symmetric distribution, the population mean will coincide with the median or the 50th percentile price change. However, in an asymmetric distribution, the population mean will correspond to different percentile of the distribution. For example, if the distribution is negatively skewed, the mean will have a percentile ranking below 50.[16] If this percentile can be determined, then the sample value of the percentile can be considered as an estimator for the population mean, just as the sample median is used as an estimator of the population mean in a symmetric distribution. Chart 7 shows that the percentile ranking has fluctuated considerably over time, while table 3 illustrates that, for most years during 1991-2000, the annual average percentile ranking of the sample mean is slightly below 50, with an average value of 47½. This would suggest that the value of the 48th percentile could be considered as an estimator for the population mean.

15 Hogg (1967) and Harter (1974) suggest using median as an unbiased estimator if kurtosis is over 5.5 and 3.7 respectively (see Roger (2000)).

16 The percentile ranking—or "mean percentile" used in Roger (1997)—is defined as the (cumulative) percentile of the distribution of price changes which corresponds to the arithmetic mean of distribution at a particular period (see Appendix A for determining the percentile ranking of a mean).

Chart 7. Percentile ranking of the mean

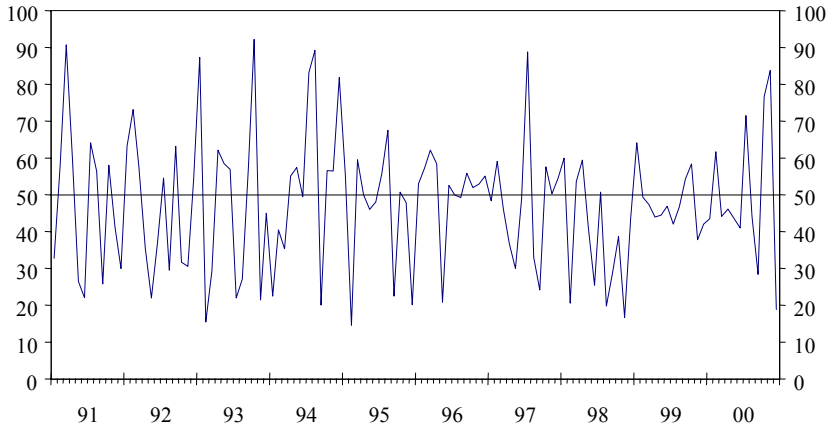


Table 3. Percentile ranking of consumer price changes
(Seasonally adjusted month-on-month change in percent)

Sample period	Average percentile ranking of sample mean
1991	47.2
1992	46.0
1993	47.9
1994	54.0
1995	44.8
1996	51.6
1997	48.1
1998	38.2
1999	48.1
2000	50.3
1991-2000	47.6

A good measure of core inflation should track trend inflation over a long period of time, that is, the average rate of core inflation should match the average rate of overall inflation. In other words, measure of core inflation should neither understate nor overstate the long-term trend price changes. Following Roger (1997), one way to examine the implications of choosing alternative assumptions is to compare the rates of "drift' or bias in the average price changes of different percentiles relative to the average price change of the headline CPI. The percentile price changes of the 47th to 50th percentiles are then computed.[17] Table 4 shows that the 47th to 50th percentile price change estimators all display very little "drift" relative to the sample mean through 1991-2000. On balance, the 48th percentile appears to a reasonable approximation of the percentile ranking of the population mean. On this basis, the 48th percentile price change is assumed to be an unbiased estimator of the core inflation. However, it should be noted that the validity of this assumption is sensitive to the stability of the degree of asymmetry in the distribution of price changes. If the degree of asymmetry are changing over time,

[17] See Appendix A for the steps to determinate the percentile price change of a distribution.

then the percentile of the distribution corresponding to the population mean will also be time-varying.

Table 4. Rates of drift in price changes associated with different percentiles relative to the headline CPI

	1991-1995		1996-2000		1991-2000	
Inflation measure[1]	Average monthly change, %	Average drift vs. CPI	Average monthly change, %	Average drift vs. CPI	Average monthly change, %	Average drift vs. CPI
CPI	0.72		0.07		0.39	
Percentile						
47th	0.70	–0.02	0.06	–0.01	0.38	–0.01
48th	0.71	–0.01	0.08	+0.01	0.40	+0.01
49th	0.72	0.00	0.10	+0.03	0.41	+0.02
50th	0.73	+0.01	0.12	+0.05	0.42	+0.03

1/ All monthly changes are seasonally adjusted.

