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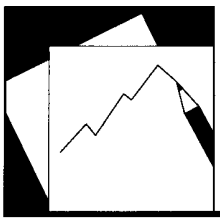

IMF Working Paper

South Africa: The Cyclical Behavior of the Markups and its Implications for Monetary Policy

Nir Klein

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African Department

South Africa: The Cyclical Behavior of the Markups and its Implications for Monetary Policy

Prepared by Nir Klein

Authorized for distribution by Abebe Aemro Selassie

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Abstract

The study looks at the cyclical behavior of the markups and assesses its impact on inflation dynamics. The analysis finds that the aggregate level of the private sector's markup is relatively high, thus pointing to the lack of strong competition in South Africa's product markets. Additionally, the results suggest that the markups tend to move in a countercyclical manner, with a short-term positive impact on inflation. This implies that the countercyclical pattern of the markups is one factor among others that contribute to the relatively weak output gap-inflation co-movement. In the context of South Africa's inflation targeting framework, the counter-cyclical markups may also generate an asymmetric response of monetary policy to the fluctuations in economic activity.

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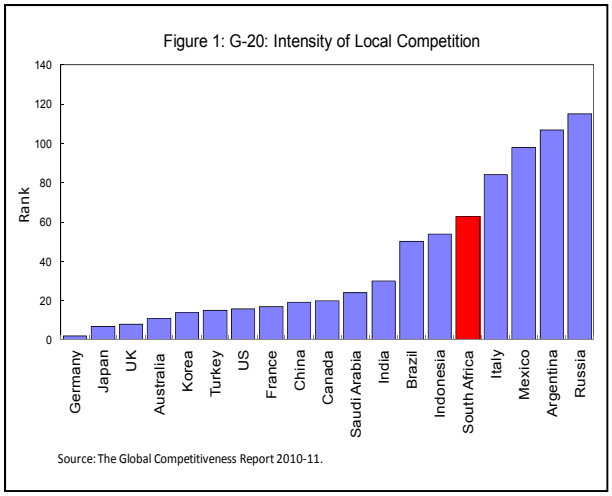
Keywords: Counter-cyclical markups, monetary policy, output gap-inflation co-movement.

Author's E-Mail Address:nklein@imf.org

Contents Page

I. INTRODUCTION

South Africa made a substantial progress in recent years in liberalizing economic policies and in strengthening the enforcement of competition policy. However, the product markets' competitiveness still lags behind that of the most dynamic emerging markets, reflecting high market concentration, heavy burden of regulations and high entry barriers imposed by state-owned enterprises (OECD, 2008).[1] In this context, the intensity of South Africa's local competition is ranked at 63 out of 139 countries by the World Economic Forum, significantly behind most of the G-20 member countries (Figure 1).



The lack of competition in South Africa's product markets, and in particular the high concentration across sectors, was found to be associated with high price-cost markups in the manufacturing sector.[2] Beyond its adverse impact on productivity and growth, the high markups and their volatility may have a substantial impact on the overall price dynamics during economic fluctuations with repercussions on the monetary policy's reaction function. Understanding this link seems to be highly important, particularly in South Africa, where the Reserve Bank operates within inflation targeting framework.

The economic theory is rather ambiguous and does not provide a solid prediction as to the cyclical behavior of the markups.[3] Among other factors, the markups' volatility largely depends on the relative stickiness of wages and other costs to prices, which tends to vary among countries, reflecting different structures of the labor and product markets. Additionally, the volatility of the markup can also reflect strategic decisions that are taken by the firms during economic cycles. In this regard, the "Customer market" model of Phelps and Winter (1970) suggests that the markups are pro-cyclical as firms lower their current prices to expand their customer base when they anticipate higher sales in the future. Alternatively, other models suggest that the markups should be counter-cyclical as higher competition during economic upswings compress the markup (and vice versa) through various channels. For example, Rotemberg and Saloner (1986) argued that the markups decline during booms because firms are less able to collude as their incentive to reduce prices and increase their

[1] In South Africa, 5 percent of the firms in the manufacturing sector account for over half the industry output (Fedderke and Szalontai, 2004).

[2] Aghion et al. (2008) found that the profitability margins in South Africa's manufacturing sector are, on average, more than twice compared to other countries, and they are associated with the relatively low productivity and growth. Fedderke et al. (2006) showed that the industry concentration in South Africa exerts a positive influence on the price-cost markups.

[3] A comprehensive survey of the literature appears in Rotemberg and Woodford (1999).

market share is higher. Stiglitz (1984) also advocated the view that markups are counter-cyclical by arguing that firms try to deter the entry of other firms to the market during economic booms by lowering the markups. Additionally, Stiglitz and others such as Blis (1989), Klemperer (1995) and Okun (1981) claimed that the elasticity of the aggregate demand declines during economic downturns, thus leading to higher markups due to increased pricing power.

Other group of models attributed the counter-cyclical of the markups to the imperfections of the capital market. In this regard, Greenwald et al (1984), Gottfries (1991), Klemperer (1995), and Chevalier and Scharfstein (1996), suggested that markups are counter-cyclical because during recession, when firms have a low cash flow and a greater difficulty in raising external funds, they tend to raise the markups to meet their financing needs.

The empirical evidence regarding the cyclical behavior of the markup is not robust. The results seem to depend on the estimation techniques and assumptions used to identify the marginal cost of production, which is a key component of the markup. The large literature in this area includes, Macallan et al. (2008), Haskel et al. (1995) and Machin and van Reenen (1993) who found that the markups move pro-cyclically in the UK; Morrison (1994) who found a pro-cyclical pattern in Canada; Blis (1987), Rotemberg and Woodford (1991), and Olivera Martins and Scarpetta (1999) who found evidence of counter-cyclicality behavior in the US. In the context of South Africa, Fedderke et al (2007), who examined the period of 1970-97, found evidence of a countercyclical pattern in the manufacturing sector.

Beyond the cyclical behavior of the markups, the analysis also touches upon the link between the markups' volatility and inflation. Here again, the literature is not conclusive and depends on the direction of the causality as well as the horizon of the impact. Neiss (2001), for instance, found a positive correlation between the markups and inflation across OECD countries, arguing that higher markups raise the monetary authorities' incentive to increase output, leading to higher equilibrium rates of inflation. A positive link between the markups and inflation was also found in Chirinko and Fazzari (1999) and Bowlder and Jansen (2004). Some New-Keynesian models, such as Ball, Mankiw and Reis (2003), and Steinsson (2005) also suggest a positive correlation between the markups and inflation as they interpret the change in the desired markup as a cost-push shock. Other studies, which looked at the impact of inflation on the markups, pointed to a negative correlation. In this regard, Benabou (1992) argued that higher inflation leads to higher price dispersion, which increases competition in customer markets and as a result reduces the markup. Banerjee's and Russell's (2005) findings support this line of argument.

The aim of this paper is to look at the cyclical behavior of the markup in South Africa at the aggregate level of the private sector, and to assess its impact on inflation dynamics. The analysis, which focuses on a period of three decades (1980–2009) and based on quarterly data, finds that the markup of the private sector is relatively high, consistent with previous findings. The analysis also indicates that the aggregate markup tends to move in a countercyclical manner, with a significant impact on inflation. The latter implies that the markup's countercyclical behavior is one factor among others that contribute to the relatively weak co-movement between the output gap and inflation in South Africa.

