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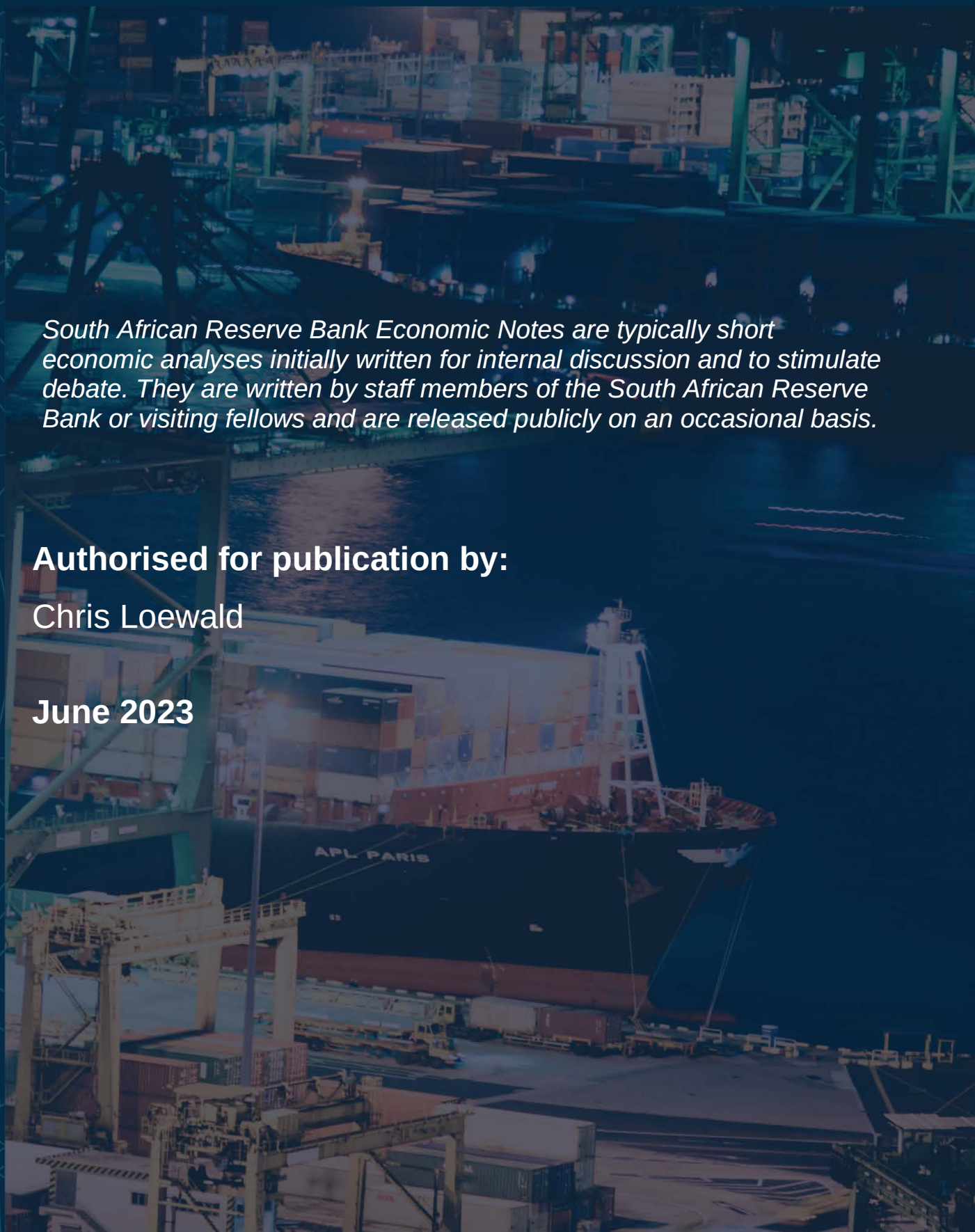
SOUTH AFRICAN RESERVE BANK