Trimmed mean approach

An alternative solution to the difficulties associated with leptokurtic distribution is to use limited-influence estimators, for example, the trimmed mean. These estimators provide more efficient estimates of the central tendency of the population by reducing the weights attributed to extreme price movements compared with the sample mean. The trimmed mean involves taking a weighted average of a subset of the CPI basket, which trims the most extreme movements in inflation.[18] The usual weighted average is a special case where none of the tails are trimmed, and the weighted median is another special case where 50 percent of the tails are trimmed from both sides.

However, if the distribution is not symmetric, we will need to trim the tails asymmetrically. For the sample period of 1991-1995, it is found that, in the case of the 25% symmetrically trimmed mean, the average of trimmed mean is downward biased compared with the average of sample mean (Table 5).[19] To eliminate the bias, an asymmetric trimmed mean was calculated, trimming more from the bottom than from the top, in order to raise the average of the remainder. A trimmed mean excluding 30 percent of the smallest and 20 percent of the largest changes in prices is found closest to the average of the sample mean. On the other hand, for the sample period of 1996-2000, a trimmed mean excluding 24 percent of the smallest and 26 percent of the largest is found to be closest to the average of sample mean.

[18] See Appendix A for the steps to calculate the trimmed mean of a distribution.

[19] The sample period is split into two sub-periods, 1991-1995 and 1996-2000, as they are under different baskets of expenditure weights.

Table 5. Rates of drift in price changes associated with different trimmed means relative to the headline CPI

1991-1995			1996-2000		
Inflation measure[1]	Average monthly change, %	Average drift vs. CPI	Inflation measure[1]	Average monthly change, %	Average drift vs. CPI
CPI	0.72		CPI	0.07	
Trimmed mean[2]			Trimmed mean[2]		
(25th, 25th)	0.62	–0.10	(25th, 25th)	0.09	+0.02
(30th, 20th)	0.73	+0.01	(24th, 26th)	0.07	0.00

1/ All monthly changes are seasonally adjusted.
2/ For example, (30th, 20th) denotes the trimmed mean excluding 30% of the smallest and 20% of the largest price changes.

Application to Hong Kong

The monthly changes of the headline CPI and the statistical-based measures are then converted into annual rate of inflation for comparison, as year-on-year change is more common for expressing the inflation rate.[20] Table 6 reports the average annual inflation rates and the standard deviations of changes in inflation rates of the above statistical-based core inflation measures and the headline inflation.[21] The core inflation rate based on the trimmed median appears to be less volatile than both the trimmed mean measure and headline inflation (see also Chart 8). However, the difference is not statistically significant.[22]

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[20] The annual inflation rate for the t th month is derived from $\left(\prod_{i=0}^{11}(1+\pi_{t-i})\right)-1$, where π_{t-i} denotes the monthly inflation rate for the (t-i) th month.

[21] The sample period is split into two sub-periods, 1991-1995 and 1996-2000, as they are under different baskets of expenditure weights.