The rest of the paper is organized as follows: section II lays out the motivation for this study by presenting some stylized facts related to the sensitivity of prices to the output gap in South Africa and pointing to the main factors that may contribute to it; section III presents the empirical methodology related to the markup calculations, and discusses the observed correlation between the markup volatility and the business cycle. Section IV presents a VAR analysis on the link between the markups, inflation and the output gap, and discusses the main results, and section V provides some conclusions and discusses the implications for monetary policy.

II. THE LINK BETWEEN PRICES AND OUTPUT: SOME STYLIZED FACTS

In view of the potential impact of the markups' cyclical behavior on the overall price dynamics, this section aims to shed light on the link between prices and output gap, also from international perspective, and offer some explanations to the observed link.

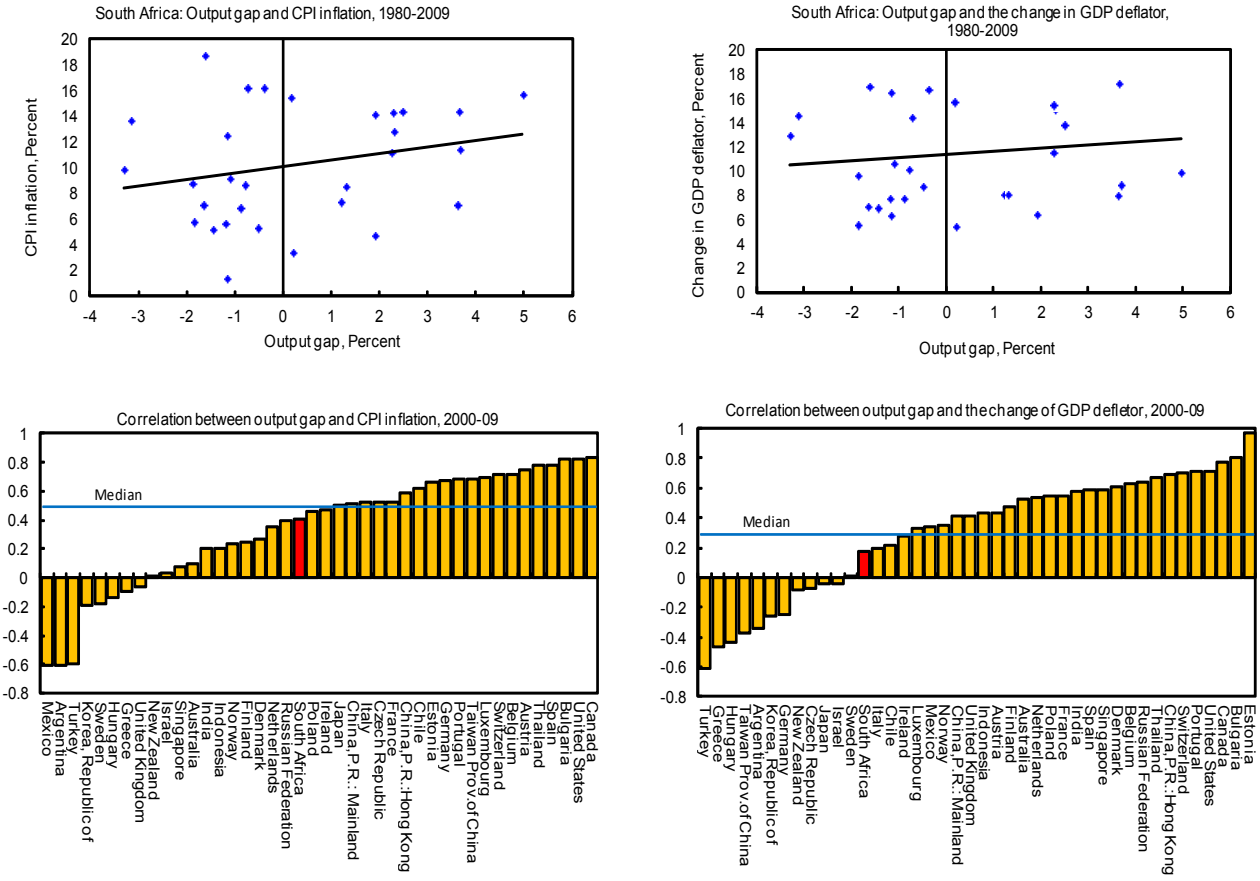
In South Africa, the co-movement between output and prices seems to be rather weak. The correlation between the output gap, as measured by the deviation of real GDP from its Hodrick -Prescott filter, and the change in GDP deflator for the period of 1980–2009 stands at 0.12, and is reflected in a relatively moderate slope of the trend line (Figure 2). The correlation between the output gap and CPI inflation is slightly higher, but still low at 0.24. The 10-year rolling correlation shows that it was highly volatile over the sample period, and during the 1980s and late 1990s, it was even negative (Figure A1 in the Appendix).

From international perspective, the output gap and price co-movement in South Africa is also relatively low (Figure 2). Although the comparison depends on the measurement of inflation (CPI or GDP deflator), it shows that South Africa's correlation in the past decade was positive in the 0.2-0.4 range, below the median of a sample that includes more than 40 advanced and emerging markets.

The absence of a strong co-movement between output gap and prices in South Africa may reflect several factors. For one, it may reflect the relatively strong persistence of inflation, in part due to inflation expectations that are largely backward looking. Second, it may result from the evolution of exchange rate and its relatively strong and fast pass-through to prices and the fact that economic downturns (upswings) in South Africa are often associated with exchange rate depriciation (apreciation). Third, the weak co-movement of prices and output may also reflect the evolution of comodity prices, which are weakly correlated with South Africa's business cycles.[4] An additional factor that may contribute to the weak sensetivity of prices to output could be the cyclical behavior of the markups. This will be the focus of the next sections.

[4] The long-term correlation (1980-2009) between the change in non-fuel commodity prices and the output gap is relatively weak (0.05). The correlation between the output gap and the change in fuel price index is 0.36.

Figure 2. Correlation between output gap and inflation



Source: WEO and staff's calculations.
* The cross-country comparison is based on the period 2000-09 due to lack of output gap data for many emerging countries in earlier years.

III. MEASURING THE MARKUP AND ITS CYCLICAL PATTERN

A. The link between the markup and the labor share

The term markup, μ, is typically used to refer to the gap between the price that a firm charges, *P*, and its marginal cost, *MC*. However, since the marginal cost is not an observable variable, it can be expressed in terms of labor share, S, and the elasticity of output with respect to labor input, $\eta_{Y,L}$, as follows:

(1) $$\mu = \frac{P}{MC} = \frac{P \cdot MPL}{W} = \frac{P \cdot \frac{Y}{L}\eta_{Y,L}}{W} = \frac{\eta_{Y,L}}{S}$$

where *MPL* denotes the marginal productivity of labor. Assuming that the elasticity of output with respect to labor is fixed over time, then the change in the labor share is inversely related to the change in the markup.

In South Africa, the evolution of the labor share seems to move in a pro-cyclical manner. Both the labor share of the economy as a whole and that of the private sector tend to increase when GDP is above potential and decline during economic downturns (Figure 3). This may suggest that the aggregate markup moves in a counter-cyclical manner, assuming that the elasticity of output with respect labor is relatively stable over time. A closer look at the labor share, which can be also expressed as the ratio between the real wage and labor productivity, reveals that part of its pro-cyclical movement can be attributed to the movements of the real wage per employee, which, apart from the episode of the sharp decline in output during the early 1990s, seem to have high and positive correlation with the output gap (Figure 4).