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Chris Loewald

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Table of Contents

Contents

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Mind second round effects! The effects of food and energy inflation on core inflation in South Africa

Witness Simbanegavi and Andrea Leonard Palazzi

Abstract

A review of the literature on second-round effects from food and energy (non-core) inflation shows that these effects are mainly transmitted via cost-push and demand-pull inflation channels. We deploy a gap model to investigate the presence of second-round effects in South Africa in the period 2003–2022. We find evidence that shocks to non-core inflation cause core inflation to revert to headline inflation, suggesting that these shocks transmit to core inflation. Core inflation reverts to headline inflation within one year, but the reversion is only partial, which could be interpreted as affirming the credibility of the South African Reserve Bank (SARB). Thus, following shocks to non-core inflation, policymakers should closely monitor conduits such as wage settlements and firms' mark-ups for signs of spillovers and pass-through. Keeping inflation expectations well anchored should minimise these risks.

1. Introduction

Monetary policy is designed primarily to deal with demand-side shocks to the economy. Shocks emanating from the supply side often require tools that typically are not available to central banks. Research, particularly on advanced economies, has generally found that shocks emanating from food and energy prices (non-core inflation) tend to be short-lived and not disturb inflation expectations.[1] Such shocks mostly affect relative prices rather than the general price level.[2] A fundamental view in monetary practice is that monetary policy should look through supply-side shocks because of their transitory nature.

When it comes to food and energy price shocks, there are important differences between advanced and emerging market and developing economies (EMDEs). First, food and energy generally carry larger weights in the consumer price index (CPI) baskets of EMDEs, which makes consumers more sensitive to price changes for these items. Second, EMDEs tend to have higher food inflation, which in turn has larger propagation effects compared to energy inflation.[3] Third, inflation expectations are generally not as well anchored in EMDEs as they are in advanced economies, which makes the former more susceptible to higher pass-through.

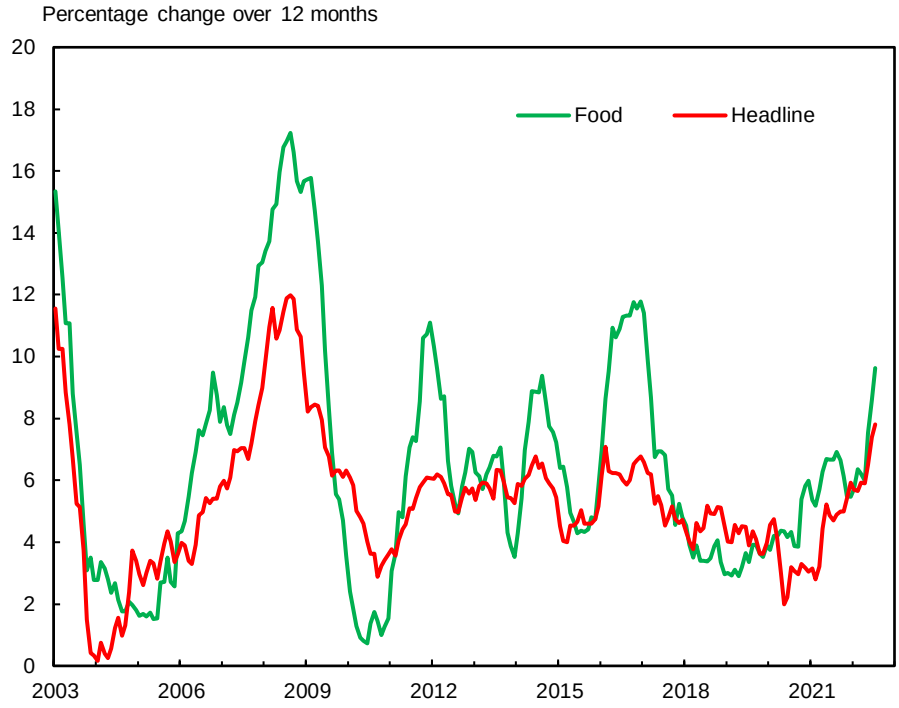
1 The current environment of multiple, large and overlapping demand and supply shocks could very well unsettle inflation expectations in advanced economies. However, the jury is still out on whether this means future food or energy price shocks would engender inflation persistence.

