Relative price variability: which components of the CPI contribute toward its variability?

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This paper follows work by Choi *et al* (2011), deviating from their analysis by looking at the relative price variability of selected components of the CPI rather than an aggregated measure. The purpose of this work is to analyse which components are more variable and to see if there has been a change in the relative price variability (mean, distribution) since the adoption of inflation. A semi-parametric methodology has been used, and the relative price variability of components pre-inflation targeting and during the inflation targeting era considered to see if the relationship of the components relative price variability's produces similar results to those presented for aggregate headline CPI for South Africa in Choi *et al* (2011). The results suggest that in most cases, the components of the CPI have experienced decreased mean inflation rates and narrower distributions during the inflation targeting period with the changes in the mean and distribution of relative price variability decreasing and narrowing in most cases. Furthermore, the nature of the relationship of the relative price variability of the components with inflation seems to fit a quadratic specification well with a minimum relative price variability at a positive rate of inflation. These results are found to be fairly robust during the period tested.

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1. Introduction

A recent study by Choi *et al* (2011) looks into the relationship between relative price variability and inflation for a number of countries with the intention to see if the adoption of inflation targeting has an effect on the mean and distribution of inflation and relative price variability (RPV) and the relationship between inflation and RPV. The study, in which some of the countries in the sample are dubbed high-inflation countries, and others are dubbed low-inflation countries, some adopt inflation-targeting during the period under review and some do not, suggests that countries with initially high inflation experience a decrease in mean inflation, RPV and their distributions. South Africa is included in the sample of countries that are high-inflation countries (prior to adopting inflation targeting). The results suggested that, for South Africa, the adoption of inflation targeting lead to a decrease in the mean and distribution of inflation and RPV. Furthermore, the paper found that the relationship between inflation and RPV in South Africa to be U-shaped (prior to and after the adoption of inflation targeting, although the rate of inflation at which RPV is minimised falls in the post adoption period).

The motivation to study RPV is that it is the best available variable from which to infer the effect of price changes to individual goods and services (rather than general price level changes) on the welfare of the consumer, albeit an indirect measure (Fischer, 1981). Inflation is define as a general price increase in the cost of living – thus the change in price of individual good or services does not necessarily lead to an increase in inflation[1]. Prices of different goods and services are have been found to exhibit different degrees of price stickiness in South Africa (Creamer and Rankin, 2007) which could then lead to increased RPV when the general price level rises or falls. It is this change in the relative prices that can lead to consumers having to change the proportion of income that is spent on these goods and services – potentially impacting negatively on the welfare of the consumer.

This field of study is concerned with the effect that individual price changes will have on relative prices and the resulting consumer mix that is chosen. For example individual price increases could lead to increased relative prices against those goods and services that have

[1] Although Vining and Elwertowski (1976) do find, that in the case of the US, inflation can be caused by extreme increases by few goods or services in the relevant inflation basket.

had no price changes (or changes in the opposite direction) [2]. This would require that the consumer alter their consumption mix (and if there is no change in income, not only will they change the consumption mix, but they will also find themselves consuming at a lower level of utility), with luxuries and non-necessities likely to be the first items to be re-prioritised. Given the argument thus far, it could be concluded that a decrease in individual prices could equivalently lead to an increase in utility/welfare as the consumer is always optimising. This might not be the case though if the variability is somehow tied to misperceptions as to the state of the economy. Continuing from the consumer's point of view, if a change in the price of a number of items in the consumer mix is viewed to be inflationary (when in fact it is not), then a consumer might end up purchasing a mix of goods and services which are at a non-optimising level. This could also be the case if inflation is perceived as relative price changes. Similarly from the production side, a firm that views a price increase for their product to be inflationary might alter their production mix differently than if it was an increase in their product price relative to other goods (perhaps due to increased demand) and thus if the firm incorrectly identifies the process leading to the increased price, they might alter their output incorrectly leading to the firm to produce at a non profit maximising level (Bleijer and Leiderman, 1982). Further reasons given by Bleijer and Leiderman as to why RPV should ideally be minimised is that high RPV will decrease the value of prices as signals and will shorten contract times (and therefore increase contracting costs).

The latter part of the above scenario suggested at least one reason as to why there could be some kind of relationship between inflation and RPV. Fischer (1981) presents a useful summary of the types of relationships between inflation and RPV that are hypothesised and tested in the literature. He first suggests that the literature on the relationship between RPV and inflation falls into two broad categories of theories. These can be further disaggregated into six sub-categories into which the literature on the relationship between RPV and inflation fall. The first category are models with rational expectations, market clearing and misperceptions such that unexpected changes in the price level will lead to higher RPV. All of this is powered by an unexpected change in the money supply, however, as much policy making is based more on interest rates than on money supply, it is likely that unanticipated interest rate changes would have a similar effect. The next model is based on a menu cost approach, in which inflation is assumed to be exogenous. Due to staggered price setting, not

[2] And indeterminate relative price changes if prices move in the same direction.

all prices change to ensure that relative prices remain the same at the same time leading to an increase in relative prices. In this model increasing and decreasing inflation can lead to increased RPV. The next relationship is based on the assumption that RPV is exogenous as prices are sticky downward, thus when there is excess demand for goods and services, prices can increase, but when there is excess supply, prices do not decrease. In this case, high price variability leads to higher inflation. Next Fischer describes models in which shocks in the economy affect many aspects of the economy including inflation and RPV. In this case shocks to the economy can affect both inflation and RPV, although due to various factors the speed of reaction of these two variables to the shocks may be different. For example, if the shocks cause a shift in demand from one good to another, the changes in the prices of the two goods are not necessarily going to be proportional to the change in demand due to different price elasticity's. Another set of models observed are those in which macroeconomic policy results in increased inflation and increased RPV. The mechanism here is such that a change in government spending will alter the composition of final demand and hence causing a change in the rate of inflation and relative prices. Finally models in which macroeconomic policy is accommodating to moderate the effect of economic shocks on output, RPV and employment at the expense of low inflation is the last category of model outlined by Fischer. In this model, it is expected that the monetary authority uses accommodating monetary policy to mitigate the effects of real shocks on real output that usually lead to increased RPV and unemployment. This policy stance is expected to lead to increased inflation.

When tested empirically, there has been a lot of support for a positive relationship between inflation and RPV (see Parks, 1978 and Domberger, 1987), although tentative evidence of a U-shaped (quadratic) relationship did arise in Logue and Willet (1976). Vining and Elwertowski (1976) found that the distribution of individual prices (in the consumer price index (CPI)) is not stable over time with a relationship between the distribution of prices and inflation emerging such that the distribution showed signs of skewness to the right during periods of rising inflation and skewness to the left during periods of decreasing inflation. This does suggest that the general price level, using CPI as an observed measure, could very well be influenced by the prices of individual components. This is further supported by the analysis conducted in Fischer (1981) where he finds that food and oil prices have a strong influence on the relationship between inflation and RPV.

This paper builds on the work done by Choi *et al* (2011), by looking at the individual relationships of selected components of the CPI with overall inflation to see if the pattern observed at the aggregate level exists for all components or only for some. This paper does not disaggregate RPV in the spirit of Domberger (1987), but rather aims to look at the relationships underlying the results for South Africa reported in Choi *et al* (2011). The intention is to investigate the nature of the relationship of the selected components with inflation and to establish if any characteristics of the components have changed since the adoption of the inflation targeting framework in South Africa. The rest of the paper will consider this more explicitly with section 2 looking at the data used for the study, section 3 a descriptive analysis of the data, the econometric analysis considering the methodology and results is presented in section 4 and the paper concluded in section 5.

2. The Data

The data used in this paper comes from Statistics South Africa. It is the monthly data for the components and total CPI for historical metropolitan areas from January 1980 until December 2008 and the components and total CPI for primary urban areas from January 2009 until December 2010. We have effectively updated the sample used in Choi *et al* (2011), but were unable to splice all the series due to the change in the composition of the CPI basket and the classification system used. A data appendix is provided at the end of the paper that details the series used and their composition. The series used account for over 74 per cent of the CPI for metropolitan areas and over 63 per cent for the CPI for primary urban areas. The data has been seasonally adjusted using the Census X12 method[3] (as in Choi *et al*, 2011) and the month-on-month log difference taken to calculate the monthly inflation rate and the price changes for the various components of the CPI. The RPV variable in this case is calculated as the absolute value of the difference between the component price change $\left(p_{j,t}\right)$ and inflation $\left(\pi_t\right)$ as given in equation [1].

$$RPV_{j,t} = \left| p_{j,t} - \pi_t \right| \qquad [1]$$

where $p_{j,t} = \ln P_{j,t} - \ln P_{j,t-1}$, with $P_{j,t}$ being the price index level of component *j* at time *t*, and inflation defined as the month-on-month log difference of the CPI level. This is a slight deviation from the normal calculation, due to the approach of the paper which looks at the

[3] This was only done for those series that were found to have seasonality present, of which 12 series did not.

relationship of the RPV of the components of the CPI with inflation, rather than a fully aggregated measure.

3. Descriptive analysis

Table 1 reports the summary statistics for the inflation rate and RPV before and after the adoption of the inflation targeting framework. The mean inflation rates under the inflation targeting framework are lower relative to those before inflation targeting. This indicates that adoption of inflation targeting is likely to have contributed to the reduced the mean inflation rates. Similarly we compare the mean RPV before and under the inflation targeting framework. The mean RPV is lower under the inflation targeting framework except for fats and oils, clothing and footwear, clothing, footwear, appliances, domestic workers, transport and running costs which increased.

The density plots in figure 1 suggest that the adoption of inflation targeting affected the mean inflation rates and dispersion of these variables. In most inflation components there is leftward shift in the peak of density plots in the post inflation targeting period suggesting that the mean inflation rate declined in this period. However the density plots become wider for the transport, fats and oils, and running costs categories. Moreover we assess the differences in the RPV between the pre and post inflation targeting periods using the density plots. In figure 2, we find the density plots have shifted inwards indicating the variability of these inflation components decreased. However the density plots for the footwear, furniture, appliances, fats and oils, transport, clothing, clothing and footwear, running costs and personal care shifted outwards indicating their variability has increased under inflation targeting framework. Both the reported summary statistics and the density plots point to the same conclusion that in most cases both the mean inflation rates and RPV declined under the inflation targeting framework.