Figure 3. South Africa: The Business Cycle and the change in the labor share

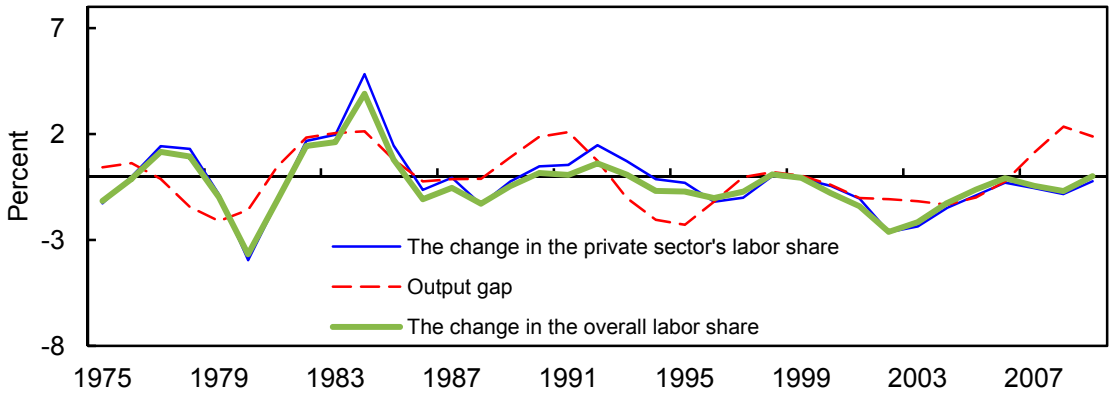
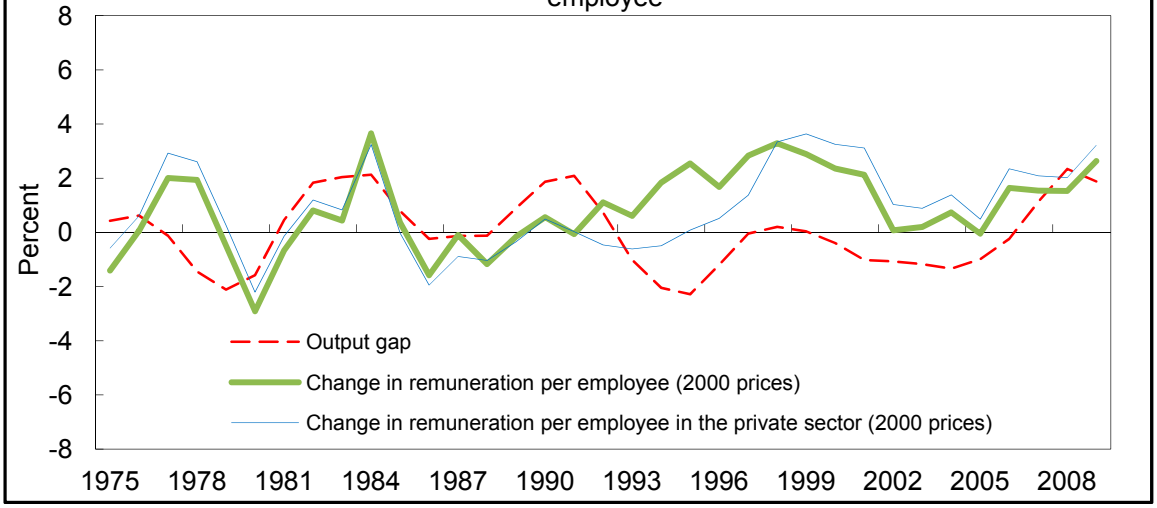
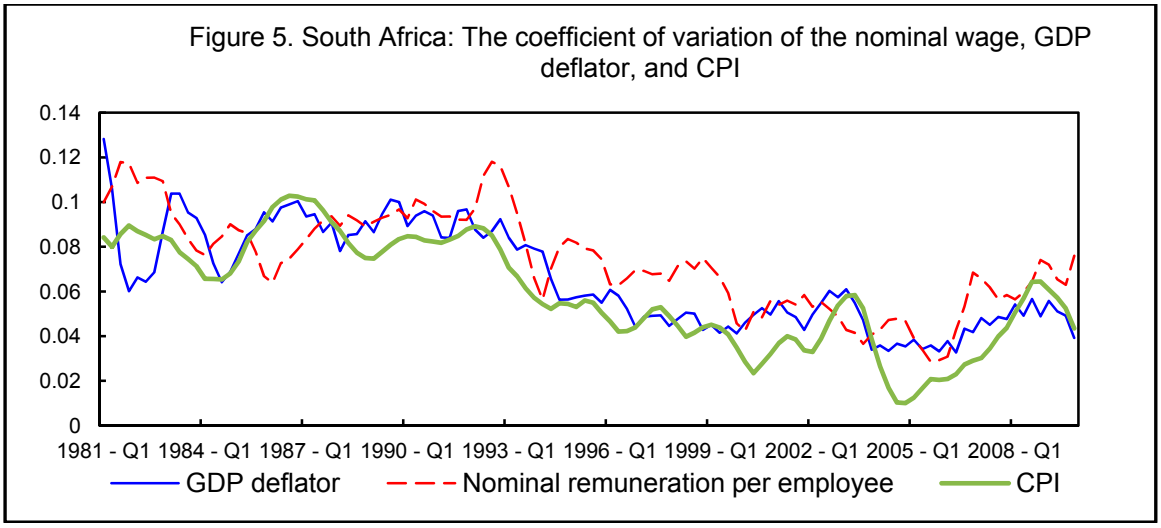


Figure 4. South Africa: Output gap and the change in real remuneration per employee





One explanation for the pro-cyclicalicality of real wages is the counter-cyclical markups.[5] Yet, given the upward pressures on prices in episodes of economic expansions, this also requires that nominal wages will be more flexible than prices. In South Africa, this seems plausible given the relatively high frequency of wage agreements and the observed stickiness of inflation. And indeed, the coefficient of variation of the nominal wage is higher than the coefficient of variation of the CPI and the GDP deflator most of the time in the past three decades (Figure 5).

B. Deriving the markup from the Nominal Solow Residual

An additional approach to measure the markup was proposed by Hall (1990). Hall demonstrated that the difference between output growth and the weighted average of factor input growth cannot be entirely attributed to autonomous technical change when markets are imperfectly competitive. In particular, he showed that under the assumption of constant returns to scale, with two-input production function and Hicks neutrality in technical progress, the primal Solow Residual (SR) is a function of the price-cost markup as follows:

(2)
$$\begin{aligned} SR &= \Delta q - \alpha \cdot \Delta l - (1-\alpha) \cdot \Delta k \\ &= (\mu - 1) \cdot \alpha \cdot (\Delta l - \Delta k) + \theta \end{aligned}$$

Where θ and Δ denote the technological change and the difference operator, respectively. q, l, and k and are the natural log of real value added, labor and capital input. α is the labor share. Under perfect competition the price is equal to the marginal cost ($\mu = 1$); however, when firms have a market power, prices are normally above the marginal cost ($\mu > 1$).

