IMPROVING THE MEASUREMENT OF CORE INFLATION

IN COLOMBIA USING ASYMMETRIC TRIMMED MEANS

by Carlos Felipe Jaramillo[1]

I. INTRODUCTION

Variations in the Consumer Price Index (CPI) are a key source of information about inflationary trends for monetary authorities. However, month to month movements may often be misleading. Monthly CPI changes are notorious for their volatility and frequent short-term swings. The noise in high-frequency CPI data is compounded by flaws in the standard measure of overall inflation—i.e., the weighted mean of price changes. This measure is a least variance estimator of economy-wide price changes only if the price change distribution is normal. Empirical studies have rejected this assumption for a large spectrum of countries.[2]

A popular method to deal with the noise in price data is to eliminate the food and energy components from the CPI. By excluding sectors that are presumed to exhibit a high noise-to-signal ratio, the remaining index is expected to be dominated by items that contain more information about persistent trends in prices. Successful application of this technique requires that food and energy sectors have little influence in long-term inflationary trends, a valid assumption when they represent a relatively minor share of the consumer basket. This requirement is often not met in low and middle income economies, where food expenditures, in particular, may account for a large share of consumer outlays.

Recent work on improved indicators of underlying inflation suggest that statistics such as the median price change and trimmed averages (i.e., means of subsamples of component CPI price change information) may have desirable characteristics (Bryan and Ceccheti, 1993a).[3] Broadly, these indicators reduce the influence of highly volatile prices, irrespective of their sector of origin. Unfortunately, little effort has been made to evaluate how much improvement can be expected from these estimators. A pioneering effort in this area is the recent evaluation of symmetric trimmed means for the U.S. by Bryan et al. (1997).

The present study is aimed at evaluating the potential gains of using asymmetric trimmed means as estimators of underlying inflation. Specifically, it

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[2] See, for example, Rae (1993) on New Zealand, Mizon et al. (1990) on the UK, Ball and Mankiw (1995) on the US, Blejer (1983) for Argentina and Jaramillo and Córdoba (1997) on Colombia.

[3] Bryan and Ceccheti (1993b) have also proposed an alternative inflation index derived from a dynamic factor model, which corrects some of the CPI's weighting bias.

computes optimal asymmetric trimmed means and evaluates their efficiency vis-a-vis standard indicators. Calculations are made for Colombia, a country with a rich history of high and variable inflation rates.

Results indicate that an optimally trimmed estimator for the 27 component Colombian CPI during the 1972 :06 to 1997 :12 period requires that 12 percent be trimmed from the upper tail and 24 percent from the upper tail. This indicator exhibits substantially higher efficiency than a number of alternatives, including the weighted average of price changes, the CPI excluding food and energy, the median and symmetric trimmed means. Findings are robust to changes in the 36 month centered moving average benchmark of annual inflation. It is concluded that asymmetric trimmed means seem best suited to deal with the non-normality of price change distributions which have been documented in Colombia (Córdoba, 1995; Jaramillo and Córdoba, 1997).

The optimal estimator is not found to be robust to changes in data sample. This is likely due to changes in parameters of the underlying data distribution, probably linked to structural changes in the Colombian economy after 1990. Optimal levels of asymmetrical trimming are also found to be highly sensitive to the degree of disaggregation of the CPI data. This is expected since greater disaggregation reveals higher kurtosis and skewness of the underlying data.

The next section describes key characteristics of price change distributions in Colombia. Section III introduces symmetrical and asymmetrical trimmed means and presents estimates of an optimal trimmed mean estimator for Colombian inflation, using data for the 1972 :06 to 1997 :12 sample. Further sections explore the robustness of the result to changing the measurement benchmark, to varying the data sample and to a higher level of disaggregation of the CPI. A final section offers some concluding remarks.

II. CHARACTERISTICS OF PRICE CHANGE DISTRIBUTIONS

Short-term variations in the CPI tend to be highly variable. As a result, it is often difficult to judge whether short-term variations are indicative of more permanent changes or simply transitory phenomenon unrelated to underlying trends.

