



# What online prices reveal about inflation in South Africa

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## Abstract

E-commerce data enable economists to study a range of economic phenomena, ranging from price dynamics, market structure and product entry and innovation, consumer demand and behaviour, and pass-through of input costs to final retail prices. In this paper we compare developments in e-commerce prices to official estimates of consumer good inflation in South Africa. We highlight measurement challenges and differences between online list prices and officially surveyed statistics from discounting, product changes and product availability over time. We also evaluate online discounting behaviour for specific products and product categories, especially during Black Friday sales, and quantify online price persistence in South Africa. We show that e-commerce prices experience changes at a broadly similar frequency as our estimates imply for official measures of consumer prices. Our analysis suggests real-time alternative data are important, not just for forecasting, but also for understanding the nature of price dynamics in South Africa.

**JEL classification:** E31, C81, L81

**Keywords:** E-commerce, big data, real-time data

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# 1 Executive Summary<sup>1</sup>

E-commerce data enable economists to study a range of economic phenomena, ranging from price dynamics, market structure and product entry and innovation, consumer demand and behaviour, and pass-through of input costs to final retail prices. We use our ‘Scrapealot’ web data collection tool to create a ‘Takealot online price index’ to represent the costs of e-commerce goods over time and document developments in specific products and product categories.

We zoom in on discounting behaviour on the platform, both over time, as well as during Black Friday sales periods. We show that the listed prices of several categories of products, particularly consumer electronics, have decreased over the last 3 years. Measured using a balanced panel of products to avoid biasing measurement from changes in product composition, we find that listed price inflation has been substantially lower than consumer inflation of consumer goods. Despite the large number of individual products considered, we emphasise that this reflects the fact that the official Consumer Price Index (CPI) basket includes a broader range of categories of goods than available from e-commerce platforms. It also potentially reflects the possibility of ‘inlier’ problems when measuring prices using e-commerce sites. Inlier problems include, for example, short-lived discounts, product replacements (changes in product size or quality), or irregular price updating. When investigating discounting behaviour, our results indicate that online discounts during Black Friday sales are, on average, limited at both the product and product-category levels. We also quantify online price persistence in South Africa, showing that e-commerce prices experience changes at a broadly similar frequency as our estimates imply for official measures of consumer prices. Our results raise a range of methodological and policy questions that have received little empirical attention in South Africa.

## 2 E-Commerce Price Developments

A key challenge when measuring e-commerce price developments is product rotation, which involves changes in product categories or brands available online at specific points in time. To address this, we construct a dataset of about 8500 products from Takealot, a South African online retailer.<sup>2</sup> After creating a monthly series of prices for each product and product category, we ensure that the panel of products is balanced over the full sample to ensure consistency over the indices constructed and reduce the possibility of biased measurement from a change in listings over time. For our sample starting in July 2021, about 1100 products remain after balancing the panel to remove products with missing values.<sup>3</sup> Index construction is based on the geometric mean of all individual product indices comprising a category in a given month.

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<sup>1</sup>We thank Riaan Grobler and Oliver Guest for comments and suggestions. Please note that data are used solely for research and policy analysis and that reasonable crawl delays were implemented, along with appropriate data caching, to ensure that requests to Takealot and Serval avoided putting strain on the platforms.

<sup>2</sup>We use last available price observation in a given month as the observation for that month to represent price developments in that month. We also draw data from Serval, which keeps a daily history of Takealot prices, which we aggregate to a monthly basis. Aggregating to weekly basis did not meaningfully increase the number of full balanced product series over our sample. Although aggregating to a weekly frequency would make it easier to evaluate discounting behaviour, especially over Black Friday sales, but would dramatically reduce the size of our balanced panel. We also merge the number of product categories displayed in the paper into a smaller set to make figures easier to read.

<sup>3</sup>Note that using an unbalanced panel of products would create a strong downward bias in prices. In future research, we will consider alternative approaches to creation of a balanced panel.