2 F U Ruch, 'Second-round effects on inflation, and underlying inflation', PhD dissertation, University of Stellenbosch, 2016.

3 J De Gregorio, 'Commodity prices, monetary policy, and inflation', *IMF Economic Review* 60(4), 2012, pp 600–633.

Lastly, the higher presence of administrative prices in EMDEs (in both energy and food) favours greater propagation of non-core price shocks, particularly in the absence of government subsidies.[4,5] Many scholars have shown that in EMDEs 'temporary' shocks to non-core inflation typically will embed into core prices.[6] Therefore, failure to diagnose and act on possible second-round effects amounts to a policy error and could result in supposedly temporary inflation becoming permanently embedded in core inflation.[7]

Figure 1: Food and headline inflation in South Africa



Source: Statistics South Africa

4 In South Africa, for instance, electricity and fuel prices are regulated.

5 Other factors, including trade openness, market competition, exchange rate volatility and taxes, affect the sensitivity of domestic prices to food and/or oil price shocks and thus potentially second round effects, particularly the size of these effects. See, for instance, Ruch (2016) and R Anand, D Ding and V Tulin, 'Food inflation in India: the role for monetary policy', IMF Working Paper, WP14/178, 2014.

6 See S C Cecchetti and R Moessner, 'Commodity prices and inflation dynamics', *BIS Quarterly Review*, 2008, pp 55–66; L Rangasamy, 'Food inflation in South Africa: some implications for economic policy', *South African Journal of Economics* 79(2), 2011, pp 184–201; J De Gregorio, 'Commodity prices, monetary policy, and inflation', *IMF Economic Review* 60(4), 2012, pp 600–633; Anand, Ding and Tulin (2014); L Rangasamy and E Nel, 'Reconsidering the role of food prices in South African headline inflation', *Agrekon* 53(4), 2014, pp 16–37; R N Misati and O Munene, 'Second round effects and pass-through of food prices to inflation in Kenya', *International Journal of Food and Agriculture Economics* 3(3), 2015, pp 75–87; G Gelos and Y Ustyugova, 'Inflation responses to commodity price shocks – how and why do countries differ?' IMF Working Paper, WP 12/225, 2012; G Peersman and I Van Robays, 'Oil and the euro area economy', *Economic Policy* 24(60), 2009, pp 603–651.

7 F U Ruch, 2016.

The aim of this note is twofold. First, we identify the propagation channels for second-round effects drawing from the literature, and second, we empirically investigate the presence of such effects during the 2003–2022 period in South Africa. We adopt the framework of Cecchetti and Moessner (2008) to test for the existence of second-round effects. This methodology is neutral as to the nature of shocks to non-core inflation (positive or negative), and simply tests whether changes to non-core inflation drive changes in core inflation.

We find evidence that second-round effects are present in South Africa. Following a shock to non-core inflation, headline inflation does not revert to core inflation while core inflation reverts to headline inflation. The former implies that shocks to food and energy prices do not dissipate quickly whereas the latter implies that shocks to food and energy embed into core inflation.

2. Related literature

There is a large body of literature on second-round effects. Evidence suggests that emerging market and developing economies are more exposed to risks of inflation pass-through from food and energy price changes than advanced economies. Second-round effects mostly transmit through demand-pull and cost-push dynamics such as increased production costs, higher nominal wages and a shrinking output gap.