An aggravating factor is that month-to-month changes in many of the component CPI indexes tends to be highly seasonal. Ideally, all seasonality should be filtered out in order to facilitate detection of trends in core inflation. However, not many countries enjoy the luxury of having access to CPI data that has been processed to remove seasonality. For example, in Latin America, virtually no official CPI is treated for seasonality. Economists tend to deal with this issue by examining annual variations in monthly CPI indexes.

Figure 1 presents Colombian monthly inflation rates—derived from annual index variation—for the period 1973 :06 to 1997 :12.[4] In this period, inflation has been high and variable, a feature typical of many Latin American economies, although Colombian prices have not suffered from hyperinflation episodes. The average inflation rate was 20.7 percent, with maximum and minimum values of 31.0 and 12.1 percent, respectively.

Figure 1 also contrasts monthly inflation rates with a 36-month centered moving average. The comparison illustrates that monthly rates contain substantial noise. Deviations from the moving average trend are often large and suffer from frequent reversals. The standard deviation of the difference between the monthly variation and the moving average price change is 2.7 percentage points.[5]

Food and energy prices are often blamed for causing the bulk of the short-term noise in CPI information. Consequently, analysts often exclude these components from the CPI when looking for underlying trends. Figure 1 illustrates how this adjusted version of the CPI does little better in following long term trends. Interestingly, the standard deviation of the series excluding food and energy is insignificantly higher (3.48) than that for the full series (3.46). The standard deviation of the difference between the adjusted CPI and the 36-month moving average is 2.2 percentage points. A 90 percent confidence interval for this difference ranges from +1.96 to -5.30 percentage points, which indicates that excluding food and energy prices introduces a substantial downward bias in the adjusted estimator.[6] This is likely a result of the long-term upward trend in aggregate retail food prices that has been registered in Colombia since the early 1970s (Jaramillo et al., 1997).

To understand the nature of the noise in inflation data, it is useful to explore the characteristics of price change distributions. Table 1 presents descriptive statistics for the cross-sectional distribution of Colombian monthly price changes at overlapping horizons of one to twenty-four months. The data used corresponds to the 27 component series for the period 1972 :06 to 1997 :12.

The noteworthy characteristic is that price change distributions are not normal.[7] Distributions tend to show significant kurtosis (i.e., fat tails) and high absolute degrees of skewness. Large degrees of asymmetry are the consequence of a disproportionate concentration of prices on one side of the mean, without a corresponding concentration on the other side. Although the statistics show that

[4] The inflation rate is constructed from the 27 component CPI available from Banco de la República.

[5] A 90 percent confidence interval for this difference ranges from +4.42 to -4.43.

[6] The confidence interval must only be interpreted as an informal measure of deviations from the 36-month moving average, since there is evidence that inflation indicators may be non-stationary.

[7] Jarque-Bera tests reject normality for all frequencies.

on average the degree of skewness is not significantly different from zero at any frequency, the standard deviation suggests that high absolute levels of skewness are a common feature. Further, positive skewness is also a more frequent characteristic of the data (Jaramillo and Córdoba, 1997). Skewness is positive in 196 of 295 annual observations and in 219 of 306 months, suggesting that significant concentrations of price changes on the upper tail of the distribution is a more common phenomenon than the reverse.

Price change distributions also display tails with significantly more weight than corresponding normal distributions. At annual frequencies, the average weighted kurtosis is 3.6. Jaramillo and Córdoba (1997) have shown that the high levels of kurtosis and skewness displayed by Colombian CPI data are significantly different from zero and that normality can be rejected at monthly, quarterly and annual frequencies.[8]

Another interesting feature of price changes is the tendency for non-normality symptoms to decrease as the horizon increases. This has been noted in price change distributions in several countries, and has been taken as evidence that for sufficiently high frequencies, price change distributions will approach normality (Córdoba, 1995).