[5] In imperfect product markets, the demand for labor will be a function of the markup. Consequently, counter-cyclical markups imply that, in economic booms (downturns), the labor demand will shift up (down) and result in higher (lower) equilibrium of real wage. For further discussion, see NBER Macroeconomics Annual 1991, pp. 63–129.

The difficulty of estimating equation (2) is that the change in the labor and capital is likely to be correlated with the technology change, thus resulting in bias and inconsistency in the estimates of the coefficient. In the absence of good instruments, Roeger (1995) suggested to compute the Dual Solow Residual (DSR), which, under imperfect competition, is also a function of the markup:

$$DSR = \alpha \cdot \Delta w - (1-\alpha) \cdot \Delta r - \Delta \mathrm{p} = (\mu - 1) \cdot \alpha \cdot (\Delta w - \Delta r) + \theta \quad (3)$$

with *r* and *w* denoting the natural logs of the wage rate and rental price of capital, respectively, and Δp denotes the change in prices. Then, subtracting equation (3) from equation (2), would give us the Nominal Solow Residual (NSR), with the technological changes (θ) cancelled out, as follows:

$$NSR = \Delta(q+p) - \alpha \cdot \Delta(w+l) - (1-\alpha) \cdot \Delta(r+k) = (\mu - 1) \cdot \alpha \cdot [(\Delta(w+l) - \Delta(r+k)] \quad (4)$$

The markup can be computed from equation (4).[6] The markup's calculation uses quarterly data for the period 1980-2009.[7] In particular, (q+p) is the overall gross added value in current prices excluding the value added of the general government; *w* is the nominal remuneration per worker in the private sector; the rental price of capital, *r* is defined as $(i - \pi^e + \delta) \cdot p_K$, where $(i - \pi^e)$ denotes the expected real rate, δ is the depreciation rate (assumed at 5 percent), and p_K is the price index on capital stock.[8] In the absence of full coverage of employment data for the sample period, we use the non-agricultural formal employment of the private sector, denoted by *l*.[9] In addition, given that the private's sector capital stock is available only on annual basis, we converted the data to quarterly frequency using a log-linear interpolation.

The measurement of the aggregate markup for the private sector points to a low level of competition in South Africa's industries (figure 6). The estimation shows that the average price-cost markup for the period 1980-2009 is around 1.5, which reflects a significant profit margin for the local firms. This level is broadly consistent with the findings in Aghion et al. in various industries in South Africa's manufacturing sector. Additionally, the calculated

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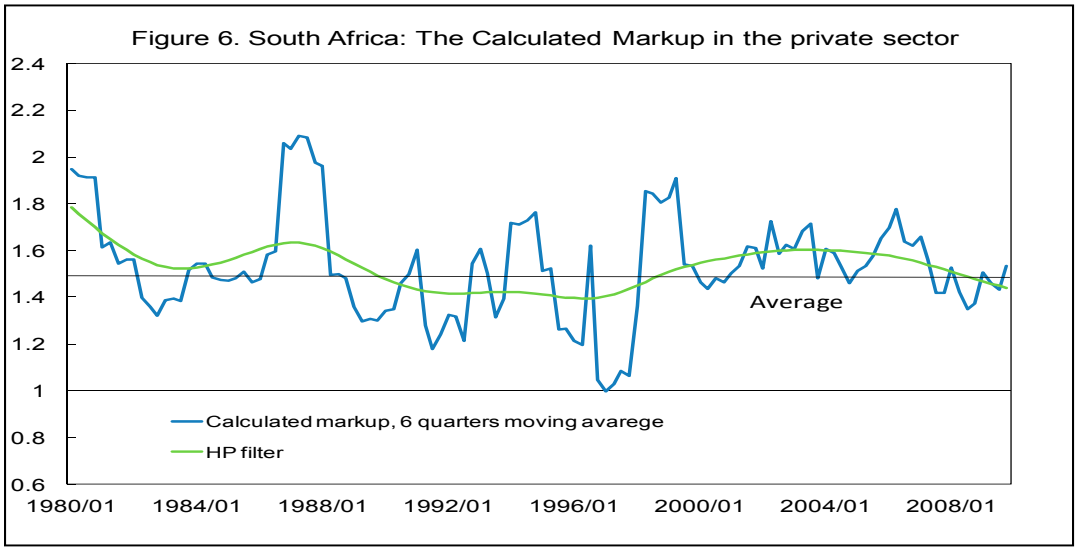
[6] Rearrangement of equation (4) gives: $\mu - 1 = \frac{[\Delta(p+q) - \alpha\Delta(w+l) - (1-\alpha)\Delta(r+k)]}{\alpha[\Delta(w+l) - \Delta(r+k]}$. Olivera Martins and Scarpetta (1999) demonstrate that the calculated markup in equation (4) should be interpreted as a lower bound if increasing returns to scale are present.

[7] The raw data was taken from the SARB's website: http://www.reservebank.co.za/.

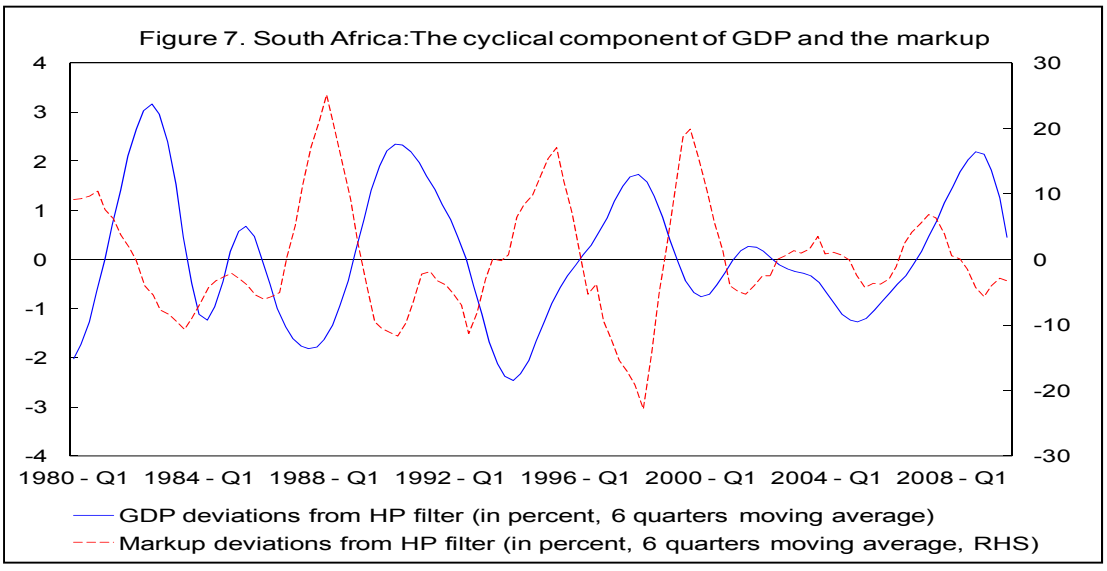
[8] The expected real rate is derived from the yields on government bonds with maturities of 15 years, and inflation expectations, which are computed on the basis of Hodrick-Prescott filter for inflation rate. The price of capital stock is derived from the price of fixed capital formation.

[9] Given that the Labor Force Survey (LFS) was introduced in 2000, the data for employment in the agricultural sector is not available for earlier years.

markup seems to be quite volatile around its mean and its evolution does not point to a clear long-term trend, despite the liberalization process that took place in the post-apartheid era.