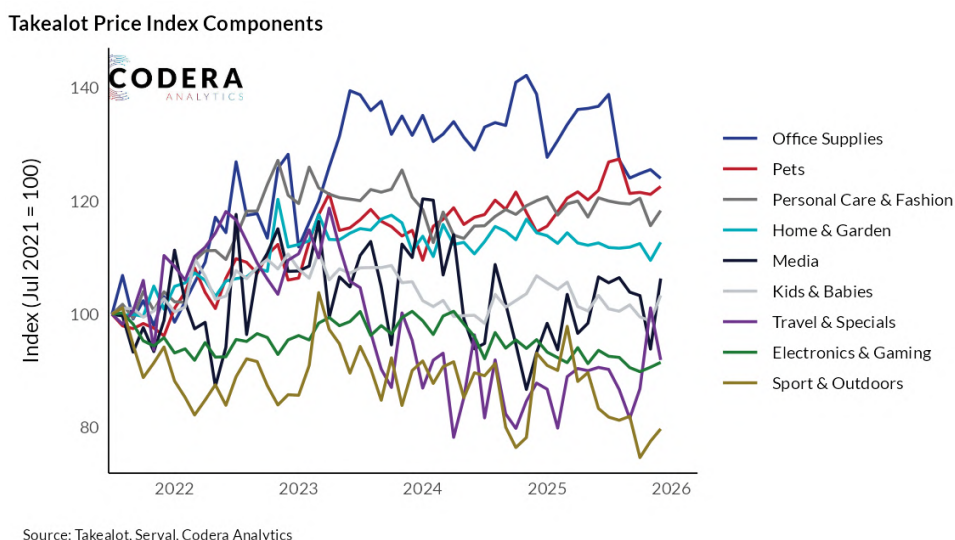
Prices are taken as the effective price after discounts are applied.<sup>4</sup> Given that online prices already include discounts, any discounting period such as the Blue Dot sale around Black Friday should be evident in the time series and there should be a meaningful decline in price indices in November as a result.

When compiling official CPI statistics, Statistics South Africa uses actual transaction prices, including regular discounts but excluding loyalty discounts, coupons or bundle offers, see [Statistics South Africa \(2013\)](#). Prices of temporarily missing products are usually imputed using information such as prices of similar products or from different outlets. Permanently discontinued products are replaced with a similar products to ensure continuity in measurement, potentially with quality adjustments. Differences in the annual composition of the products available from e-commerce sites make it difficult to directly compare price developments to the consumer goods included in the official headline consumer price index. As our indices cover the totality of online goods on Takealot that have complete data, there are differences in the implicit weights of online products to what is included under the 'goods' aggregation of CPI in South Africa.<sup>5</sup> It is also important to note that our analysis also does not incorporate shipping costs, which could create differences in total costs across different geographical areas.

Unfortunately, eliminating coverage differences is beyond the scope of this exploratory paper. As such, our results should not be interpreted as evidence of measurement errors in official statistics. Nevertheless, our measures provide a summary of price developments for a range of specific products and product categories using online data and summaries of posted prices over time.

Figure 1 presents price indices for a range of product categories. Online office supplies, pet products, and personal care and fashion product prices rose strongly, particularly from early 2022 to early 2023. Sports and outdoor products and electronics and gambling products saw their prices decrease over the last three years.

Figure 1: Takealot Consumer Price Index Components



<sup>4</sup>The timeseries for prices with discount are complete for almost all series, while timeseries for price before discount often has missing values, making it infeasible to use price before discount.

<sup>5</sup>For a summary of CPI weights, see [here](#). Our [EconData](#) platform makes historical CPI weights back to 1970 available on the website, in excel, R or Python. For a tutorial on using CPI weights to create custom CPI indices, see [here](#).

Aggregating across these product categories, Figure 2 shows that the overall Takealot online price index and official goods CPI track each between late 2022 and early 2023, before diverging substantially. One reason for this is that several product categories, particularly food and clothing and footwear, are very under-represented in the Takealot balanced sample compared to official CPI weights, while medicines, health products and beauty products, are over-represented in the Takealot sample we use. While Takealot does sell shelf stable groceries, limitations in the data mean that very few food products are actually in the balanced sample.<sup>6</sup> Interestingly, while Takealot is known for its broad range of electronics-related products, the rapid release cycle of newer products means that after strongly balancing the panel many electronics devices drop out of our sample. Figures 3 and 4 however show that the indices move in same direction 59 percent of the time, with a correlation between the Takealot price index and official goods CPI of 0.36. As the moving averages of the two indices are similar, it is likely that further dataset cleaning could produce a higher correspondence between official and online price inflation measures. For those interested in measurement bias in CPI, in [Horn et al. \(2025\)](#) we show that inflation has tended to be higher in real-time than subsequently measured when weights have been re-estimated. A lower CPI estimate from updated weights suggests that inflation may be overstated at specific points of time when using outdated spending patterns, and newer weights provide a more accurate reflection of actual price changes experienced by consumers. Our estimates suggest an average 'mismeasurement' of headline CPI by this measure of around 0.5 percentage points since 2008.