Non-normality of price change distributions has been commonly interpreted to reflect costly price adjustment (see, for example, Ball and Mankiw, 1995). Such costs may lead to unchanging prices in the short-run, even in the face of sectoral deviations from optimal frictionless prices. However, as the span between price changes increases, price adjustments are often assumed to respond to desired changes (Fischer,1981; Blejer, 1983).

In the following sections, the implications of non-normality in price change distributions for the design of efficient inflation estimators is pursued. Specifically, a family of estimators that are robust to the presence of non-normality will be discussed and applied to the case of Colombia.

III. CALCULATING OPTIMAL TRIMMED ESTIMATORS

In this section, an efficient indicator of inflation is designed for settings where these distributions are non-normal. In section A, the concept of symmetrical and asymmetrical trimmed means are introduced as well as the reasons why they may be superior to the mean in the face of non-normal price change distributions. In section B, an optimal trimmed mean estimator is computed for Colombia, using the entire 1972 :06 to 1997 :12 sample available. The remaining sections explore the robustness of this result. In section C, the implications of changing the

[8] Jaramillo and Córdoba (1997) use Jarque-Bera tests for normality using disaggregated CPI data from 1982 :03 to 1996 :09.

measurement benchmark from a 36 month moving average to 24 and 48 months is explored. In section D, the optimal trimmed mean is calculated for two time periods, in order to test the stability of the estimator. Finally, section E explores the effect of disaggregated data over a shorter time period on the optimal trimming procedure.

A. Trimmed means

Trimmed means have been increasingly used in recent years as indexes of underlying inflation, usually as alternatives to the CPI excluding food and energy. In simple terms, centered (or symmetrical) trimmed means are the average of a selected portion of the price change distribution. The portion is chosen so that the tails of the distribution are excluded. For example, the algorithm to calculate a 10 percent trimmed mean begins by ordering the sample of price changes, removing the upper and lower 10 percent of the observations and then calculating the mean of the remaining sample. In the weighted version, observations accounting for the top and bottom 10 percent of the CPI weights are removed.

More formally, following Bryan et al. (1997), to obtain the α-trimmed mean , the sample must be ordered, $\{x_1,..x_n\}$, as well as the associated weights $\{w_1, ...w_n\}$. Define W_i as the cumulative weighted from 1 to i; that is $W_i \equiv \sum_{j=1}^{i} w_j$. Then the observations to be averaged for the calculation are the i's such that $\frac{a}{100} < W_i < \left(1 - \frac{a}{100}\right)$. This set is defined as I_α. The weighted α-trimmed mean can thus be defined as :

$$\bar{x}_a = \frac{1}{1 - 2\frac{a}{100}} \sum_{i \in I_a} w_i x_i .$$

Two special cases are the sample mean, $\bar{x}_0$, and the sample median, $\bar{x}_{50}$.

Uncentered (or asymmetrical) trimmed means are obtained by trimming disproportionately more from one tail than the other. Calling c the centering parameter, define the asymmetrical trimmed mean $\bar{x}_{i,c}$ as an average calculated by trimming i percent of the weight from the upper tail and i+c percent of the weight from the lower tail. The parameter c can be negative, in order to allow for greater trimming of the positive tail.

Sample means are the most efficient estimators of the population mean when data are drawn from a normal distribution. However, in the presence of non-normal distributions, the sample mean will not be the most efficient estimator. Bryan et al. (1997) demonstrate that trimmed means are more efficient when the distribution exhibits non-normal levels of kurtosis. Also, as the level of kurtosis increases, the level of trimming must increase to preserve efficiency. Uncentered trimmed means can be more efficient than symmetrical trimmed means when the underlying distribution tends to display persistent asymmetries.

B. The Baseline Computation of Optimal Trimmed Means

Before proceeding with the actual computation of optimal trimmed indicators, a measure of the population mean that is being estimated is needed. This is a tricky problem, given that what is needed is an unbiased measure of underlying inflation. In the literature, such measures have been usually approximated by some sort of smoothing procedure, including simple moving averages or Hodrick-Prescott filtering. These procedures appeal to monetary authorities because they tend to give some weight to present, past and future inflation levels, while removing short-term fluctuations (Blinder, 1997). Following Ceccheti (1997), the computations will use the 36-month centered moving average of actual annual inflation. In a later section, sensitivity analysis to changes in the benchmark chosen will be presented.