Apart from its high volatility, the calculated markup seems to move in a countercyclical manner (figure 7). The cyclical component of the markup (the "markup gap"), which is measured by the markup's deviation from the HP filter, seems to widen in periods of economic downturns and decline in episodes of economic booms.[10] This is consistent with the view put forward by several theoretical models and empirical findings elsewhere. The correlation between the two variables over the sample period is negative at -0.55, although it declined to -0.22 in 2000–2009.



[10] The markup gap aims to look at the cyclical component of the markup and exclude the changes in the markup's trend that can be attributed to structural changes in the product markets.

A simple OLS regression shows that the impact of the output gap on the markup gap is negative and significant (Table 1). The link between the markup gap and the output gap is examined in the following specification:

(5) $$\widehat{\mu_t} = c_0 + c_1 \cdot y_{gap,t-1} + \varepsilon_t$$

Where y_{gap}, is the output gap, and $\hat{\mu}$ is the "markup gap", both measured in percentage points. The estimation results show that the coefficient of the output gap is significant and negative, and its size implies that a one percent increase of output above potential leads, on average, to a decline of 3 percent in the markup gap.[11] A rolling regression, which examines how the coefficient evolved over the sample period, reveals that it varied significantly, shifting from nearly zero in the mid-1980s to negative values in the subsequent periods. In recent years, the negative value of the coefficient seems to have stabilized around minus 4 percent, and although the significance band has somewhat widened, the output gap coefficient remained significantly different from zero (Figure 8).

Table 1. OLS Estimation Results, 1980Q1–2009Q4

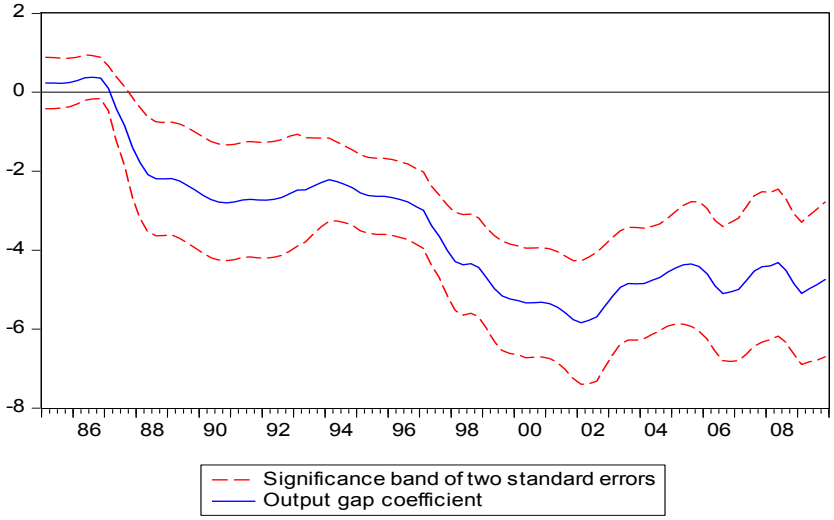
Dependent Variable: *MARKUP GAP**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.212383	1.522628	0.139484	0.8893
OUTPUT GAP(-1)	-3.01653	0.930769	-3.2409	0.0016

Adjusted R-squared : 0.213

*Standard errors are adjusted by Newey-West.

Figure 8. Coefficient of the OUTPUT GAP, Rolling Regression, 1985-2009



[11] The estimation does not show evidence for an asymmetric response of the markup gap to the output gap.

IV. THE LINK BETWEEN THE MARKUP GAP, INFLATION AND OUTPUT GAP

In an effort to further explore how the markup, output and prices are linked, a Vector Auto-Regression (VAR) was estimated. The estimation is based on a quarterly data for the period 1980–2009 (120 observations), as follows:

$$z_t = A_0 + A_1 z_{t-1} + \cdots + A_p Z_{t-p} + Bx_t + \varepsilon_t \quad (6)$$

Where Z is a vector that includes three endogenous variables (output gap, inflation, and the "markup gap"), X is a vector of exogenous variables and *A* and *B* are matrices of the coefficients to be estimated.[12]

The augmented Dickey-Fuller tests for both the output gap and the "markup gap" reject the null hypothesis that the variables have a unit root (Table A1 in the appendix). However, the tests results for inflation indicate that we cannot reject the null hypothesis of a unit root. Therefore, the VAR estimation includes the deviation of inflation from the HP filter, which is a stationary series. The summary statistics for the three endogenous variables and their evolution, which are presented in Table A.2 and Figure A2 in the appendix, show that the three variables moved in a fairly wide range. The output gap shifted from nearly 4 percent above the potential output (1982Q1) to around 3 percent below it (1993Q2). At the peak, inflation reached 19 percent (1986Q3) and declined to -1.8 percent at the bottom (1994Q1). The markup gap moved in a wider range of 28 percent above and below its mean.

The estimation results, which are presented in Table 2, confirm the countercyclical pattern of the markup. In particular, the results show that a one percent increase of output above its potential, leads, on average, to a contraction of 3.5 percent in the markup gap in the following quarter.[13] Although the direct impact of the output gap on the cyclical component of inflation (*INFLATION_CYC*) is positive and significant, the estimation results suggest that the positive link between the latter and the markup gap tends to moderate this impact. This is shown by the positive and significant coefficient of the markup gap in the inflation equation.

The variables' dynamic behavior was also assessed through impulse response functions (IRFs).[14] This exercise points to a negative reaction of the markup to a shock in the output gap in the subsequent ten quarters, thus validating the counter-cyclicality of the markup at the aggregate level (Figure 9). More specifically, the IRFs show that a one percent increase of output above its potential leads to a contraction of about 13 percent in the markup gap (on

[12] The VAR estimations include three exogenous variables: the cyclical component of the world GDP, *World_Cyc*, to control for global business cycles, the cyclical component of world inflation, *World_Inf_Cyc*, to reflect the variation in commodity prices, and a dummy for outliers in inflation in South Africa, *DUMINF,* which reflects observations in which inflation moved by one standard deviation or more within one quarter.

[13] The coefficient of the second lag of the output gap is positive but it is not significantly different from zero.

[14] The shocks in the VAR were orthogonized using Cholesky decomposition. Although in this specification, the output gap was considered as the most exogenous variable and inflation as the least exogenous variable, a change in the ordering did not change the main results.

a cumulative basis, 4 quarters). In addition, they indicate that the markup gap is positively correlated with inflation, such that the cyclical component of inflation tends to increase by 15 basis points as a result of one percent increase of the markup gap (on a cumulative basis, 4 quarters). The combination of these two results implies that the countercyclical behavior of the markup tend to moderate inflation over the business cycles and thus contribute to the observed weak co-movement between the output gap and inflation in the past three decades. In particular, the IRFs imply that in the absence of the markup's response to the output gap, inflation would have increased by additional 190 basis points in response to a one percent increase of GDP above its potential (on a cumulative basis, 4 quarters). This may also explain why the response of inflation to the output gap shock - while positive - is not significantly different from zero.