We also investigated graphical the relationships between the inflation rates and RPV which has been hypothesised in literature to be in a quadratic form. In figure 3, we find evidence of quadratic relationship between RPV and inflation rates in some inflation components. However the relationships seem weaker for the communication, services and personnel care which display relatively more dispersed or scattered points.

4. Econometric Analysis

We use various econometric techniques to explore the relationship between the RPV and inflation using regression analysis.[4] Following various studies (Choi 2010, Choi *et al* 2011, Fielding and Mizen 2008) we utilize a semi-parametric regression approach to identify the underlying functional form of the relationship between inflation rate and RPV without imposing any prior assumptions. Subject to results on the functional form, we then apply the parametric regression technique to both full sample and subsamples separated by the adoption of inflation targeting. Lastly we conduct the sensitivity analysis using the rolling regression analysis to check the robustness of the regression results. We examine to what extent the adoption of inflation targeting might have impacted on individual components' RPV after taking into account the structural change in these component's inflation rates. Furthermore, we examine whether the structural change in high inflation components but not in low inflation components category had different effects.

4.1. Underlying functional form and semi parametric regression analysis

According to Choi *et al* (2011) there is lack of concrete guidance from economic theory concerning the underlying functional form of the relationship between inflation and RPV. They argue it is better to utilize a semi-parametric approach which combines features of both parametric and non-parametric models as this maintains the easy interpretability of the former and retains partly the flexibility in the latter model. We follow Fielding and Mizen (2008), Choi (2010), Choi *et al* (2011) in defining the partially linear model as follows.

$$RPV_{j,t} = Y_{j,t}{}'\beta + f_j(\pi_t) + \eta_{j,t} \qquad [2]$$

where $Y_{j,t}$ is a $(p+q)\times 1$ vector of explanatory variables which include the lagged terms of RPV, $(RPV_{j,t})$ and inflation (π_t) where $Y'_{j,t} = \{RPV_{j,t-1},...,RPV_{j,t-p},\pi_{t-1},...,\pi_{t-q}\}$. The function $f_j(.)$ is an unknown smooth differential function that captures a contemporaneous effect of inflation on RPV. We use this function to determine the underlying functional form of the relationship between inflation and RPV. The function $f_j(\pi_t)$ in equation [2] is

[4] Choi *et al* (2011) cautions that a seemingly loose structural connection in the link between inflation and RPV in low inflation components does suggest a collapse of the link between the two variables as they as suspected to have undergone some different structural changes.

estimated using a semi parametric technique in two stages. Firstly, the parameter vector is estimated from the regression equation of the form

$$RPV_{j,t} = \hat{Y}_{j,t}{}'\beta + \mu_{j,t} \qquad [3]$$

where $\hat{Y}_{j,t}{}'$ is the residual from the non-parametric regression $Y_{j,t}$ on π_t.We use the Nadaraya-Watson kernel regression estimator and the Gaussian kernel based on automatic bandwidth selection method. Secondly, we then estimate this function parametrically using equation [4] as done in Fielding and Mizen (2008), Choi (2010), Choi *et al* (2011) with particular attention paid on the estimation of the first derivative of $f_j(\pi_t)$. We interpret the results in relation to the underlying relationship.

$$\hat{\mu}_{j,t} = f_j(\pi_t) + \nu_{j,t} \qquad [4]$$

where $\hat{\mu}_{j,t} = RPV_{j,t} - \hat{Y}_{j,t}{}'\beta$ and $f_j(\pi_t) = \beta_0 + \beta_1\pi_t + \beta_2\pi_t^2$. We are interested in the derivative given by $f_j'(\pi_t) = \dfrac{\partial f_j(\pi_t)}{\partial \pi_t}$ which captures the marginal effect of π_t on $f_j(\pi_t)$. Alternatively this shows the sensitivity of the RPV to marginal increases in the inflation. If $f_j'(\pi_t) > 0$, $(f_j'(\pi_t) < 0)$ then RPV increases (decreases) with the inflation rate and $f_j'(\pi_t) = 0$ gives the threshold level of inflation rate where RPV is minimized. We interpret the results in relation to the underlying relationship. Firstly if the underlying relationship is linear, this implies the fitted $f_j'(\pi_t)$ would be close to a constant. Secondly when $f_j'(\pi_t)$ is linear this suggests that the true relationship is quadratic.

The plots of the semi parametric estimates of $f_j'(\pi_t)$ for the full sample for different values of the inflation rate are shown in figure 4. The horizontal x-axis corresponds to the point where the derivative is zero ($f_j'(.) = 0$). The point where $f_j'(.) = 0$ indicates the point where RPV is minimized at the corresponding inflation rate $(\pi_j{}^*)$. When the inflation rate is below $\pi_j{}^*$ then $f_j'(\pi_t) < 0$ implies that the function $f_j(\pi_t)$ is downward sloping. $f_j'(\pi_t) > 0$ suggests that $f_j(\pi_t)$ is upward sloping given that inflation rate exceeds $\pi_j{}^*$. The quadratic relationship between the inflation rate and RPV is deduced by a transition of $f_j'(\pi_t)$ from

negative to positive values. The absence of discontinuity about the threshold implies the smooth transition of the $f_j'(\pi_t)$ suggesting the underlying $f_j(\pi_t)$ is not closer to a V-shape but U-shape.

The results are shown in figure 4. We find that in most cases the shapes of fitted $f_j'(\pi_t)$ are linear and upward sloping indicating that $f_j(\pi_t)$ has a quadratic or U-shaped form.[5]

4.2. The U-Shaped relationship and parametric regression analysis

According to Choi *et al* (2011) the semi parametric analysis suggest that a well specified parametric model of the inflation-RPV should include two main features (i) a quadratic profile and (ii) structural changes in the underlying model. We utilize the parametric modelling approach that accommodates both the inflation levels (π_t) and squared inflation (π_t^2) as explanatory variables including the lagged terms of both RPV and inflation. This specification allows the RPV to respond differently to both inflation level, π_t and squared inflation level, π_t^2. Moreover it nests both the linear and quadratic models. The inclusion of the square term of inflation was motivated by evidence of U-shaped pattern found in figure 3 and support from some earlier studies (Choi 2010, Choi *et al* 2011, Parks 1978) which reported inflation volatility as a significant explanatory variable.

$$RPV_{j,t} = \kappa_0 + \sum_{m=1}^{l} \kappa_h RPV_{j,t-m} + \beta_1 \pi_t + \beta_2 \pi_t^2 + \sum_{i=1}^{p} \phi_i \pi_{t-i} + \varepsilon_{j,t} \qquad [5]$$

Certain characteristics of this quadratic functional form are particularly of great interest in this analysis. The coefficients on squared inflation (π_t^2) or β_2 in equation [5] captures the direction of curvature. A U-shaped relationship occurs when β_2 is positive and an inverted U-shaped when β_2 is negative and the estimate of β_2 has to be statistically significant.

[5] Choi *et al* (2011) found that the point where $f_j'(.)$ intersects the π_j^* decreased in the second subsample in the high initial inflation countries indicating that U-shaped relationship has shifted leftward as the mean inflation declined. However we fail to find evidence that components with a high initial inflation rate that the derivative or $f_j'(.)$ does not cross the x-axis when it remains consistently above or below it. This would indicate that $f_j(.)$ is not quadratic but monotonic.

Moreover when β_2 is very close or approaches zero the functional form collapses to linear form hence the relationship between RPV and inflation is only determined by β_1. The minimum point in the quadratic model pertains to the value of inflation rate level (π_t) at which the estimated RPV takes the lowest value which corresponds to π_j^*. The minimum point of the U-shaped function derived from equation [2] is defined by

$$\pi_j^* = -\frac{\beta_1}{2\beta_2} \qquad [6]$$

There are possible combinations of coefficients of both the inflation rate and squared inflation rate which yield a U-shape at different turning points. For example in equation [6] the U-shaped function to be around a positive inflation $\pi_j^* > 0$ occurs when $\beta_2 > 0$ and $\beta_1 < 0$. Furthermore the U-shaped to be around a negative inflation rate $\pi_j^* < 0$ requires that $\beta_2 > 0$ and $\beta_1 > 0$. Moreover when $\beta_1 = 0$ it implies that $\pi_j^* = 0$ indicating a U-shape would be around the zero inflation rates irrespective of the sign on β_2. Lastly, when $\beta_2 \approx 0$, then π_j^* explodes because it is not properly defined (as the relationship is linear if β_1 is significant or the relationship does not exist if β_1 is insignificant).

There are implications regarding the U-shape centred about an inflation rate equal to zero $(\pi_j^* = 0)$ or about a non-zero inflation rate $(\pi_j^* \neq 0)$. A U-shaped association between RPV and inflation about the inflation rate equal to zero implies that the RPV would monotonically increase with inflation (or deflation). However, the RPV increases monotonically with deviations from the π_j^* inflation rate, and not the inflation rate when the U-shaped relationship is around the non-zero inflation rate. Choi *et al* (2010) found using the aggregated data that there was little support for the view that minimum point of U-shape was about a zero inflation rate $\left(\pi_j^* = 0\right)$.

Similarly the results of the full sample are reported in table 2 confirm the relationship is U-shaped about a positive inflation rate which is significantly different from zero for some components. Secondly, the effect of inflation volatility on RPV is non-negative $\beta_2 > 0$ in

most cases, while that of inflation level is negative $\beta_1 < 0$. This indicates that a U-shaped relationship between inflation and RPV exists. Thirdly, apart from π_j^* being positive and significantly different from zero, the findings suggest the RPV-related welfare costs of inflation are minimised when the inflation rate exceeds zero compared to when it is zero. Lastly $\beta_2 > 0$ and $\beta_1 > 0$ are positive and significant for communication, reading matter and public transport suggesting that the U-shape relationship is minimised at negative inflation rate, π_j^*. Only the grain component suggests the U-shape relationship is minimised at the zero inflation rates mainly because $\beta_1 = 0$. This indicates that RPV varies monotonically with inflation rate.