Official CPI is based on infrequently adjusted expenditure weights and exclude some discounts that consumers receive, so there is a risk of overstating true cost of living. Any potential bias in CPI measurement would have implications for the optimal inflation target for an inflation-targeting central bank as it can affect the credibility of the central bank by creating a divergence between the experience of households and firms and official statistics. Digital pricing and the growing role of e-commerce also imply faster pass-through of macroeconomic shocks to prices, which implies central banks need to monitor real-time data to avoid inappropriate policy reactions. If true inflation is overstated, inflation-adjusted GDP growth may also be understated. In South Africa, a significant divergence between the GDP deflator (which measures inflation for all domestically produced goods and services in a given year) and the CPI, which tracks inflation for a fixed basket of consumer goods and services, including imports, emerged during the COVID-19 pandemic. Apart from definitional differences, one reason the CPI may understate inflation during a pandemic is that it fails to account for shifts in spending patterns. However, as shown by Figure 5, in the aftermath of the pandemic, CPI inflation has been higher than the increases in the GDP deflator and the two measures have tended to grow by broadly similar magnitudes over time. The role of the digital economy in driving productivity growth and therefore understanding macroeconomic developments is an area that deserves greater attention from researchers and policymakers.

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<sup>6</sup>Likewise, cigarettes and tobacco products are also not present on Takealot, while they have large weights in the official goods CPI. Electronic cigarettes and vapes are sold on Takealot but generally fall out of the balanced sample.