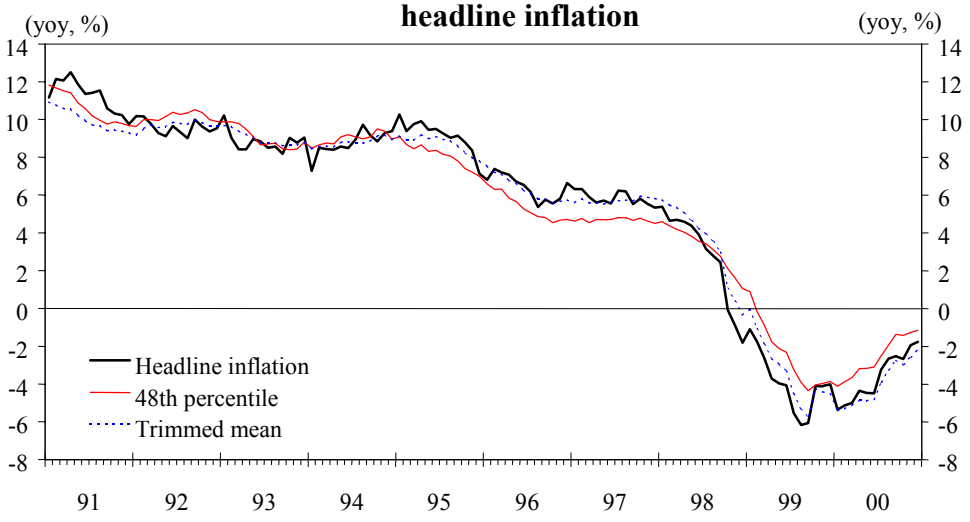
[22] Statistical tests suggest that the hypothesis of equal variances between headline inflation and various statistical-based core inflation measures cannot be rejected at 5% level of significance for quarterly data.

Table 6. Volatility of statistical-based measures and headline inflation

Sample period	Inflation measure	Average annual inflation rate, %	Standard deviation of change in annual rate	
			Monthly[1]	Quarterly[2]
1991-1995	Headline	9.5	0.6	0.6
	48th percentile	9.4	0.2	0.4
	Trimmed mean	9.2	0.2	0.3
1996-2000	Headline	1.5	0.7	1.3
	48th percentile	1.6	0.3	0.9
	Trimmed mean	1.6	0.5	1.1
1991-2000	Headline	5.5	0.6	1.0
	48th percentile	5.5	0.3	0.7
	Trimmed mean	5.4	0.4	0.8

1/ Calculated based on month-on-month change of annual inflation rate.
2/ Calculated based on quarter-to-quarter change of annual inflation rate.

Chart 8. Statistical-based core inflation and headline inflation



IV. Evaluation of Different Measures

This section discusses a few criteria for comparing different measures of core inflation, including credibility, robustness, efficiency, and predictive ability.

A. Credibility

A credible measure of core inflation should be transparent in its calculation, verifiable, easy to communicate, and widely recognized. The exclusion-based approach requires the identification of significant supply disturbances and other unrepresentative movements. The somewhat subjective nature of the judgement may possibly impair the credibility of the inflation measures. The statistical measures of core inflation, on the other hand, are both transparent and verifiable by independent observers. However, the justification for calculating trimmed mean and median is based on the non-normality of the inflation distribution and the inefficiency of the mean, with weights changing over time. These concepts may not be easy to explain to the general public.

B. Robustness

The exclusion-based approach may not be able to fully eliminate distortionary price shocks, if such shocks also affect other components remaining in the index. In addition, past volatility of particular series may not be a reliable guide to future volatility. Furthermore, if a measure of core inflation shows a systematically different trend than the series from which it is derived, it will provide false signals, leading to policy biases and undermining credibility. In this regard, the statistical approach appears to produce more robust measures. By design, they place reduced weights on large price movements from any source. The volatile or unrepresentative components are not pre-determined but are screened out through a statistical process.

C. Efficiency

A good measure of core inflation should be able to the extract most useful information from the headline inflation. A one-way Granger-causality test is conducted to examine whether the difference between core inflation rate (π^{core}) and headline inflation rate (π^{CPI}) contains useful information about future core inflation. The results, presented in Table 7, show that the null hypothesis that the lags of $\pi^{core} - \pi^{CPI}$ does not cause π^{core} (for lags = 1 to 12) cannot be rejected for any of the core inflation measures. That is, the items excluded from CPI inflation does not contain leading information about the core inflation, suggesting all the measures are efficient.

Table 7. Granger-causality tests for different core inflation measures

	CPIxFEA	CPIxFEAR	48th percentile	Trimmed mean
F-statistics	0.62	1.56	1.14	0.82

A F-test is performed to test the null hypothesis. All F statistics indicate that the null hypothesis cannot be rejected at 5% level of significance. The sample period is 1991-2000.