We also report the results estimated using the two subsamples in table 3. The results confirm that inflation targeting framework has impacted on the relationship between inflation and RPV. In most cases, before the adoption of inflation targeting, we found that $\beta_2 < 0$ and $\beta_1 > 0$ and were insignificant suggesting there was no clear relationship between RPV and inflation. In contrast, under inflation targeting we find in most cases that $\beta_2 > 0$ and $\beta_1 < 0$ and were significant suggesting a U-shape relationship about a positive non-zero inflation rate. Moreover this finding indicates that the underlying relationship between inflation and RPV is not stable over time. In the situation where $\beta_2 > 0$ and $\beta_1 > 0$ under the inflation targeting framework , the latter coefficient tends to be insignificant, this was found for the communication and running costs categories, suggesting that the U-shape relationship minimized at a zero inflation rate. Furthermore we find that U-shape relationship is minimized at zero inflation rates in the commodities, education, food, health and transport categories under the inflation targeting framework as $\beta_1 < 0$ and insignificant.

4.3. Robustness check using the rolling regression analysis

The preceding evidence from the subsamples suggests that the adoption of the inflation targeting framework has changed the relationship between inflation and RPV. Thus the underlying relationship between inflation and RPV may not be stable over time. Due to the time varying nature of the relationship, inferences made from full sample without taking the identified structural period into account can be of limited advantage in detecting the true

relationship. Hence we follow Choi *et al* (2011) to use the rolling regression approach based on equation [5] to capture the time–varying properties of the relationship without imposing any prior restrictions on the timing of break points. This approach has greater flexibility in detecting structural changes over time since the full sample results are vulnerable to time variation in the conditional mean of the inflation process. Moreover it allows for each rolling sample to have completely different estimate and the specification allows the RPV to respond differently to both the inflation level (π_t) and the square of the inflation level (π_t^2). These two parameters are vital in determining the time varying behaviour of the relationship between inflation and RPV which is captured by instability over rolling samples.

The rolling estimates of β_1 and β_2 for various goods are shown in figures 5. We used a rolling window of 10 years. The numbers on the horizontal axis represent the end of the 10 year window. For example 1990 captures the period 1980-1990. We find that the rolling estimates of β_2 are consistently positive whereas the estimates for β_1 are negative, excluding the education, communication and reading matter components in which β_1 tends to be positive. Thus the relationship between inflation and RPV is U-shaped about a non-zero inflation rate in most components of inflation suggesting that the RPV increases with the deviation of the inflation rate from π_j^*. In addition we also calculate the time varying π_j^* based on equation [6] using the rolling regression estimates of β_1 and β_2 for various goods. The time varying π_j^* values are shown in figure 6. It is evident that in most inflation components the π_j^* fell to lower levels during the inflation targeting period except for reading matter, education, communication and domestic workers. However for clothing and footwear, clothing and fuel it has increased after 2008. According to Choi *et al* (2011) these suggest that the U-shaped relationships shifted.[6] Furthermore this relationship is confirmed by results reported for the full sample of π_j^* reported in table 2. We find that in most cases π_j^* is positive and significantly different from zero suggesting that the relationship between inflation and RPV is U-shaped about a positive inflation rate.

[6] According to Choi et al (2011) the important role of π^* in the inflation –RPV nexus raises questions about how to interpret the nonzero π^* and how the π^* could be related to the inflation target.

5. Conclusion

This paper set out to investigate the nature of the relationship between the RPV of the components of the CPI and inflation and if there has been any change that has been observed since the adoption of inflation targeting. Other than a few components, it was found that the inflation rates of these components have experienced a decrease in their mean rates as well as a tightening of their distributions. Furthermore, the RPV of these components has mostly seen a decrease in their means as well as a narrowing of their distributions.

Formal analysis followed an approach used by Fielding and Mizen (2008) and Choi *et al* (2011). This approach used both parametric and non-parametric techniques in considering the nature of the relationship between RPV and inflation. Estimation of the model suggested that for most of the components of CPI, a quadratic specification (in the relationship with inflation) was the correct specification and this was largely supported by the results of the rolling regressions. Furthermore, the rate of inflation at which RPV was minimised $\left(\pi_j^*\right)$ was found to be significantly positive. Considering the models that have been tested in previous literature as laid out by Fischer (1981), not much can be definitively concluded as to the actual mechanism that drives the relationship between RPV and inflation in South Africa, or if it is restricted to only one channel (which is unlikely). Also, the effect of unexpected inflation versus expected inflation has not been tested here. Supported by these results though include the menu cost mechanism, that both RPV and inflation are affected by a common shock (although with different lags possibly) as well as both policy related mechanisms described by Fischer. Furthermore, inefficiencies in the form of higher contracting costs relatively sticky prices (in that price changes up are more frequent than price changes downward) could also help explain the mechanism underlying the results reported in this paper.

This paper has not attempted to test alternative causes of the decrease in mean inflation and RPV other than the adoption of inflation targeting. The evidence presented though, does suggest that the adoption of inflation targeting is probably at least one potential explanation for this observation as well as the change in the relationship between RPV and inflation.

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Table 1: Summary statistics for Inflation and RPV

	Inflation rate		RPV	
	Pre-IT	Post- IT	Pre-IT	Post-IT
	Mean [Error]	Mean [Error]	Mean [Error]	Mean [Error]
Cpi_All	0.939[0.545]	0.476[0.423]		
Cpi_Commodities	0.969[0.617]	0.506[0.523]	0.290[0.260]	0.230[0.216]
Cpi_Services	0.891[0.649]	0.434[0.554]	0.420[0.383]	0.291[0.286]
Cpi_Food	1.039[0.991]	0.601[0.623]	0.664[0.556]	0.424[0.370]
Cpi_Grain	1.036[1.488]	0.614[1.148]	0.829[1.213]	0.732[0.730]
Cpi_Meat	1.097[1.720]	0.608[0.927]	1.028[1.229]	0.586[0.637]
Cpi_Fish	0.944[1.736]	0.547[1.067]	1.231[1.232]	0.843[0.689]
Cpi_Dairy	0.972[1.372]	0.682[0.962]	0.886[1.071]	0.690[0.611]
Cpi_Fatsandoils	0.869[1.391]	0.612[1.753]	*1.019[0.999]*	*1.197[1.154]*
Cpi_Fruit	1.038[3.058]	0.566[1.979]	2.275[2.006]	1.451[1.382]
Cpi_Vegetables	1.072[4.728]	0.635[2.540]	3.358[3.180]	1.959[1.673]
Cpi_Sugar	0.990[1.534]	0.532[1.186]	1.022[1.157]	0.907[0.759]
Cpi_Nab	0.945[1.515]	0.504[0.919]	1.084[1.084]	0.654[0.596]
Cpi_Hotbeverages	1.107[1.670]	0.527[0.907]	1.029[1.384]	0.697[0.655]
Cpi_Alcholic	1.002[1.249]	0.623[0.502]	0.786[0.906]	0.499[0.483]
Cpi_Tobacco	1.230[1.528]	0.830[0.919]	1.087[1.132]	0.725[0.765]
Cpi_Clothingfoot	0.766[0.824]	-0.057[1.583]	*0.600[0.582]*	*0.881[1.418]*
Cpi_Clothing	0.760[0.862]	-0.020[1.438]	*0.638[0.586]*	*0.876[1.245]*
Cpi_Footwear	0.801[1.060]	-0.132[2.062]	*0.792[0.724]*	*1.052[1.875]*
Cpi_Fuel	0.871[1.227]	0.879[1.369]	0.780[0.949]	0.778[1.171]
Cpi_Furnitureand	0.754[0.799]	0.166[0.449]	0.528[0.564]	0.508[0.403]
Cpi_Furniture	0.816[1.138]	0.101[0.586]	0.662[0.877]	0.644[0.469]
Cpi_Appliances	0.693[0.895]	0.193[0.812]	*0.626[0.610]*	*0.652[0.594]*
Cpi_Hhconsumable	1.159[1.557]	0.584[0.699]	0.972[1.118]	0.462[0.535]
Cpi_Domesticwork	1.137[0.459]	0.557[1.109]	*0.647[0.488]*	*0.809[0.879]*
Cpi_Health	1.127[1.346]	0.692[0.489]	0.841[1.105]	0.449[0.450]
Cpi_Transport	0.930[1.471]	0.426[1.747]	*0.893[0.963]*	*1.161[1.017]*
Cpi_Vehicles	1.132[1.247]	0.171[0.518[	0.742[0.856]	0.519[0.408]
Cpi_Runningcosts	0.813[2.229]	0.733[3.163]	*1.187[1.723]*	*2.137[2.069]*
Cpi_Publictransp	0.779[1.717]	0.171[0.605]	1.171[1.181]	0.581[0.572]
Cpi_Communicatio	0.988[3.759]	0.200[1.032]	1.729[3.203]	0.742[0.864]
Cpi_Recreationculture	0.807[1.171]	0.064[0.711]	0.796[0.746]	0.631[0.594]
Cpi_Readingmatter	1.119[2.680]	0.483[0.783]	1.273[2.350]	0.561[0.646]
Cpi_Education	1.386[3.404]	0.743[1.009]	1.125[3.198]	0.563[0.938]
Cpi_Personalcare	0.968[0.741]	0.445[0.575]	0.494[0.520]	0.441[0.411]