Using historical data for the 27 component Colombian CPI for the 1972 :07 to 1997 :12, the root mean squared error (RMSE) and mean absolute deviation (MAD) for each of the trimmed estimators was calculated. [9] Trimmed estimators were calculated by trimming from 0 percent to 50 percent from the tail and varying the centering parameter (c) from -50 percent to 50 percent.

The minimum RMSE was found with a centering value of 12 percent and an optimal trim of 12 percent ($\bar{x}_{12,12}$)—12 percent is trimmed from the upper tail and 24 percent from the lower tail. Optimal trimming reduces RMSE by 19.9 percent with respect to the weighted mean.[10] On the other hand, the minimum MAD was found with $\bar{x}_{13,11}$. The optimal estimator reduces MAD by 10.5 percent with respect to the mean. However, MAD efficiency is only slightly inferior for $\bar{x}_{12,12}$, for which the mean absolute error is reduced by 9.8 percent.

Trims in the neighborhood of this estimator perform nearly as well as can be seen in the rough confidence regions plotted in Figures 2 and 3.[11] In the Figure,

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[9] During the span of the data sample, reweighting revisions of the CPI took place in January 1979, and January 1989.

[10] Interestingly, the efficiency gain of nearly 20 percent is virtually identical to that obtained by Bryan et al. (1997) in their computation of symmetrical optimal trimming with US CPI data for the 1967 :02 to 1997 :04 period.

[11] The highly non-linear character of the loss functions suggest the possibility that estimators wide apart in c and α values can be close in efficiency. This is why MAD results in Figure 3 depicts two separate clusters of optimal indicators within 5 percent of the optimal mean. This discontinuity is a feature of the data and was also found with US data by Bryan et al. (1997) in some of the samples they explored.

combinations of α and c for which the RMSE is within 5 percent of the optimal estimator are marked with an X. Since the optimal trimmed mean of $\bar{x}_{12,12}$ yields an RMSE of 2.14, all the combinations of α and c marked with an X in Figure 2 exhibit RMSE values below 2.14 *1.05= 2.25.

Whether symmetrical or asymmetrical trimming is a more efficient procedure can be directly evaluated. The efficiency of the asymmetrical estimator can be evaluated by comparing the RMSE of the best estimator that can be obtained when the centering parameter is restricted to a value of zero (i.e., symmetrical trimming). With respect to this benchmark, asymmetrical trimming improves RMSE efficiency by 17.6 percent and MAD efficiency by 6.4 percent. This significant improvement can be confirmed by noting that no symmetrical trimmed mean lies within the 5 percent confidence region.

With respect to the direction of the asymmetry, the optimal estimator requires higher trimming of observations on the lower tail (i.e., below the mean). This suggests that some prices in the upper tail of the distribution have more valuable information about inflation persistence than those in the lower tail. Note that in positive tails tend to include a disproportionate fraction of food and energy items, as well as government regulated goods and service prices (Jaramillo and Córdoba, 1997). Some analyses have suggested that positive skewness is a feature of periods of persistent increasing inflation in Colombia. On the other hand, negative skewness seems to be related only to short-term drops in inflation. Interestingly, negative tails include almost exclusively perishable food prices, items that usually exert only a passing influence on aggregate price trends.

Table 2 compares the efficiency of alternative estimators of inflation. The optimal asymmetrical trimmed mean is most efficient in comparison with the untrimmed mean, the median, CPI without food and energy as well as the symmetrical optimally trimmed mean. Excluding food and energy actually worsens efficiency with respect to the mean. Trimming symmetrically helps but yields substantially smaller gains.