D. Predictive ability

A good measure of core inflation should help predict future inflation in overall CPI. Following Clark (2000), the predictive ability can be based on the notion that, if current overall inflation differs from the underlying trend rate, overall inflation should move toward trend. Thus, the predictive content in alternative measures of core inflation can be tested by regressing the change in future overall inflation on the gap between current core and overall inflation. The gap in this context is taken as the deviation of overall inflation from its trend. The equation can be specified as follows:

$$\pi_{t+h}^{CPI} - \pi_t^{CPI} = \alpha + \beta\left(\pi_t^{core} - \pi_t^{CPI}\right) + \varepsilon_t$$

where the parameter *h* takes the values of 3, 6 and 12 (months). The regression results, as presented in Table 8, suggest that all core inflation measures have satisfactory predictive content for future overall inflation. Among the different measures, the 48th percentile price change produces the highest R^2 value and most significant coefficient for β.

Table 8 Summary of regression results

	CPIxFEA	CPIxFEAR	48th percentile	Trimmed mean
		3-month ahead (h = 3)		
β =	0.73	1.07	1.24	1.29
	(2.97)	(6.46)	(8.72)	(7.71)
R^2 =	0.11	0.44	0.52	0.37
Q = (lag =1)	0.40	0.03	0.04	0.31
		6-month ahead (h = 6)		
β =	0.77	0.92	1.07	1.25
	(3.89)	(6.83)	(8.21)	(8.79)
R^2 =	0.13	0.35	0.41	0.37
Q = (lag =1)	0.13	1.41	0.07	0.08
		12-month ahead (h = 12)		
β =	0.58	0.90	1.19	1.21
	(2.22)	(5.83)	(10.79)	(6.33)
R^2 =	0.06	0.27	0.44	0.30
Q = (lag =1)	1.07	0.25	4.87	5.10

The t-statistics are given in parentheses, which indicate that all the coefficients are significantly different from zero at the 5% level. The standard errors are calculated using the Newey-West method. The sample period is 1991-2000.

V. CONCLUSION

Core inflation measures are useful for summarizing information about the persistent component of the inflation rate, and for separating temporary factors that are unrepresentative of the overall price movements. The high kurtosis of the distribution of price changes in Hong Kong's CPI basket suggests that a median-based measure of price change is likely to be more efficient and more robust than the arithmetic mean. The comparative analysis presented in this paper suggests that the core inflation measure based on the 48th percentile price change has superior properties than other core inflation measures, as this measure has the lowest volatility and best predictive ability compared with other measures. However, it is worth noting that the various core inflation measures are not significantly different from the headline inflation in terms of their trends and volatility. This suggests that the headline inflation is a good indicator of underlying inflation in Hong Kong.

Appendix A

Technical note

This note sets out the steps to compile the corresponding percentile ranking of a sample mean, to determine the value of a particular percentile, and to compute the trimmed mean.

a. ***Percentile ranking of a sample mean.*** The corresponding percentile ranking of a sample mean for each month can be found using the following steps.

1. Compute the monthly percent changes for each CPI component.

2. Sort the price changes for each component from smallest to largest, along with the corresponding weights. The ordered inflation rates and weights are denoted, respectively, as π_i and w_i, $i = 1,2,\ldots,n$.

3. Calculate the cumulative sum of the sorted weights for each ordered price change i. For example, the cumulative weight associated with π_3, the third-ranked price change, equals $w_1 + w_2 + w_3$.

4. Set the *percentile ranking* equal to the cumulative weight, at which the price change is equal to the sample mean of the distribution.

b. ***Percentile price change***. The kth percentile of the distribution of price changes for each month can be determined using the following steps:

1. Follow steps 1-3 of part a.

2. Set the *percentile price change* equal to the first price change with a cumulative weight greater than or equal to k percent.

c. ***Trimmed mean.*** The trimmed mean, excluding α and β percent of the weights from the left and right tails respectively, for each month can be computed using the following steps:

1. Follow steps 1-3 of part a.

2. Exclude those percentage changes in price for which the cumulative weight is either less than α percent or greater than (100-β) percent.

3. Computed the *trimmed mean* inflation rate as

$$\left(1 / \sum_{i} w_i\right) \sum_{i} w_i \pi_i ,$$

where the summations start with the first ordered price change to be included and end with the last ordered price change to be included.

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