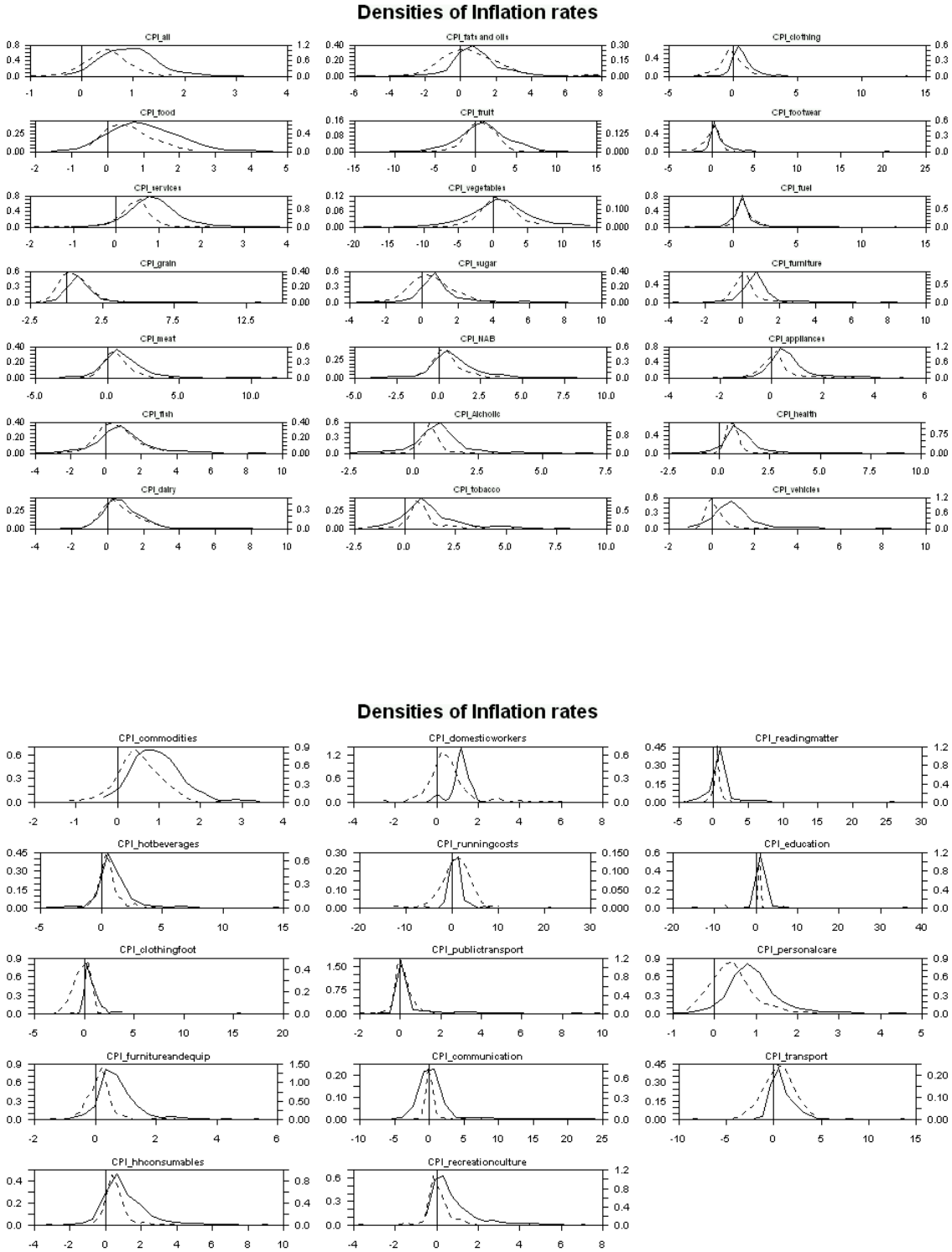
Table 2. Parametric regression results for full sample.

	β_1 [s.e.]	β_2 [s.e.]	π^* [s.e.]	Significance
Appliances	-0.536[0.042]	0.239[0.012]	0.064[0.008]	0.000
Clothing	-0.270[0.034]	0.089[0.004]	0.000[0.000]	0.790
Clothingfoot	-0.284[0.038]	0.076[0.003]	0.011[0.002]	0.000
Communication	*0.421[0.036]*	*0.023[0.002]*	*-0.005[0.000]*	*0.000*
Commodities	-0.112[0.040]	0.062[0.017]	0.003[0.002]	0.100
Readingmatter	*0.264[0.038]*	*0.030[0.002]*	*-0.002[0.001]*	*0.000*
Dairy	-0.277[0.038]	0.157[0.007]	0.022[0.004]	0.000
Domesticworker	-0.306[0.050]	0.199[0.013]	0.031[0.007]	0.000
Education	-0.240[0.026]	0.035[0.001]	0.004[0.001]	0.000
Fats and oils	-0.275[0.026]	0.151[0.006]	0.021[0.002]	0.000
Fish	-0.336[0.028]	0.150[0.006]	0.025[0.003]	0.000
Food	-0.306[0.046]	0.185[0.015]	0.028[0.006]	0.000
Footwear	-0.179[0.035]	0.055[0.002]	0.005[0.001]	0.000
Fruit	-0.190[0.016]	0.113[0.003]	0.011[0.001]	0.000
Fuel	-0.124[0.040]	0.090[0.005]	0.006[0.002]	0.006
Furniture	-0.403[0.035]	0.151[0.006]	0.030[0.004]	0.000
Furnitureandeq	-0.627[0.053]	0.260[0.015]	0.082[0.011]	0.000
Grain	*0.010[0.038]*	*0.076[0.005]*	*0.000[0.001]*	*0.789*
Health	-0.238[0.041]	0.136[0.006]	0.016[0.003]	0.000
Hhconsumables	-0.198[0.036]	0.120[0.006]	0.012[0.003]	0.000
Hotbeverages	-0.098[0.035]	0.084[0.004]	0.004[0.002]	0.010
Meat	-0.217[0.033]	0.099[0.005]	0.011[0.002]	0.000
NAB	-0.361[0.031]	0.174[0.007]	0.031[0.004]	0.000
Personal care	-0.305[0.056]	0.193[0.017]	0.030[0.008]	0.000
Public transport	*0.073[0.042]*	*0.079[0.006]*	*-0.003[0.001]*	*0.052*
Recreation and culture	-0.316[0.035]	0.169[0.008]	0.027[0.004]	0.000
Running costs	-0.090[0.023]	0.055[0.002]	0.002[0.001]	0.000
Transport	-0.111[0.024]	0.072[0.003]	0.004[0.001]	0.000
Vegetables	-0.117[0.016]	0.071[0.002]	0.004[0.001]	0.000
Vehicles	-0.139[0.043]	0.113[0.007]	0.008[0.003]	0.006
Alcholic	-0.376[0.036]	0.180[0.008]	0.034[0.005]	0.000
Sugar	-0.309[0.030]	0.163[0.006]	0.025[0.003]	0.000
Services	-0.259[0.041]	0.180[0.016]	0.023[0.005]	0.000
Tobacco	-0.233[0.042]	0.164[0.008]	0.019[0.004]	0.000

Table 3: Parametric regression results subsamples Pre-IT versus Post-IT.