Figure 4 plots the RMSE of various indicators over different 10-year sample periods. As is evident, the efficiency gain of the optimal asymmetric trimmed mean seems to be highest for the earlier part of the sample. After 1988:12, the efficiency gain with respect to the mean is sharply reduced. However, this optimal indicator exhibits the highest efficiency throughout the period. The median exhibits lower efficiency than most alternative estimators throughout most of the sample. The CPI excluding food and energy performs well only until 1986; after this date, this indicator exhibits the highest RMSE levels.

C. CHANGING THE BENCHMARK

To check the robustness of the results reported in the previous section, alternative benchmark measures of underlying inflation were used. Using a 24-month moving average of inflation, the optimal asymmetrical trimmed mean based on the RMSE criterion is the same as with the 36-month benchmark (i.e., $\bar{x}_{12,12}$). With a 48-month moving average, the trimmed mean indicator $\bar{x}_{10,14}$ yielded maximum efficiency, although the improvement with respect to $\bar{x}_{12,12}$ is slight.[12]

Figures 5 and 6 report 5 percent RMSE confidence regions for 24 and 48 month moving average benchmarks. The regions include the optimal indicator found with the 36 month moving average (i.e., $\bar{x}_{12,12}$). Similarly, the confidence region found for the baseline benchmark also included the optimal values of c and α found for the 24 and 48-month moving average cases. Results suggest that while point estimates of c and α may vary slightly depending upon the benchmark used, the confidence regions are strikingly similar. However, the "size" of the confidence region seems to broaden as a higher moving average is used. While the confidence region for the 24-month case contains 26 possible combinations of c and α, that for the 36 and 48-month computations contain 43 and 52 combinations, respectively.

Finally, it is worth examining the relative performance of the median (i.e., the trimmed indicator $\bar{x}_{50,0}$), an indicator which has been explored in recent work (Bryan and Ceccheti, 1993a; Córdoba, 1995; Melo et al., 1997). This estimator does not appear in the confidence regions for any of the benchmarks examined. Asymmetrical and symmetrical trimmed means offer superior efficiency for the periods and benchmarks explored. These results warn against using this indicator in price environments like that prevailing in Colombia.

D. SAMPLE PERIOD

Another test of robustness of the results reported in previous sections requires examining alternative sample periods. So far, it has been assumed that the data sample generated is derived from a population distribution which does not change with time. This may be a very strong requirement for a middle-income country like Colombia, where rapid and dramatic structural changes have been taking place in the economy in the past three decades.

A simple test of sample period robustness was performed by splitting the data sample into two periods. The first period is 1972 :6 to 1988 :12. The second

12 Similar results were found using MAD as a criterion. With a 24-month moving average, optimal trimming takes place at $\bar{x}_{12,12}$, with 36 months $\bar{x}_{13,11}$ and with 48 at $\bar{x}_{11,10}$. Differences in efficiency between these three estimators is small.

period, 1989 :01 to 1997 :12, was selected to coincide with the dates where the most recent revision of CPI weights and methodology has been applied.[13]

Point estimates for the optimal asymmetrical trim for both subsamples appear in Table 3, as well as indicators of efficiency gains versus alternative indicators. For the first period, a minimum RMSE is obtained for $\bar{x}_{7,17}$, which improves efficiency by 22.8 percent. For the second period, the optimal indicator is $\bar{x}_{38,7}$, with a reduction in RMSE of 11.5 percent. Only the optimal estimator for the first subsample falls in the confidence region obtained for the complete sample.[14] On the other hand, the confidence region for the most recent subsample does not overlap with the full-sample region, lying within values for α of 37 and 40 percent and c of 4 and 8 percent.

The instability of the optimal values of α and c suggests an important change in the underlying distributional characteristics of the price change population after 1989. This is not entirely surprising due to several important changes in the Colombian economy in this period. Sweeping trade liberalization reforms were enacted starting in 1990 and Central Bank independence was established by a new Constitution in 1991. As a result of these changes, inflation began to decline gradually after 1990. The application of new weights and methodologies to gather CPI data starting in 1989 may also be reflected in the results.