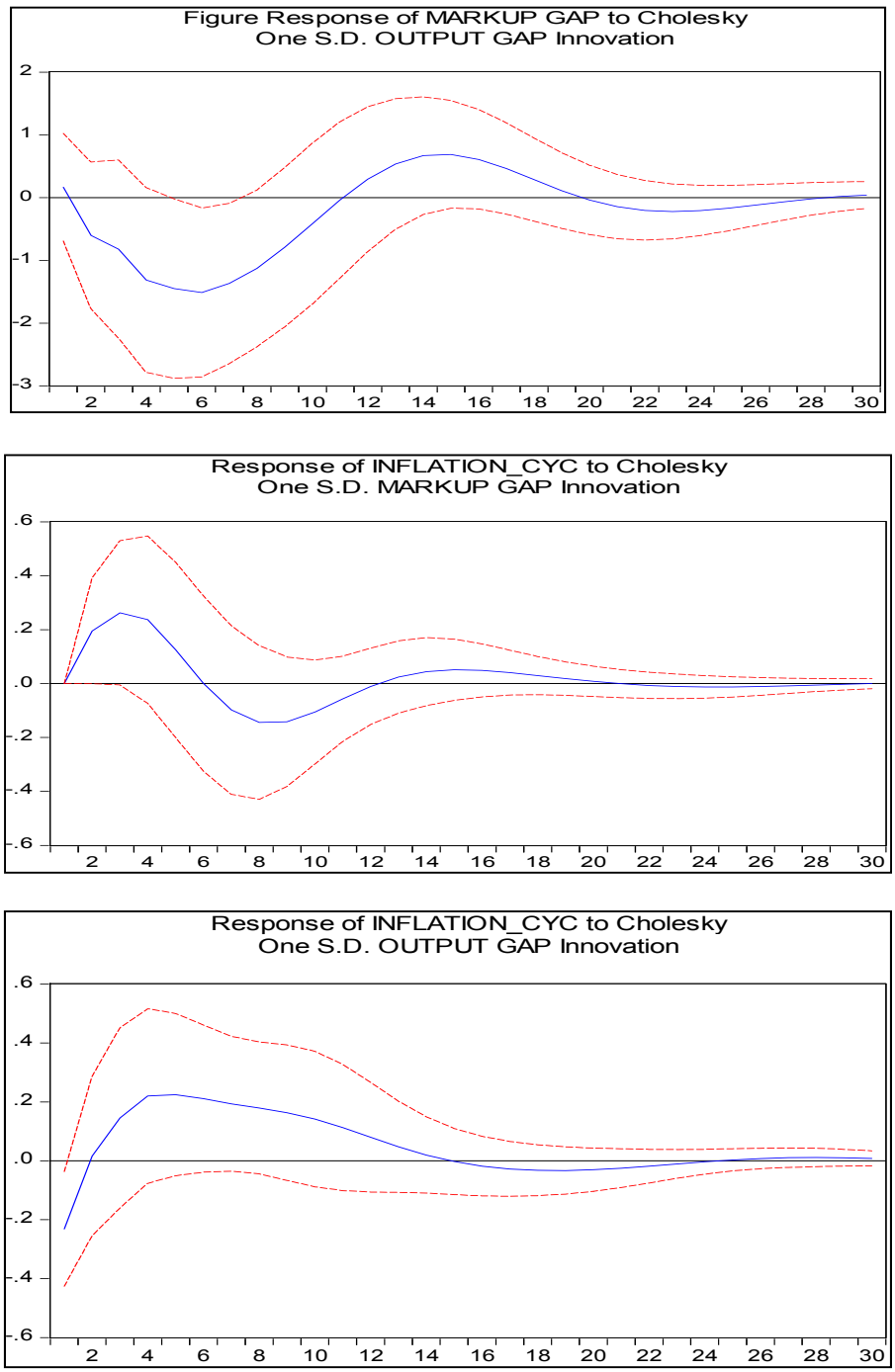
Table 2. VAR Estimation Results, 1980Q1–2009Q4*

	OUTPUT GAP	*INFLATION_CYC*	*MARKUP GAP*
OUTPUT GAP(-1)	1.972807	1.175489	-3.53483
	[21.6200]	[2.46256]	[-1.69928]
OUTPUT GAP(-2)	-1.43366	-1.75112	5.190745
	[-8.92325]	[-2.08347]	[1.41720]
OUTPUT GAP(-3)	0.375427	0.919626	-3.0176
	[4.32633]	[2.02582]	[-1.52539]
INFLATION_CYC (-1)	0.012748	0.984474	0.212702
	[0.76260]	[11.2580]	[0.55816]
INFLATION_CYC (-2)	-0.03346	-0.21244	-0.35597
	[-1.43288]	[-1.73928]	[-0.66877]
INFLATION_CYC (-3)	0.010918	-0.09987	0.650278
	[0.63925]	[-1.11773]	[1.67010]
MARKUP GAP (-1)	-0.0003	0.042722	0.946785
	[-0.07390]	[2.00750]	[10.2090]
MARKUP GAP (-2)	0.000219	-0.02474	0.068401
	[0.03940]	[-0.84941]	[0.53893]
MARKUP GAP (-3)	0.00202	-0.0142	-0.30976
	[0.50278]	[-0.67526]	[-3.38125]
C	0.001665	-0.06075	0.035464
	[0.08729]	[-0.60883]	[0.08155]
WORLD_CYC	7.072825	29.83186	21.4617
	[2.74211]	[2.21089]	[0.36499]
WORLD_INF_CYC(-5)	-0.06791	0.565359	-0.71451
	[-1.58703]	[2.52570]	[-0.73247]
DUMINF	0.053771	2.071851	5.135388
	[0.54705]	[4.02936]	[2.29181]
Adj. R-squared	0.983	0.777	0.785

obs. 120

*The t-statistics are presented in the parenthesis. The VAR optimal lag structure was determined by Schwartz Information Criterion (SIC).

Figure 9. Impulse response functions



The VAR dynamics were also assessed by variance decomposition (Table 3). The latter shows the extent of which the forecast error variance of one variable in the system is associated with surprise movement of other endogenous variables. The variance decomposition shows that the contribution of the output gap shocks to the variability of the markup gap is higher than the contribution of inflation shocks. Interestingly, while the contribution of the markup gap shocks to the variability of inflation is higher than that of the output gap shocks in short term (up to five quarters), in the longer-term, the contribution of

the output gap shocks is higher. The latter, together with the pattern that is shown in Figure 9, emphasizes the relatively fast transmission from the markups to inflation.

Table 3. Variance decomposition

Period	*S.E.*	*OUTPUT GAP*	*INFLATION_CYC*	*MARKUP GAP*
Variance Decomposition of OUTPUT GAP				
5	0.919874	99.48489	0.469613	0.045496
10	0.990401	95.92639	2.844493	1.22912
15	1.005327	95.14426	3.309618	1.546125
20	1.006855	94.91329	3.406643	1.680069
Variance Decomposition of INFLATION_CYC				
5	1.795246	5.390993	89.05869	5.550319
10	1.860661	9.664137	83.39306	6.942804
15	1.872815	10.15921	82.74658	7.094215
20	1.875774	10.24489	82.53284	7.222266
Variance Decomposition of MARKUP GAP				
5	8.86838	6.228134	1.329131	92.44273
10	9.768029	11.6575	9.634364	78.70814
15	9.950018	12.54147	9.770536	77.68799
20	10.01249	13.06226	10.06635	76.87139

Robustness check

The VAR system was also estimated for the second half of the period (1995Q1–2009Q4), which only includes the post apartheid regime and thus avoid a possible structural break in the economic conditions and policies. The estimation shows that the main results remain valid for this sub-sample, although the magnitude of the inflation's responses to the markups' movements has significantly declined (Table A3). In particular, the IRFs reveal that in this sub-sample, the markup gap declined on average by 17 percent in response to a one percent increase of output above its potential level (on a cumulative basis, 4 quarters), and that inflation increased only by 4 basis points as a result of one percent increase in the markup gap (on a cumulative basis, 4 quarters). This implies that, in the absence of the markups' response to the output gap, inflation would have increased by additional 70 basis points in response to a one percent increase of GDP above its potential (on a cumulative basis, 4 quarters).