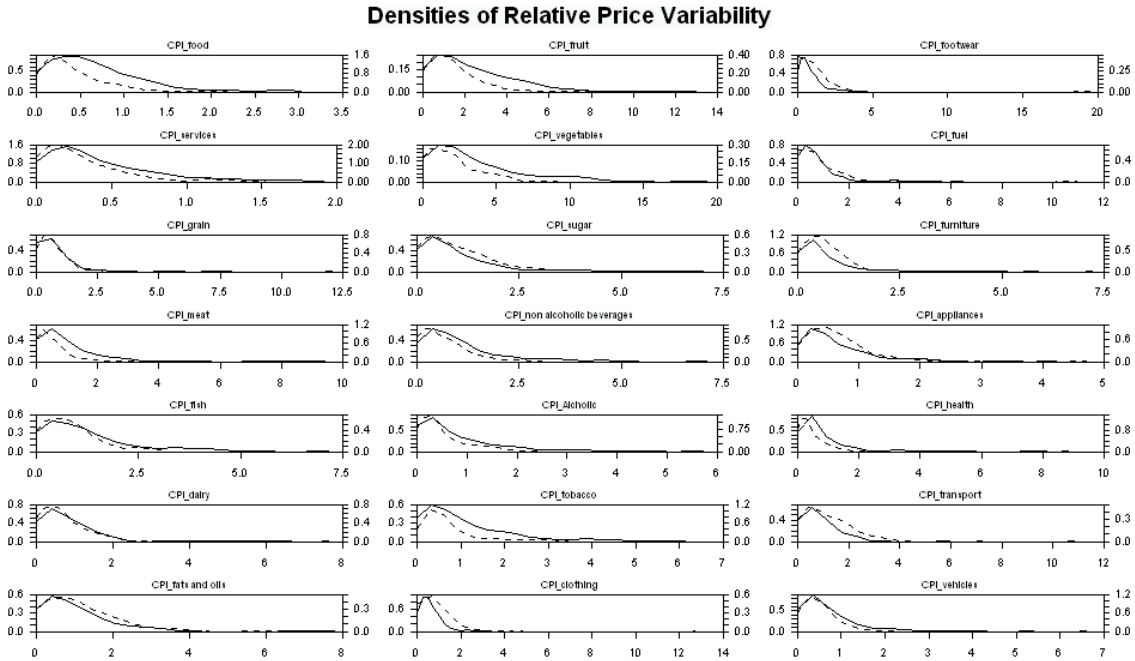
	Pre-IT							Post-IT						
	β_1	[s.e.]	β_2	[s.e.]	π^*	[s.e.]	pvalue	β_1	[s.e.]	β_2	[s.e.]	π^*	[s.e.]	pvalue
Appliances	0.194	[0.107]	-0.063	[0.036]	0.006	[0.007]	0.359	-0.313	[0.055]	0.215	[0.016]	0.034	[0.008]	0.000
Clothing	0.098	[0.089]	-0.009	[0.033]	0.000	[0.002]	0.821	-0.512	[0.043]	0.100	[0.004]	0.026	[0.003]	0.000
Clothing and footwear	0.120	[0.093]	-0.045	[0.035]	0.003	[0.004]	0.500	-0.605	[0.047]	0.094	[0.003]	0.028	[0.003]	0.000
Communication	-0.370	[0.188]	0.000	[0.010]	0.000	[0.002]	0.981	0.033	[0.075]	0.120	[0.013]	**-0.002**	[0.004]	0.649
Commodities	0.061	[0.070]	-0.033	[0.025]	0.001	[0.002]	0.591	-0.086	[0.048]	0.173	[0.032]	0.007	[0.005]	0.157
Readingmatter	-0.340	[0.116]	-0.003	[0.007]	0.000	[0.001]	0.681	-0.101	[0.049]	0.229	[0.016]	0.012	[0.006]	0.055
Dairy	0.275	[0.118]	-0.062	[0.030]	0.009	[0.007]	0.249	-0.182	[0.060]	0.248	[0.022]	0.023	[0.009]	0.015
Domestic worker	0.473	[0.244]	-0.061	[0.110]	0.014	[0.033]	0.663	-0.161	[0.062]	0.173	[0.015]	0.014	[0.006]	0.031
Education	-0.595	[0.088]	0.008	[0.006]	0.003	[0.002]	0.245	-0.061	[0.038]	0.124	[0.006]	0.004	[0.002]	0.120
Fats and oils	0.061	[0.065]	-0.037	[0.023]	0.001	[0.002]	0.522	-0.242	[0.041]	0.141	[0.008]	0.017	[0.004]	0.000
Fish	-0.060	[0.080]	0.030	[0.023]	0.001	[0.002]	0.615	-0.289	[0.040]	0.305	[0.019]	0.044	[0.008]	0.000
Food	-0.015	[0.076]	0.050	[0.027]	0.000	[0.002]	0.861	-0.144	[0.100]	0.306	[0.053]	0.022	[0.019]	0.241
Footwear	-0.115	[0.113]	-0.003	[0.039]	0.000	[0.002]	0.926	-0.660	[0.041]	0.076	[0.002]	0.025	[0.002]	0.000
Fruit	0.059	[0.056]	-0.009	[0.019]	0.000	[0.001]	0.725	-0.096	[0.032]	0.117	[0.006]	0.006	[0.002]	0.004
Fuel	0.056	[0.105]	-0.051	[0.023]	0.001	[0.003]	0.661	-0.182	[0.057]	0.079	[0.005]	0.007	[0.003]	0.007
Furniture	0.049	[0.094]	-0.016	[0.023]	0.000	[0.001]	0.758	-0.567	[0.065]	0.456	[0.041]	0.129	[0.024]	0.000
Furniture and eq	0.173	[0.105]	-0.067	[0.034]	0.006	[0.006]	0.355	-0.712	[0.090]	0.467	[0.049]	0.166	[0.036]	0.000
Grain	-0.139	[0.097]	-0.011	[0.014]	-0.001	[0.001]	0.321	-0.131	[0.056]	0.160	[0.012]	0.010	[0.005]	0.042
Health	-0.126	[0.101]	-0.053	[0.024]	-0.003	[0.002]	0.057	-0.062	[0.150]	0.250	[0.054]	0.008	[0.020]	0.702
Hhconsumables	0.128	[0.084]	-0.023	[0.019]	0.001	[0.002]	0.477	-0.358	[0.086]	0.257	[0.028]	0.046	[0.015]	0.003
Hotbeverages	-0.001	[0.082]	-0.014	[0.014]	0.000	[0.001]	0.989	-0.231	[0.057]	0.235	[0.021]	0.027	[0.009]	0.002
Meat	0.059	[0.077]	0.017	[0.015]	-0.001	[0.000]	0.271	-0.145	[0.043]	0.224	[0.015]	0.016	[0.006]	0.004
NAB	0.043	[0.084]	-0.035	[0.025]	0.001	[0.002]	0.697	-0.406	[0.056]	0.310	[0.023]	0.063	[0.013]	0.000
Personalcare	0.035	[0.110]	-0.011	[0.033]	0.000	[0.001]	0.867	-0.202	[0.086]	0.259	[0.038]	0.026	[0.014]	0.072
Public transport	-0.193	[0.107]	0.020	[0.018]	0.002	[0.003]	0.446	-0.447	[0.058]	0.394	[0.023]	0.088	[0.015]	0.000
Recreation and culture	0.129	[0.103]	-0.019	[0.027]	0.001	[0.003]	0.642	-0.289	[0.043]	0.218	[0.013]	0.031	[0.005]	0.000
Running costs	-0.058	[0.085]	-0.001	[0.009]	0.000	[0.000]	0.864	0.024	[0.027]	0.083	[0.004]	**-0.001**	[0.001]	0.382
Transport	0.056	[0.071]	-0.013	[0.010]	0.000	[0.001]	0.594	-0.054	[0.033]	0.107	[0.007]	0.003	[0.002]	0.101
Vegetables	0.094	[0.050]	0.003	[0.013]	0.000	[0.001]	0.798	-0.096	[0.028]	0.140	[0.007]	0.007	[0.002]	0.001
Vehicles	0.142	[0.097]	-0.027	[0.020]	0.002	[0.003]	0.451	-0.723	[0.099]	0.468	[0.052]	0.102	[0.030]	0.001
Alcholic	-0.317	[0.083]	0.049	[0.025]	0.008	[0.006]	0.182	-0.482	[0.099]	0.422	[0.045]	0.102	[0.030]	0.001
Sugar	0.020	[0.093]	-0.030	[0.027]	0.000	[0.002]	0.854	-0.303	[0.047]	0.242	[0.018]	0.037	[0.008]	0.000
Services	0.024	[0.080]	0.013	[0.030]	0.000	[0.000]	0.572	-0.247	[0.039]	0.218	[0.023]	0.027	[0.006]	0.000
Tobacco	0.008	[0.109]	-0.032	[0.029]	0.000	[0.002]	0.942	-0.166	[0.051]	0.242	[0.014]	0.020	[0.007]	0.006

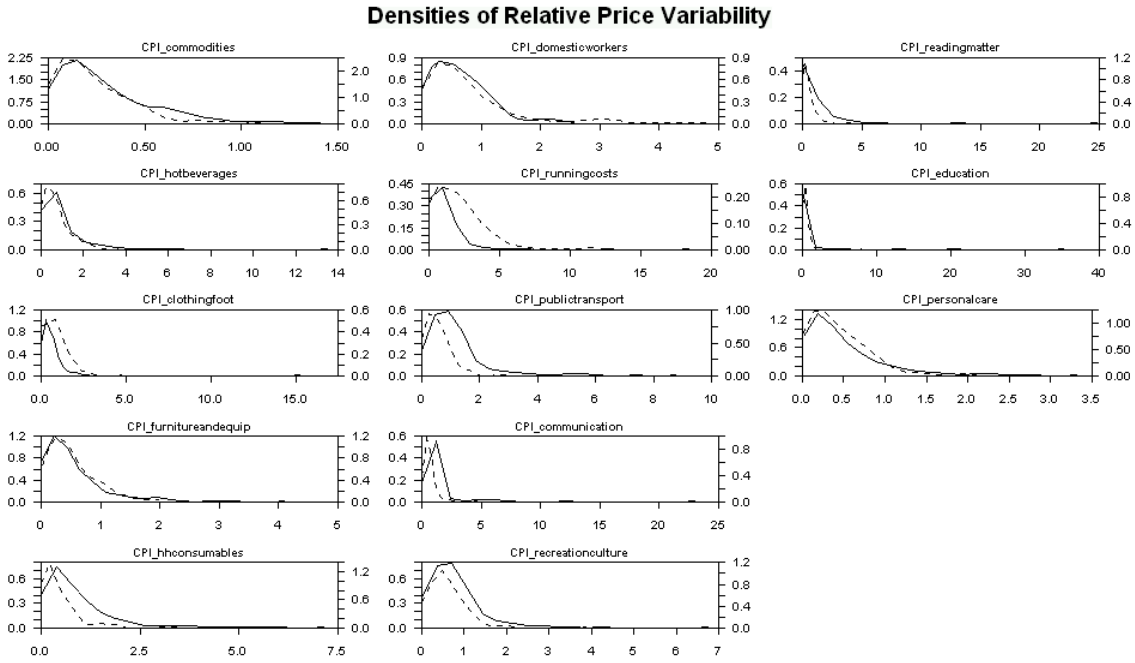
Figure 1: Density plots of the inflation rate and the rate of price changes for the components of the CPI



Dotted lines (solid line) denotes the post inflation targeting (before inflation targeting) period

Figure 2: Density plots for the RPV of the components of the CPI





Dotted lines (solid line) denotes the post inflation targeting (before inflation targeting) period