Demand-pull

Accelerating wages represent a primary vehicle for non-core inflation pass-through.[8] Under conditions of elevated inflation expectations and rising food and/or energy prices, workers often successfully negotiate higher wage increases to preserve their purchasing power.[9] This can potentially affect inflation via two channels. Firstly, real wage increases in excess of productivity growth can raise inflation expectations higher and cause firms to respond by adjusting their selling prices. Secondly, high real wage settlements can raise real demand, resulting in a generalised rise in prices. This is so because wages often do not adjust downwards once the inflation shock dissipates, and "stickiness" renders second-round effects difficult to unwind.[10]

Also, adverse supply shocks can narrow the output gap (if negative) or expand it, thereby increasing inflationary pressures on the real economy. Energy or supply-side shocks equate to a negative productivity shock and thus lower the economy's potential output, generating inflationary pressures.[11] While compelling, this argument relies on the assumption that the impact of supply-side shocks on potential output is greater than on current output. To consider the output gap as a viable transmission channel, it is therefore key to determine if energy shocks have a greater impact on current or full employment output.

8 See De Gregorio (2012, p 609); Anand, Ding and Tulin (2014, p 7); Rangasamy and Nel (2014, p 25); and Ruch (2016, p 11).
9 G Peersman and I Van Robays, 2009, p 618.
10 De Gregorio, 2012, p 609.
11 De Gregorio, 2012, pp 601–602.

Cost-push

A second channel for second-round effects concerns the increased production costs that follow from higher input prices and that are then passed on to consumers. As fuel and energy inflation increases, firms' input costs rise, which creates incentives to increase selling prices to protect profit margins.[12]

There are at least three channels through which temporary energy inflation may impact production costs and thus feed into core inflation. First, energy inflation spills over into firms' transportation costs.[13] Second, higher energy inflation raises overall inflation, and this depreciates the real exchange rate, which raises real marginal costs (i.e. firms pay more for imported raw materials).[14] Third, rising energy costs could drive up wages, and thus total labor costs, which could prompt firms to increase selling prices to preserve margins. Of course, firms need not respond to higher wage costs by raising selling prices to consumers. Depending on the sensitivity of demand to price changes, firms could permit some erosion of margins to preserve market share, or they could reduce employment to ease wage costs while pushing for greater productivity.[15,16] However, where demand is inelastic, firms may simply pass on the higher costs to consumers through price increases.

Given that labour costs are often a large share of total firm costs, sharp increases in wage costs, due to either higher food or energy inflation, could potentially trigger a self-reinforcing process – the so-called wage-price spiral.[17] Workers facing sharply higher non-core inflation could successfully bargain for wage increases, squeezing firms' profit margins.[18] To protect margins, firms may pass these higher costs back to consumers, who in turn may demand even higher wage increases – creating a wage-price spiral.

Monetary policy can help minimise the second-round effects of food and energy inflation even in EMDEs. Well-anchored inflation expectations reduce fluctuations in wage/cost adjustments and thus help to break wage-price spirals. Likewise, central bank credibility helps to curb volatility in price/wage adjustments by preventing speculation on inflation expectations.[19]

3. Data and methodology

The analysis in this note follows Cecchetti and Moessner's model (2008) to investigate the presence of second-round effects in South Africa. Econometrically, second-round effects can be assessed by considering whether headline inflation reverts to core inflation and whether core inflation reverts to headline inflation. We address these questions below.

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12 See De Gregorio (2012, p 615); Rangasamy and Nel (2014, p 25); and Ruch (2016, p 11).

13 C Chisadza, J Dlamini, R Gupta and M P Modise, 'The impact of oil shocks on the South African economy' *Energy Sources, Part B: Economics, Planning, and Policy*, 11(8), 2016, pp 739–745.

14 S Mija, D Slobozian, R Cuhal, and A Stratan, 'How core inflation reacts to the second round effects', *Romanian Journal of Economic Forecasting* 1, 2013, p 101.

15 Peersman and Van Robays, 2009, p 630.

16 Hlédik, 2004, p. 134. Quantifying the second round effects of supply-side shocks on inflation. *Prague Economic Papers*, 2, 2004.

17 Ruch, 2016, p 22.

18 T Janse van Rensburg, A Khoza and P Mathuloe, 'Food inflation and wages – more than meets the eye?' SARB Research Brief, 2002, RB/2022/02.