E. EFFECT OF DISAGGREGATION

So far, results have been reported for CPI data disaggregated into 27 components. However, data is available for the 195 components starting in 1989 :01. Whether the asymmetric optimal trim obtained for the aggregated CPI is robust to this change depends on whether the characteristics of the underlying price change distribution are comparable. However, the evidence from several countries suggests that non-normality symptoms are accentuated proportionately with the degree of disaggregation.

Table 4 displays descriptive statistics for the monthly price change distribution of using the 195 components for the 1989 :01 to 1997 :12 period. The point estimates of the average levels of standard deviation, skewness and kurtosis are all greater for all frequencies than those obtained with 27 components, although the differences do not seem to be statistically significant. However, this

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[13] The most recent revision of the Colombian CPI was performed in December of 1988, when a new set of weights based on household expenditure surveys for 1984-5 were applied. These weights were applied through the end of the sample examined in the calculations in the text.

[14] Inspection of the confidence region obtained for the 1972:06 to 1988:12 subsample (not reported) suggests that the optimal c increases and α falls slightly with respect to the region obtained with the full sample.

is due to the much higher variability of monthly statistics obtained with 195 components. Figure 7, displays monthly kurtosis for the annual frequency for both levels of disaggregation. The higher degree of variability of the disaggregated series is evident as well as the higher average value, which is 2.8 times greater than the 27-component version.

The optimal asymmetric trimmed mean for the 195 component CPI using the minimum RMSE criterion is $\bar{x}_{13,2}$, a value outside of the confidence interval of the 27-component computation. The RMSE confidence region of this computation only includes 8 combinations of α and c within 5 percent of the highest efficiency combination – $\{\bar{x}_{15,0}, \bar{x}_{16,0}, \bar{x}_{14,1}, \bar{x}_{15,1}, \bar{x}_{13,2}, \bar{x}_{14,2}, \bar{x}_{12,3}, \bar{x}_{13,3}\}$.[15] The optimal asymmetric trimmed mean for the 27-component CPI—i.e., $\bar{x}_{38,7}$—is not included in the confidence region.

The results indicate that the underlying populations are different, confirming the large differences in the statistics of the price change distribution. Clearly, optimal trimming strategies are highly sensitive to the degree of disaggregation of the primary trim, confirming findings by Bryan et al. (1997) in their calculation of symmetrical trimmed means for the U.S.

IV. CONCLUSION

This study has put into practice methods to evaluate efficient indicators of underlying inflation. It has also demonstrated the importance of designing appropriate indicators suited to environments where price change distributions are non-normal.

Results indicate that an optimally trimmed estimator for the 27 component Colombian CPI during the 1972 :06 to 1997 :12 period requires that 12 percent be trimmed from the upper tail and 24 percent from the lower tail. This indicator exhibits substantially higher efficiency than the weighted average of price changes (i.e., CPI inflation), the CPI excluding food and energy, the median and symmetric trimmed means. These findings are robust to changes in the 36 month centered moving average benchmark of annual inflation.

The optimal estimator is not found to be robust to changes in data sample. This is likely due to changes in parameters of the underlying data distribution due to structural changes in the Colombian economy, particularly in the 1990-96 period. Optimal levels of asymmetrical trimming are also found to be highly sensitive to the degree of disaggregation of the CPI data. This is expected since greater disaggregation reveals higher kurtosis and skewness of the underlying data.

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15 The MAD confidence region contains 10 combinations of α and c which roughly correspond to those found using RMSE.

The CPI excluding food and energy and the median do not seem to provide persistent efficiency gains in estimation of inflation with respect to the weighted mean. Food and energy prices are critical sectors of middle income economies such as Colombia and contain valuable information about medium and long-term trends in inflation. Finally, the median excludes many prices – especially those in the upper tail – that seem to contain valuable information about long-term trends in inflation.