Figure 2: Takealot Consumer Price Inflation vs Official Goods Inflation

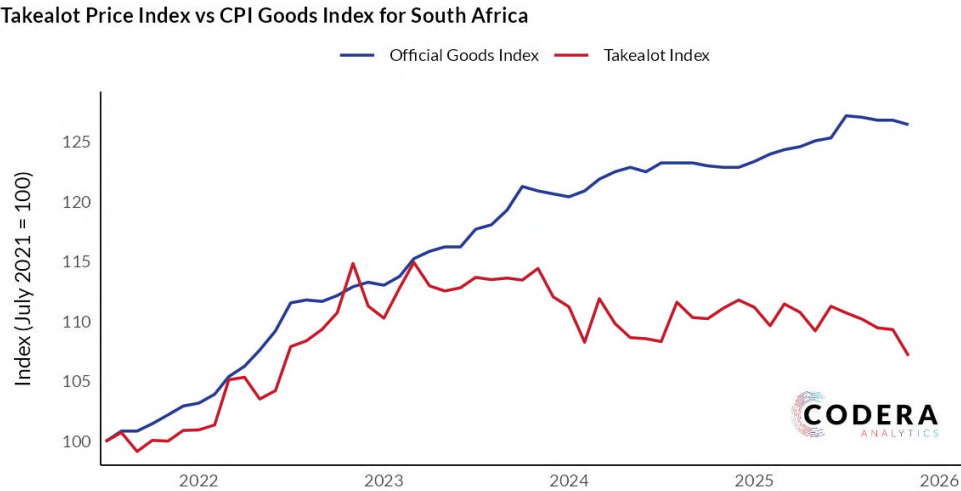


Figure 3: Takealot Consumer Price Inflation vs Official Goods Inflation

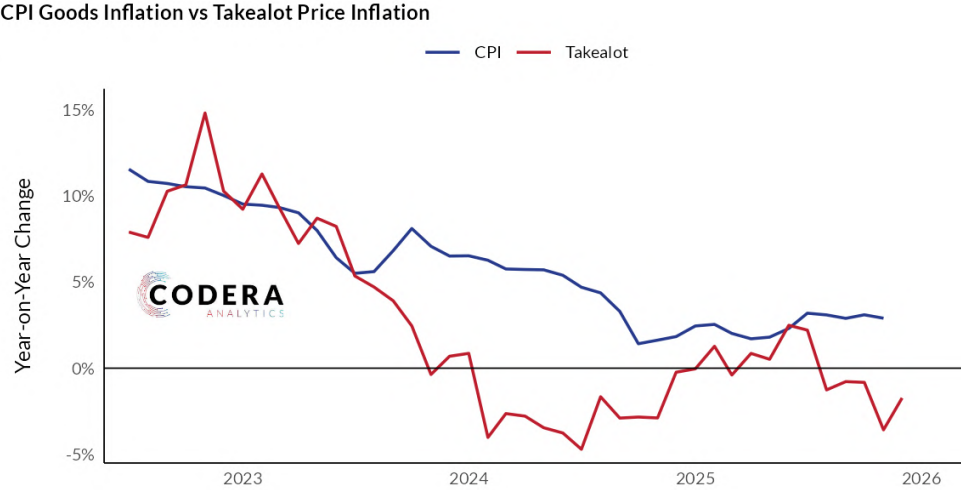


Figure 4: Takealot Consumer Price Inflation vs Official Goods Inflation

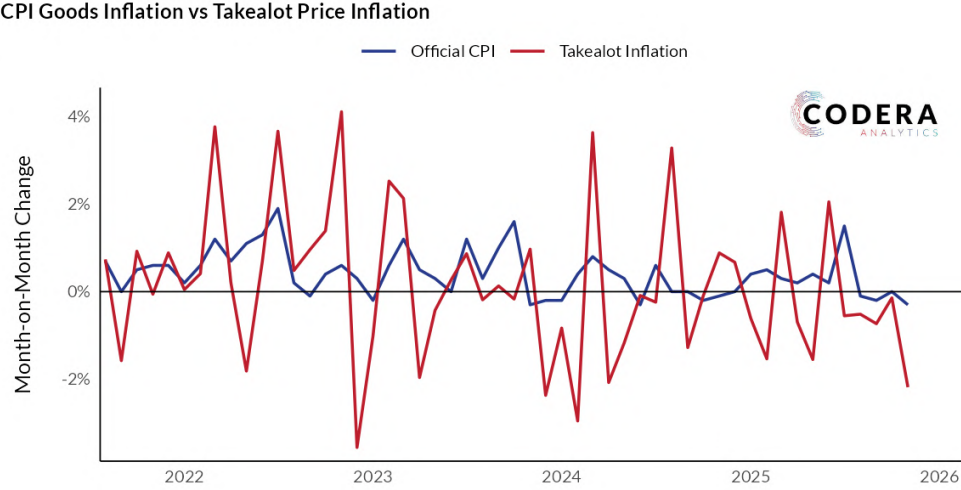
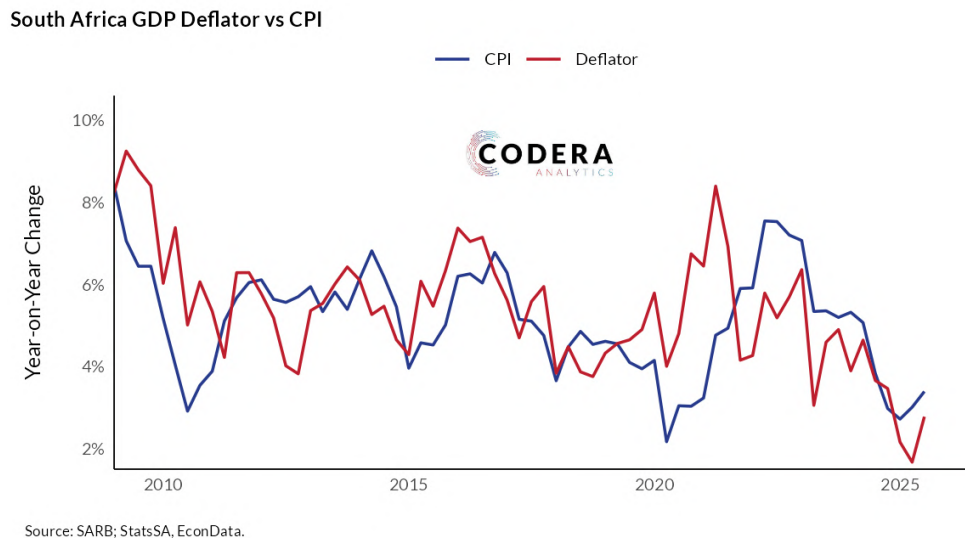


Figure 5: CPI vs GDP Deflator



### 3 Prices of specific products

We start by validating the data used in our study by comparing the prices of different products from Takealot to prices from Pick n Pay online shopping as available via Open Price Engine. Figure plots 6 selected products with the same characteristics. We plot, for example, Castle Lite Premium Lager Beer are based on a case of 24 330ml Bottles, Gordon's London Dry Gin is 750ml, Domestos is the Lavender Multipurpose Stain Removal Thick Bleach Cleaner 750ml and Nestle Hot Chocolate Rich and Creamy Foamy Cocoa Flavoured Drink 500g. These examples show that prices from Open Price Engine are often more stable, and that there are sometimes meaningful differences in the prices of comparable products.<sup>7</sup> This demonstrates that the average prices we use in our calculations are representative of retail e-commerce prices. As discussed earlier, we focus on prices from Takealot to ensure a larger cross sectional and timeseries sample for our study.