19 Peersman and Van Robays, 2009, p 628.

1. Does headline inflation revert to core inflation?

If headline inflation reverts to core inflation, then food and energy price shocks are temporary, implying that second-round effects will be limited.[20] By contrast, second-round effects are large or persistent if headline inflation does not revert to core inflation. Intuitively, if headline inflation does not revert to core inflation, it must be because the shocks to non-core inflation (which are, by definition, temporary) have somehow become self-perpetuating. This can be studied using the following equation:

$$\pi_t^{headline} - \pi_{t-12}^{headline} = a + b\,(\pi_{t-12}^{headline} - \pi_{t-12}^{core}) + e_t \quad (1)$$

where $\pi_t^{headline}$ and π_t^{core} indicate year-on-year CPI headline and core inflation.

If headline inflation reverts to core inflation, b must be negative and different from zero.[21]

2. Does core inflation revert to headline inflation?

If core inflation reverts to headline inflation, then second-round effects are confirmed because the temporary shocks to non-core inflation cause core inflation to drift so that it catches with the trend for headline inflation.[22] This can be assessed using:

$$\pi_t^{core} - \pi_{t-12}^{core} = d + g\,(\pi_{t-12}^{core} - \pi_{t-12}^{headline}) + e_t \quad (2)$$

If g equals 0, core inflation does not revert to headline inflation, while an estimate of g= -1 and d=0 implies full reversion within one year.

We use seasonally adjusted monthly data from January 2003 to May 2022 from Statistics South Africa. We consider a lag of 12 months. In the first model, the null hypothesis is b=0. The interpretation is that headline inflation does not revert to core inflation. Similarly, for the second model, the null hypothesis is g=0, again assuming no possible causal relationship between core inflation and non-core inflation.

4. Results

Tables 1 and 2 below present the regression results for the two models.

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20 Anand, Ding and Vulin, 2014, p 6.
21 Gelos and Ustyugova, 2012, p 9.
22 Anand, Ding and Vulin, 2014, p 7.

Table 1: Does headline revert to core?

Lag	R^2	b (SE)	a (SE)	H0: b=0	H0: b=-1 and a=0
12 months	.0101	.17 (.11) [.136]	-.00 (.00) [.367]	[.000]	P>F= .000

Sample: 2003–2022

Source: Own calculations

Note: p-values in squared parenthesis

Table 2: Does core revert to headline?

Lag	R^2	g (SE)	a (SE)	H0: g=-1	H0: g=-1 and g=-1 and d=0
12 months	.25	-.99*** (.11) [.000]	-.00*** (.00) [.000]	[.9723]	P>F= .000

Sample: 2003–2022

Source: Own calculations

Note: p-values in squared parenthesis

*** indicates significance at the 1% level

The first question is whether headline inflation reverts to core inflation. We get a b coefficient of 0.17, which is positive. We test the null hypothesis of b=0, and this cannot be rejected. As we discussed above, reversion requires b to be negative and statistically significant. We thus conclude that headline inflation does not revert to core inflation – hence food and energy price shocks must be either persistent or large in South Africa.