Figure 3: The relationship between RPV and inflation

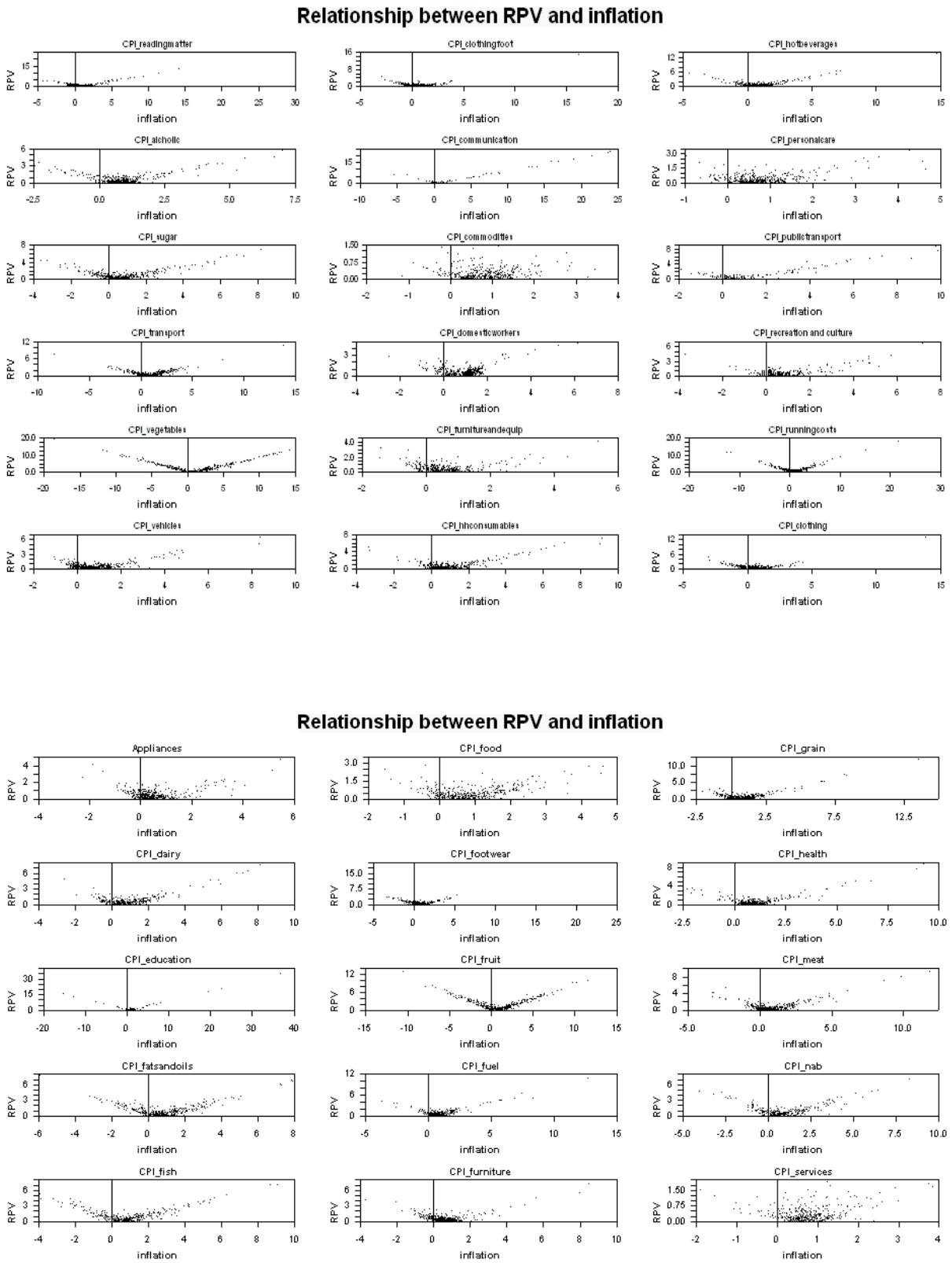
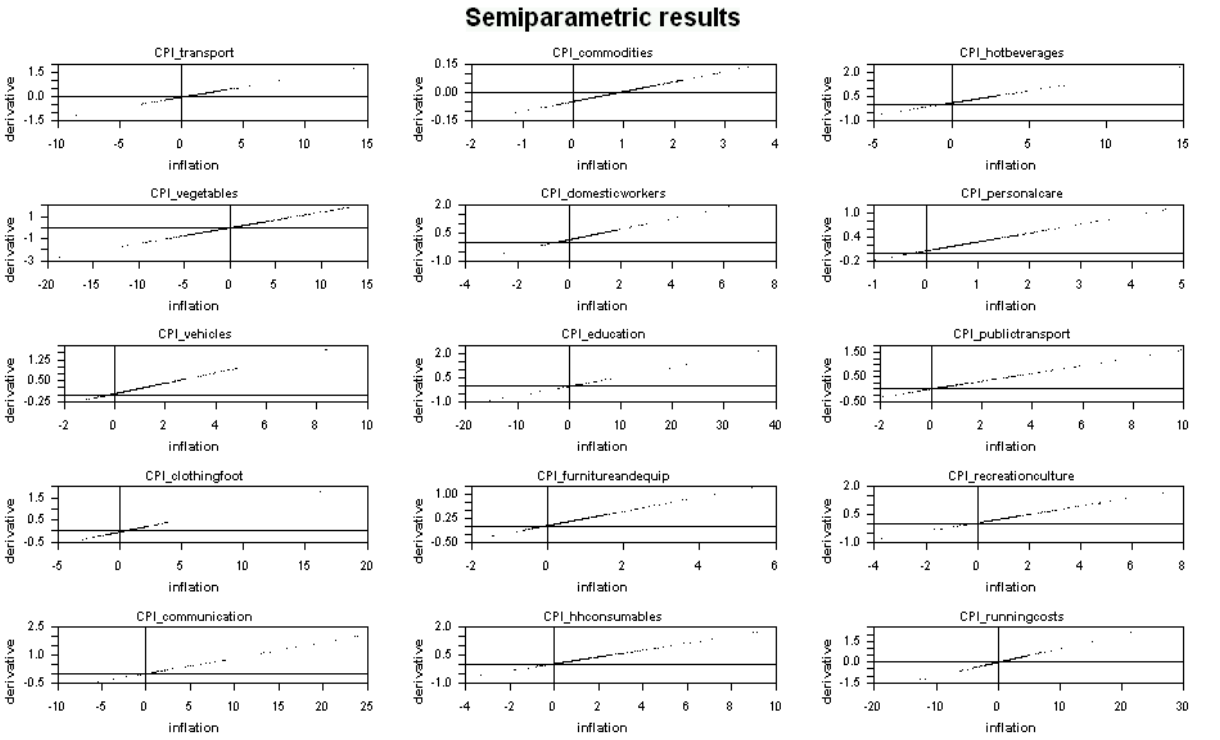


Figure 4: Results of the semi-parametric estimation.



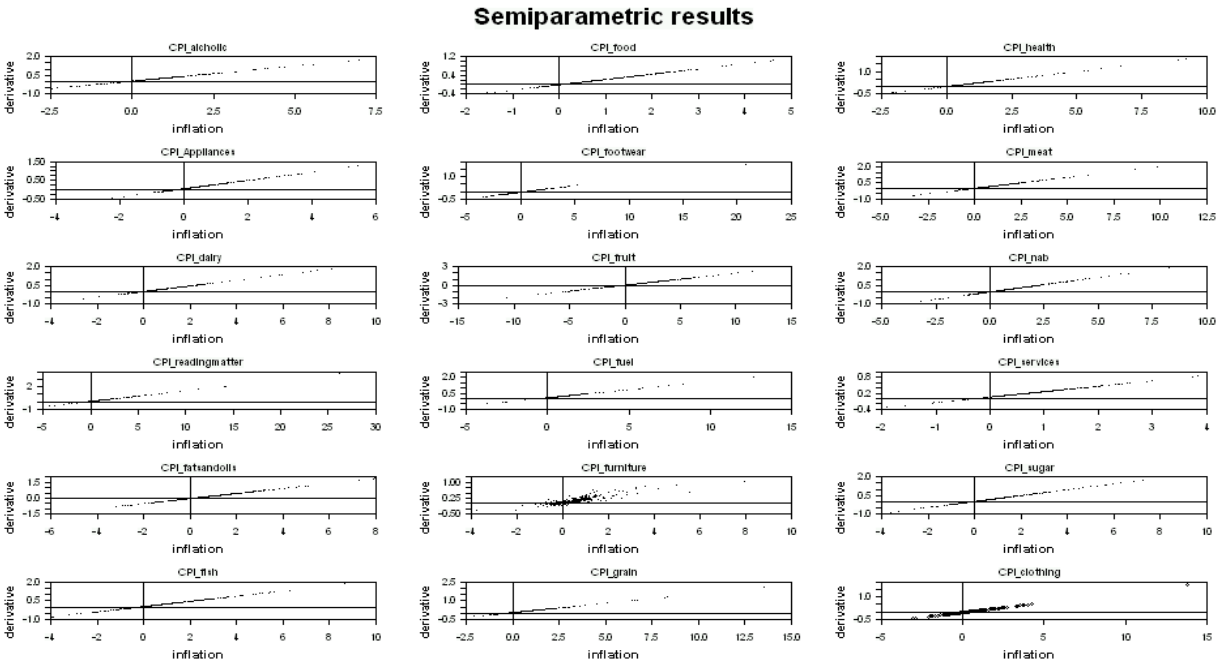
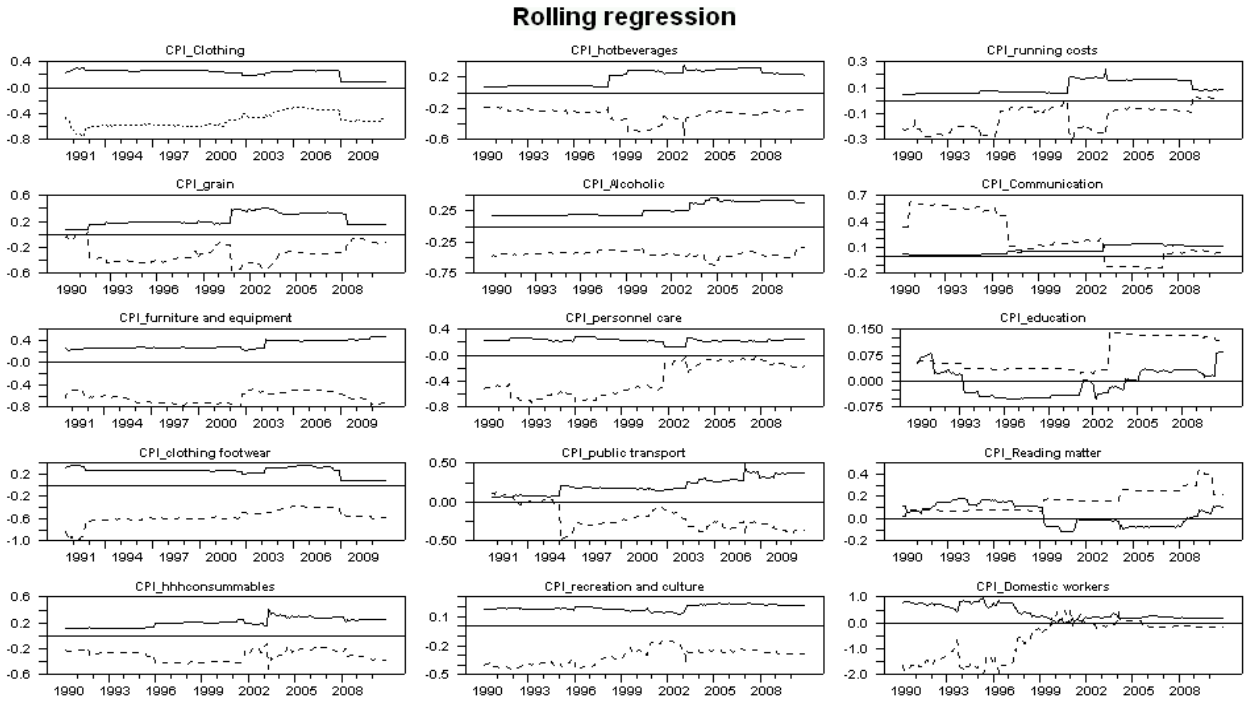
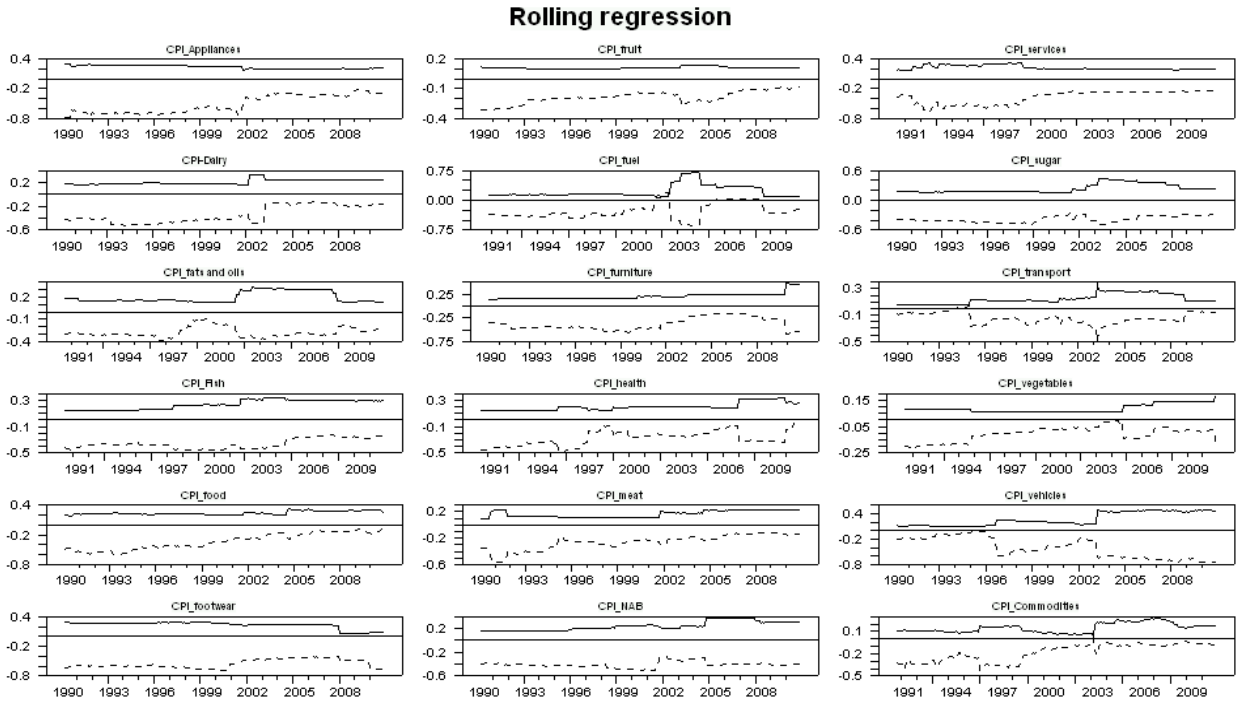