V. CONCLUSIONS AND POLICY IMPLICATIONS

Previous studies, which closely looked at the product markets in South Africa, found a high degree of concentration across industries in the manufacturing sector and high levels of price-cost markups. As markups tend to fluctuate over time, the main purpose of this paper is to look at their cyclical behavior and further explore its impact on the output-price co-movement over the business cycles.

The analysis utilizes Hall's and Roeger's approach for the markup's calculation. This methodology, which derives the markup from the Nominal Solow Residual, shows that, during the last three decades, the average markup of the private sector was rather high and it fluctuated in a relatively wide range. Additionally, the analysis indicates that the markup tends to move in a countercyclical manner and its impact on inflation contributed to the observed weak co-movement between the output gap and inflation. In particular, the impulse response functions imply that in the absence of the markup's response to the output gap, inflation would have increased by additional 190 basis points in response to a one percent increase of GDP above its potential (on a cumulative basis, 4 quarters).

The analysis result that the markup's countercyclical behavior tends to weaken the co-movement between the output gap and inflation has implications for monetary policymaking, particularly under the current inflation targeting framework. In particular, the markups' countercyclical behavior and its positive link to inflation may lead to an asymmetric reaction of monetary policy to swings in economic activity. During economic downturns, the fact that inflation does not fall as much as it would have in the absence the markup's movement, limits the SARB's room to act fast to support economic activity by significantly lowering its policy rate. The lack of monetary policy support could exacerbate the downturns and even delay the subsequent recoveries. In economic booms, however, the contraction of the markup limits inflationary pressures, and thus provides the SARB with greater room to delay the monetary tightening.

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Appendix

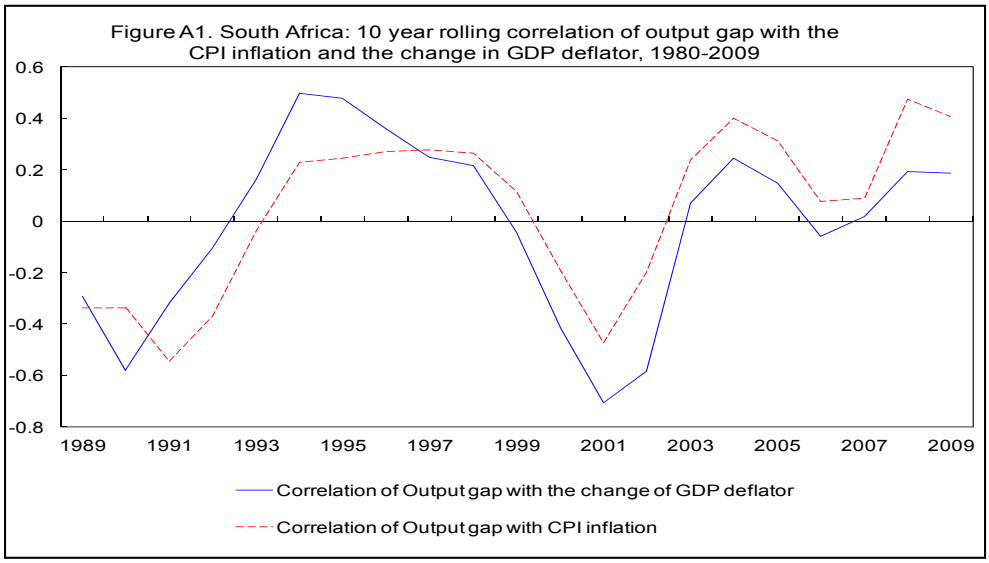

Table A1. Augmented Dickey-Fuller Unit Root Tests, 1980–2009*			
	None	Intercept	Intercept and trend
Level			
INFLATION	0.2723	0.5328	0.1982
INFLATION_CYC	0.0000	0.0000	0.0001
OUTPUT GAP	0.0000	0.0000	0.0000
MARKUP GAP	0.0000	0.0000	0.0001
First difference			
INFLATION	0.0000	0.0000	0.0001
INFLATION_CYC	0.0000	0.0000	0.0000
OUTPUT GAP	0.0000	0.0001	0.0007
MARKUP GAP	0.0000	0.0000	0.0000
* Values reflect the probability that the variable has a unit root (based on Mackinnon (1996) one-sided p-values. **Lags were determined by Schwartz Information Criterion (SIC).			

Table A2. Summary Statistics, 1980–2009			
	INFLATION	OUTPUT GAP	MARKUP GAP
Mean	9.97400	0.13992	-0.21944
Median	9.96000	-0.04590	-2.15321
Maximum	19.20000	3.92467	27.91263
Minimum	-1.77000	-3.05363	-28.02521
Std. Dev.	4.94808	1.53728	11.30353
Skewness	-0.29814	0.22033	0.46552
Kurtosis	2.32777	2.39356	3.48422
Jarque-Bera	4.03721	2.80974	5.46066
Probability	0.13284	0.24540	0.06520
Sum	1196.88	16.79	-26.11
Sum Sq. Dev.	2913.54	281.23	15076.83
Observations	120	120	120