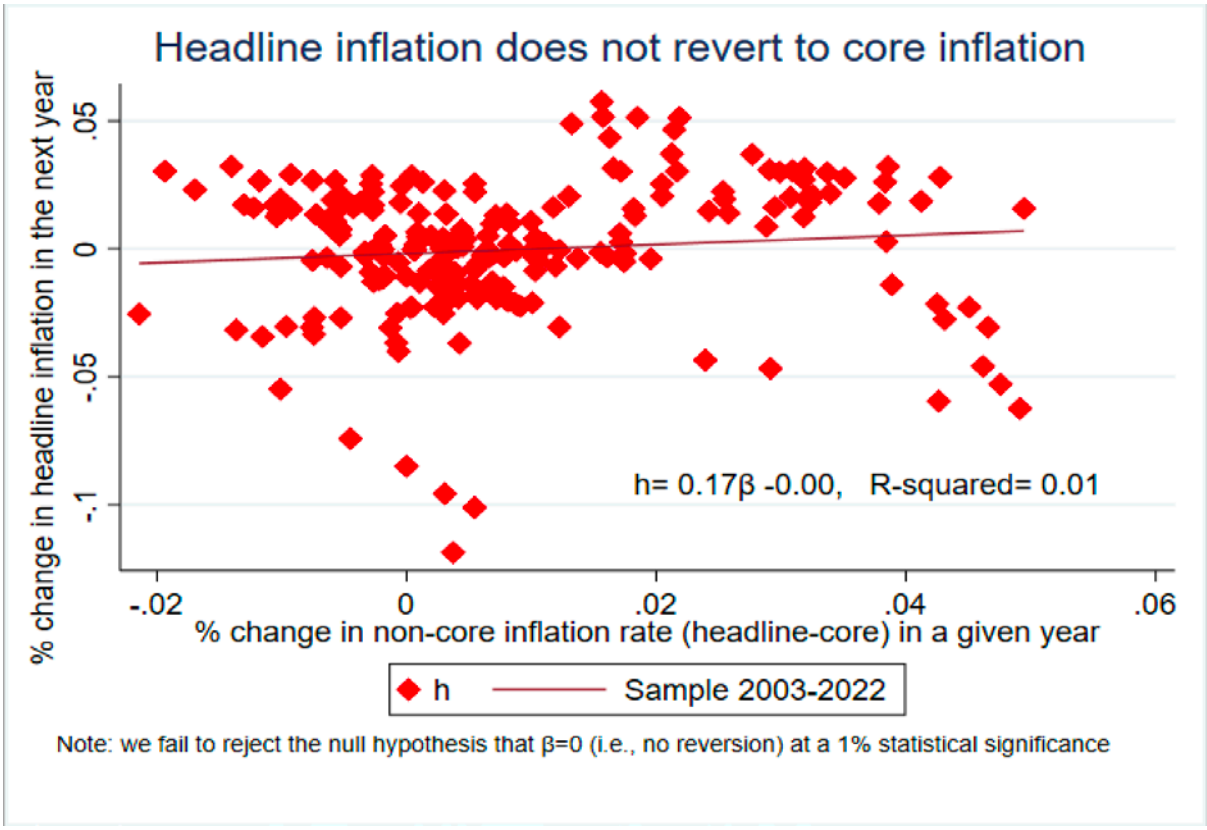
We next consider whether core inflation reverts to headline inflation. The estimated g coefficient is negative and close to -1, and statistically significant at the 1% level. The null hypothesis of g=0, that is, that core inflation does not revert to headline inflation, is thus rejected at the 1% significance level. This means we cannot reject the hypothesis that movements in non-core inflation cause core inflation to move towards the trajectory for headline inflation. We also test the hypothesis that g=-1, that is, that core inflation reverts to headline inflation within 12 months. This cannot be rejected. Finally, we test for full reversion of core inflation to headline inflation, that is, whether core inflation reverts to the exact trendline for headline inflation. This is a joint test of g=-1 and d=0. This joint hypothesis is however rejected, meaning that core inflation does not revert fully to headline inflation. A possible interpretation of the partial reversion is increased monetary policy credibility, whereby agents act on the belief that SARB would respond appropriately to any persistent deviations of inflation from the midpoint of the target range.

Considering the above findings, we conclude that second-round effects have been present in South Africa during 2003–2022, meaning that shocks to food and energy prices have partially fed into core inflation within one year.

The results are consistent with findings for other emerging markets like India[23] and Kenya,[24] as well as earlier studies for South Africa.[25] Following Rangasamy (2011), on average, over the 2003–2022 period a 1% increase in non-core inflation results in core inflation increasing by 0.99% within a 12-month period.