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Table 1
Deviations from 36 Month Moving Average

	Monthly	Quarterly	Annual	24-month
	Standard Deviation			
Mean	2.339	4.773	7.720	11.023
STD	1.072	1.857	2.429	2.216
	Skewness			
Mean	0.915	0.455	0.241	0.108
STD	1.998	1.706	0.789	0.519
	Kurtosis			
Mean	9.776	7.520	3.576	2.867
STD	6.867	4.617	1.806	1.017

Table 2
Efficiency of Inflation Estimators

	CPI 1972:06-1997:12 RMSE	MAD
Mean ($\bar{x}_{0,0}$)	2.68	1.84
ex Food & Energy	2.70	2.19
Median ($\bar{x}_{50,0}$)	2.83	2.02
Optimal Sym. Trim ($\bar{x}_{0,0}$)	2.60	1.75
Optimal Asym. Trim ($\bar{x}_{12,12}$)	2.14	1.64

All values are computed from annual changes. Deviations are from the 36-month centered moving average. The optimal trim is the trim that minimizes either MAD or RMSE.

Table 3
Efficiency of Inflation Estimators

	CPI 1972:06-1988:12		CPI 1989:01-1997:12	
	RMSE	MAD	RMSE	MAD
Mean	3.22	2.37	1.07	0.82
ex Food & Energy	3.29	2.76	2.76	1.13
Median	3.41	2.63	1.10	0.89
Optimal Sym. Trim	3.12	2.16	1.07	0.82
Optimal Asym. Trim	2.44	1.97	0.95	0.74
Optimal Asym. Trim Parameters	$\bar{x}_{7,17}$	$\bar{x}_{14,7}$	$\bar{x}_{38,7}$	$\bar{x}_{38,7}$

All values are computed from annual changes. Deviations are from the 36-month centered moving average. The optimal trim is the trim that minimizes either MAD or RMSE.

Table 4
Deviations from 36 Month Moving Average

	Monthly	Quarterly	Annual	24-month
	Standard Deviation			
Mean	2.936	5.945	9.390	13.621
STD	0.928	1.165	1.252	1.343
	Skewness			
Mean	1.107	0.641	0.529	0.200
STD	2.673	2.224	0.986	0.485
	Kurtosis			
Mean	33.875	25.273	10.124	4.807
STD	20.533	16.655	4.053	1.320

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ABSTRACT

The study evaluates the virtues of asymmetric trimmed means as efficient estimators of inflation for Colombia, an economy with high and variable inflation rates. Results suggest that the proposed indicators are more efficient than alternative indexes and are particularly suited for environments where price change distributions are non-normal.

Computations indicate that an optimally trimmed estimator for the 27-component Colombian CPI during the 1972 :06 to 1997 :12 period requires that 12 percent be trimmed from the upper tail and 24 percent from the lower tail. This indicator exhibits substantially higher efficiency than the weighted average of price changes (i.e., CPI inflation), the CPI excluding food and energy, the median and symmetric trimmed means. These findings are robust to changes in the 36-month centered moving average benchmark of annual inflation.

The optimal estimator is not found to be robust to changes in data sample. This is likely due to changes in parameters of the underlying data distribution due to structural changes in the Colombian economy, particularly in the post 1990 period. Optimal levels of asymmetrical trimming are also found to be highly sensitive to the degree of disaggregation of the CPI data. This is expected since greater disaggregation reveals higher kurtosis and skewness of the underlying data.

The CPI excluding food and energy and the median do not seem to provide persistent efficiency gains in estimation of inflation with respect to the weighted mean. Food and energy prices are critical sectors of middle income economies such as Colombia and contain valuable information about medium and long-term trends in inflation. Finally, the median excludes many prices—especially those in the upper tail—that seem to contain valuable information about long-term trends in inflation.

5% Confidence Region: RMSE 36 MA, 1972:06-1988:12

TRIMMING PERCENTAGE

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C   0    5    1    1    2    2    3    3    4    4    5
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5% Confidence Region: RMSE 36 MA, 1989:01-1997:12

Trimming Percentage

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C    0         5         1         1         2         2         3         3         4         4         5
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 8 | - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - X - - - - -
 9 | - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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