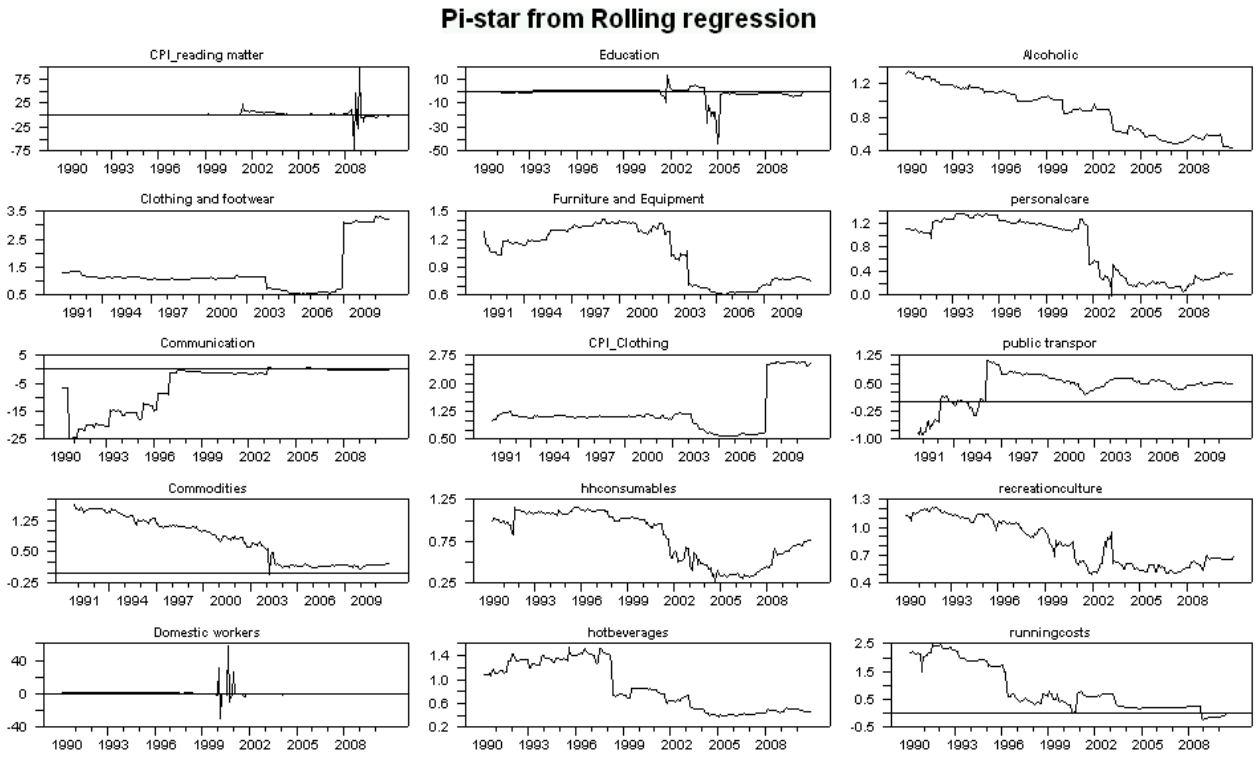
Figure 5: Rolling regression results for β_1 and β_2

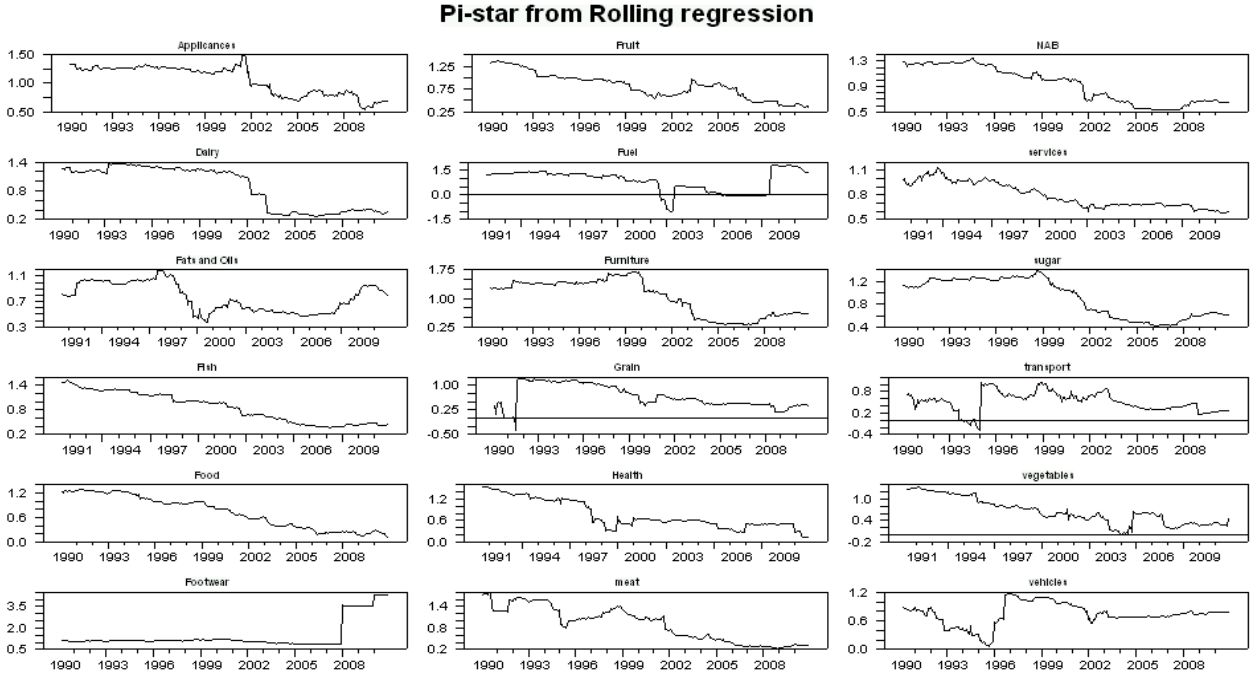




Dotted lines (solid line) denotes the β_1 and (β_2).