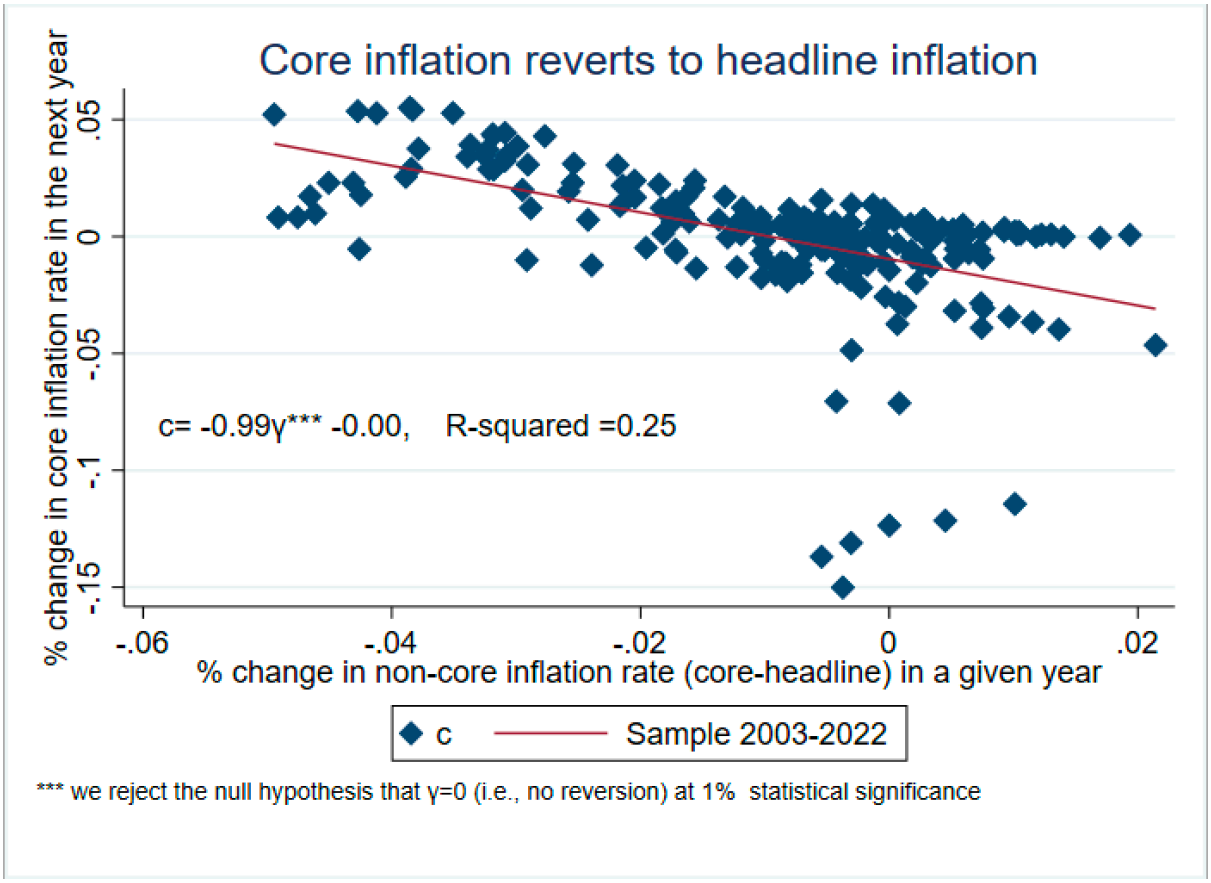
As shown in Figures 2 and 3, second-round effects are present if core inflation reverts to headline inflation and headline inflation does not revert to core inflation.

Figure 2: Headline inflation does not revert to core inflation



23 Anand, Ding and Vulin, 2014.
24 Misati and Munene, 2015.
25 Rangasamy (2011) and Ruch (2016).

Figure 3: Core inflation reverts to headline inflation



5. Conclusion

This note assessed the existence of second-round effects from food and energy price shocks in South Africa. We found that South Africa is not immune to second-round effects from non-core inflation as core inflation reverts to headline inflation within a year. We find that pass-through of non-core inflation to core inflation is present but not complete, perhaps reflecting the credibility of the monetary policy regime in South Africa. The policy implication is that calibrations of monetary policy that ignore second-round effects from non-core inflation will invariably lead to a policy mistake.