Figure A2. VAR Endogenous Variables

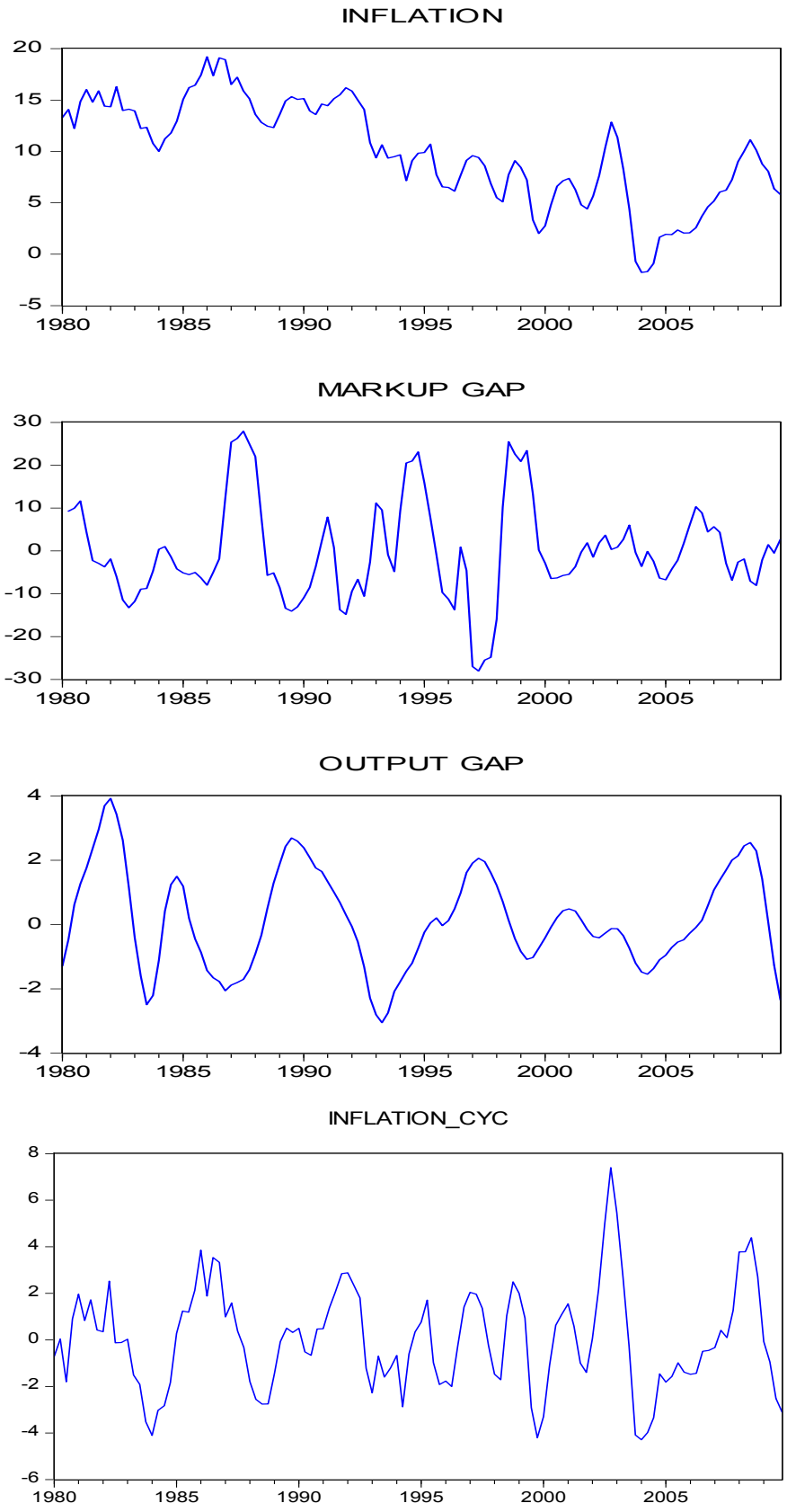

Figure A3. Residuals of VAR estimation

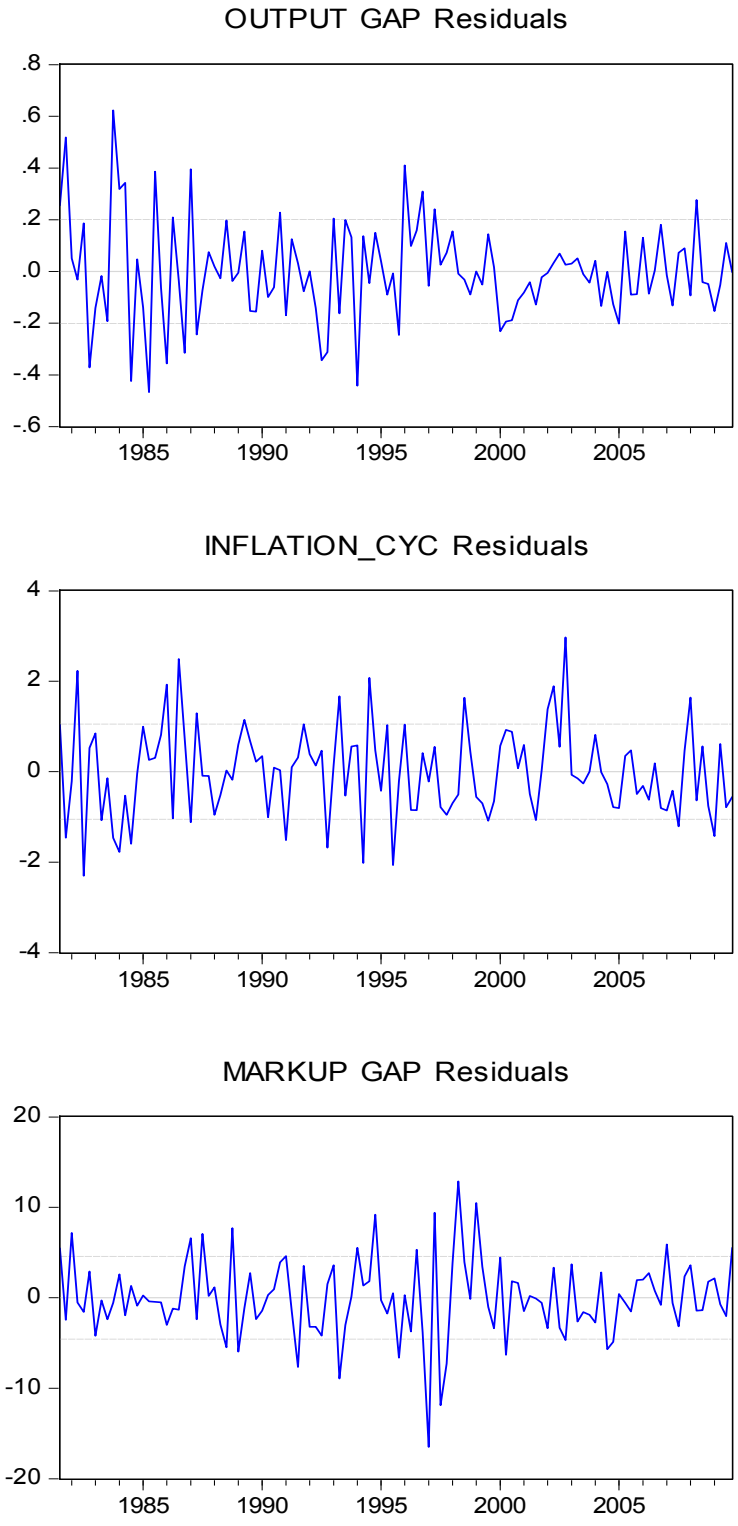

Table A3. VAR Estimation Results, 1995Q1–2009Q4*

	OUTPUT GAP	*INFLATION_CYC*	*MARKUP GAP*
OUTPUT GAP(-1)	1.606123	0.027821	-9.53855
	[19.8981]	[0.05099]	[-3.34725]
OUTPUT GAP(-2)	-0.72264	0.194022	7.970173
	[-10.0509]	[0.39924]	[3.13999]
INFLATION_CYC (-1)	0.01641	1.189158	0.495432
	[1.15085]	[12.3383]	[0.98419]
INFLATION_CYC (-2)	-0.02541	-0.51439	0.051932
	[-1.62009]	[-4.85301]	[0.09381]
MARKUP GAP (-1)	-0.00147	0.046565	0.875529
	[-0.40701]	[1.90226]	[6.84791]
MARKUP GAP (-2)	0.000916	-0.03863	-0.15829
	[0.25281]	[-1.57761]	[-1.23762]
C	-0.00228	-0.09795	-0.16284
	[-0.11960]	[-0.76193]	[-0.24252]
WORLD_CYC	9.793932	22.62616	158.4621
	[3.59467]	[1.22859]	[1.64740]
DUMINF	0.066294	2.107284	5.239387
	[0.92916]	[4.36954]	[2.08004]
Adj. R-squared	0.984	0.852	0.732
# obs. 60			

*The t-statistics are presented in the parenthesis. The VAR optimal lag structure was determined by Schwartz Information Criterion (SIC).

Figure A4. Impulse response functions, VAR estimation, 1995Q1–2009Q4