Figure 6: Rolling regression results for π^*





Data Appendix

Variable	Description	Old CPI Comprises:	Weight	New CPI Comprises:	Weight
CPI_all	All items in the CPI		100.00		100.00
CPI_commodities	Commodities/Goods		57.14		53.24
CPI_services	Services		42.86		46.76
CPI_food	Food		20.99		13.63
CPI_grain	Grain products	White, brown and whole-wheat bread, rolls, cake flour, self-raising flour, bread flour, mealie meal/maize flour, sorghum meal, corn flour, breakfast oats, taystee wheat, mabella, cereal flakes, puffed rice, rice, mealie rice samp, spaghetti, macaroni, noodles, Marie biscuits, crackers, rusks, cakes, tarts, baby food, other	3.81	Rice, white and brown bread, sweet biscuits, savoury biscuits, pasta, cake, cake and bread flour, mielie meal, porridge, cereals and samp	2.91
CPI_meat	Meat products	Beef and veal: rump steak, sirloin, fillet, topside without bone, brisket with bone, chuck with bone, hind quarter, t-bone, shin with bone, neck, thick flank. Mutton: leg, chops, shoulder, rib, neck, half a sheep, loin flank. Lamb: leg, chops, shoulder, rib, neck, half a lamb, loin, flank. Pork: chops, leg, shoulder. Chicken: whole, portions. Venison, minced meat, voerewors, pork sausages, Vienna's, French polony, cooked sliced ham, biltong, dried sausage, bacon, meat spread, corned beef, meat patties, baby food containing meat	5.66	Beef: rump steak, brisket, chuck, t-bone, mince, meat patties, extract. Pork chops and sausage, Lamb chops. Chicken: whole fresh and frozen, portions fresh and frozen, pies. Boerewors, Vienna's, polony, ham, biltong, bacon and russians, meat pies.	4.35
CPI_fish	Fish products	Fresh hake and snoek. Frozen hake, haddock, fish finders, cakes. Canned tuna, pilchards in tomato sauce, pilchards in chilli sauce, sardines, fish paste. Fish portions in crumbs, fish portions in batter, smoked fish, dried fish. Frozen sea food mixture, shrimps, lobster.	0.69	Frozen: hake, fish fingers, crumbed fish portions, battered fish portions. Tinned: tuna and other fish. Fish paste	0.67
CPI_dairy	Milk, cheese and eggs	Fresh milk, maas, butter milk, sour milk, cream, yoghurt plain and flavoured, sorbet, full cream ice cream, frozen yoghurt, skimmed milk powder, whiteners, condensed milk, evaporated milk, longlife milk, milk formula, soya milk	1.96	Fresh and long life full cream and low fat and powdered, condensed, sour and evaporated milk, whiteners, plain and flavoured yoghurt, cheddar and gouda cheese and cheese spread, fresh cream, prepared custard and eggs	1.78
CPI_fatsandoils	Fats and oils	Choice butter, medium fat spread, low fat spread, yellow margarine block, cooking oil, peanut butter, vegetable cooking fat, lard	0.76	Margarine spread and brick, peanut butter and sunflower oil	0.50
CPI_fruit	Fruit	Apples, grapes apricots, peaches, plums, pears, bananas, pawpaw's, pineapples, mangoes, avocado's, guavas, oranges, naartjies, grapefruit, lemons, watermelon, strawberries, melon. Canned: pears, peaches, guavas, fruit cocktail. Dried: peaches, prunes, raisins. Fruit juice. Roasted/not roasted coconut, almonds, pecans, walnuts, peanuts, baby food, granadilla pulp, dates.	1.09	Fresh oranges, lemons, bananas and apples. Dried fruit, raisins, nuts and peanuts.	0.45
CPI_vegetables	Vegetables	Potatoes, sweet potatoes, green mealies, onion, tomato, green beans, cabbage, cauliflower, carrots, pumpkin, marrow, gem squash, beetroot, lettuce, marogo, other fresh. Frozen: green beans, peas, carrots, mixed vegetables, cauliflower, corn kernels, potato chips, pumpkin. Canned: corn, sweet corn, baked beans, peas, butter beans, green beans. Dries: peas, beans, lentils. Baby food. Prepared salads.	2.00	Fresh lettuce, spinach/marogo, cabbage, cauliflower, broccoli, tomatoes, pumpkin, green/yellow/red peppers, cucumber, green mealies, onions, carrots, beetroot, mushrooms, potatoes and sweet potatoes. Frozen vegetables, peas, potato chips and carrots. Dried peas, beans and lentils. Tinned sweet corn, baked beans, peas and butter beans. Prepared salads, atchaar and potato crisps.	1.54
CPI_sugar	Sugar	White and brown sugar, artificial sweeteners, icing sugar, castor sugar	0.50	White and brown sugar, chocolate slab and bar, sweets, ice cream	0.70
CPI_hotbeverages	Hot Beverages	Instant coffee, ground coffee, coffee beans, Ceylon tea leaves, tag less, tagged, rooibos tea leaves, bags, herbal tea leaves, bags, cocoa, hot chocolate	1.07	Instant coffee, Ceylon/black and rooibos tea	0.31
CPI_nab	Non-alcoholic beverages	Soft drinks: orange, coca-cola. Mineral water. Orange squash and other flavours. Flavoured drink syrups.	1.10	Coffee, tea, fizzy drinks (can and bottle) fruit juice (and concentrates), dairy mixtures	1.35
CPI_alcholic	Alcoholic beverages	Brandy, Whisky (local and imported), gin, vodka, cane, liqueur. Beer, lager, dark (English), apple cider, sorghum (prepacked and own container). Wine, natural dry red, semi-sweet white, sparkling, cooking, sherry (medium cream and other), port. Alcoholic fruit beverages	1.40	Brandy, whiskey, liqueur, red and white wine, sherry, port, local beer, imported beer	3.38
CPI_tobacco	Cigarettes and tobacco	Cigarettes and tobacco	1.14	Cigarettes and tobacco	2.24

Data Appendix contd.

Variable	Description	Old CPI Comprises:	Weight	New CPI Comprises:	Weight
CPI_clothingfoot	Clothing and footwear		3.25		3.89
CPI_clothing	Clothing	Encompasses everything in the new and quite a bit more, including patterns, non-disposable nappies, lace etc.	2.04	Socks, business and casual trousers, jeans, business and casual shirts, jacket, knitwear, underpants, business and casual skirts, blouse, shirt, pyjamas, bra, panties, dress, t-shirt, shorts, tracksuit trousers and top, non-disposable nappies, baby-grow, water-proof.	2.73
CPI_footwear	Footwear	Boots, shoes and sandals, takkies, running shoes, slippers, golf shoes, slip-ons, footwear repairs	1.21	Shoes, sports shoes, slippers, sandals, infant shoes	1.16
CPI_fuel	Fuel	Electricity, gas, paraffin, firewood, charcoal, coal, methylated spirits.	3.49	Electricity, paraffin, firewood and candles	1.71
CPI_furnitureandequip	Furniture and equipment		2.53		5.62
CPI_furniture	Furniture	Bedroom suite, wardrobe, dressing table, cot, dining room suite, lounge suite, kitchen table, cabinet unit, garden furniture, loose chairs, wall unit, display cabinet, coffee table, desk, carpets, runner, floor tiles, repair costs	0.95	Bedroom suite, dining room suite, lounge suite, kitchen table and chairs, fitted carpets, floor tiles, loose carpets	1.11
CPI_appliances	Household appliances	Refrigerator, deep freezer and refrigerator combination, chest freezer, stoves, microwave oven, washing machine, dish washer, tumble drier, vacuum cleaner, floor polisher, carpet cleaner, iron, kettles and percolators, sewing machine, over locker, knitting machine, electrical beater, food processor, electric frying pan, toaster, waffle pan, sandwich-maker, lawn mower and edge trimmer, heater, lamp, fan, non electric stoves, heaters, sewing machines, lawnmowers. Repairs.	0.80	Refrigerator/Freezer and refrigerator combination, Freezer, stove and oven, microwave oven, iron, kettle, electrical frying pan, toaster	0.72
CPI_hhconsumables	Household consumables	Soap, washing powder, liquid detergents and bleaches, brushes and brooms, polish, scouring agents, matches and candles, fertilizer and lime, chlorine and acid, other cleaners	1.25	Bleach, laundry soap, washing powder, dish-washing liquid, wax shoe polish, air freshener, indoor insecticide, domestic worker wages	2.72
CPI_domesticworkers	Domestic workers		3.48		2.12
CPI_health	Health	Doctors fees, dentists fees, physiotherapists, occupational therapists, opticians, traditional doctors, hospitals, nursing homes, clinics, prescription medicines, prescription fees, other medicine, therapeutic appliances and equipment, contributions to medical aid, medical insurance	7.15	Pain killers, cough mixture, vitamin and mineral supplement, sinus medication, fungal medication, cold and flu medication, heartburn medication, muscle pain relief gel, sore throat lozenges, laxative, GP's, Obs and Gynae's, Physicians, Paediatricians, Dentists, Ward fees, Theatre fees and consumables.	1.47
CPI_transport	Transport		14.84		19.16
CPI_vehicles	Vehicles	Sedan, Station wagon, mini-buses, bakkies, four-wheel drives, motor cycles, scooters, bicycles, caravans all new and used	5.95	Hatchback, Sedan, Bakkie, SUV/MPV all new and second hand options	11.55
CPI_runningcosts	Running costs	Fuel, oil and ghries, tyres and tubes, batteries, shock absorber, disc pads, brake shoe, engine cylinder head gasket, piston, rings, exhaust valve, distributor points, main bearing linters, clutch friction plate, oil filter element, air filter element, spark plug, fan belt, headlight, fuel pump, services, installation costs, panel beating and other repair work, licence and registration fees, toll fees, parking fees, traffic fines, driving lessons, car wash	7.05	Tyre, shock absorbers, Disk pads, Engine cylinder head, gasket, clutch friction plate, spark plug, fan belt, unleaded petrol, diesel, minor service, major service, car wash, licence issue and application fees, motor vehicle licence and registration fees, parking, toll fees	4.85
CPI_publictransport	Public transport	Bus fees, Train fees, Taxi's and rented vehicles, boat transport, aeroplane, other	1.84	Train fees, local bus fares, taxi fare, long-distance bus fares, air fares	2.76
CPI_communication	Communication	Telephone fees, Cellular phone fees, internet subscription, postage, other	2.98	Stamps, rental of post box, cell phone, telephone fees, cell phone fees, internet subscription costs	3.21
CPI_recreationculture	Recreation and culture		3.31		4.30
CPI_readingmatter	Reading matter	Books, magazines, newspapers	0.39	Top 10 books, newspapers, magazine, writing pad, pencil pen	0.75
CPI_education	Education	Tuition and attendance fees for day care mothers, crèches and playgroups, pre-primary schools and after school centres, school fees, teachers training, agricultural and technical colleges, university fees, private tuition, other	3.48	Primary school fees, secondary school fees, university fees	2.33
CPI_personalcare	Personal Care	Hairdressers, hair drier, hot brush, warm curlers, electrical shaver, shampoo, hair spray, mousse, gel, relaxers, colour shampoo, conditioner, soap, bath oils and salts, toothpaste, tooth brush, moth-wash, dental floss, shaving soap, cream, blades, after-shave lotion, perfume and colognes, make up, wigs and hair pieces, powder and deodorants, toilet paper others	3.67	Shampoo, conditioner, tissues, sanitary pads, tampons, bar of soap, toothbrush, skin lotion, roll-on deodorant, toilet paper, disposable nappies, toothpaste, aerosol deodorant	1.57