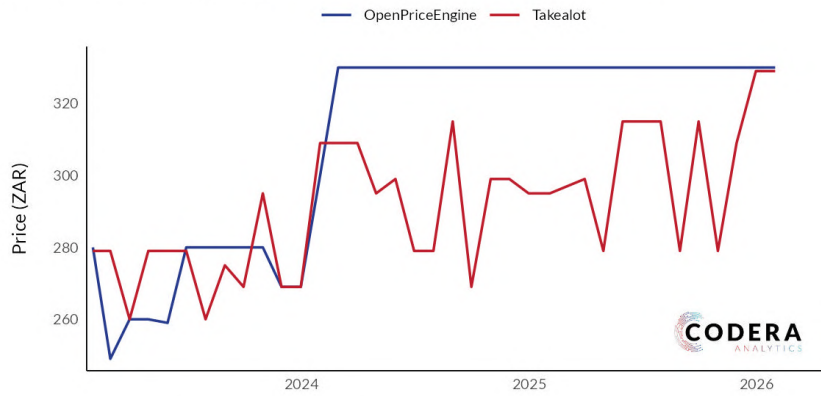
Figures 7 and 8 presents summaries of specific products, controlling for product characteristics and availability over time. All products shown are single products and not averages across products in a given range.<sup>8</sup> This reveals several interesting phenomena. Some categories of alcoholic products experience much higher price variation. Some alcoholic products, like Castel Lite and Black Label beer, have seen their prices rise a lot more since October 2022 than others, such as Savanna cider. Higher global coffee prices have seen a 50 percent increase in some categories of coffee products since mid 2023. We observe large spikes in prices of some consumer goods prices, such as Mr Muscle cleaning products, Bokomo Weetbix or Colgate Toothpaste. The data reveal large relative price changes between certain brands of products and food categories over the last three years.

<sup>7</sup>In earlier posts we looked at bread and chicken prices across different supermarkets over time, see [here](#) and [here](#) or [here](#).

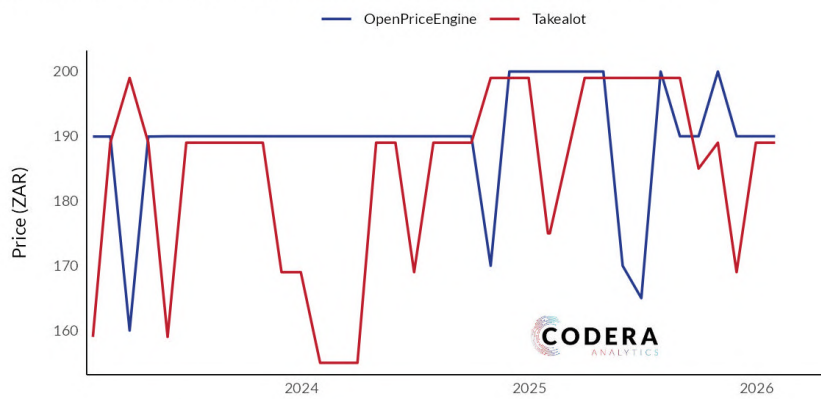
<sup>8</sup>For example, Carling Black Label Local Beer and Castle Lite Premium Lager Beer are based on a case of 24 330ml Bottles, the Sta-Soft product plotted is Spring Fresh Fabric Softener Refill 500ml and Mr Muscle refers to Kitchen Cleaner Original 500ml Trigger.

Figure 6: Price developments for specific products

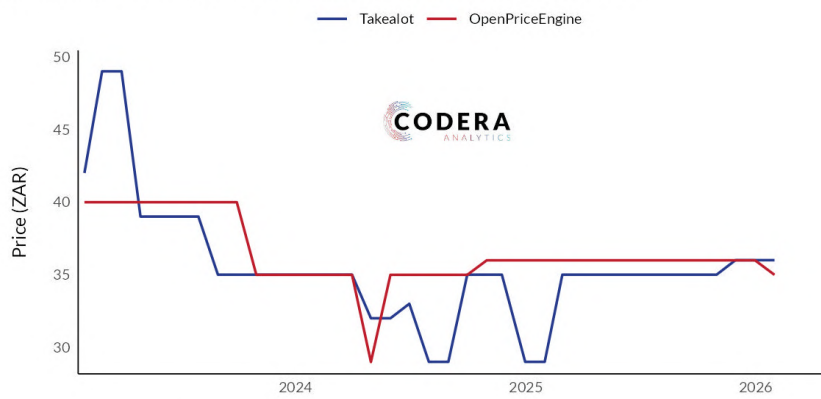
Difference in Price Changes across Takealot and OpenPrice Engine for Castle Lite



Difference in Price Changes across Takealot and OpenPrice Engine for Gordon's Gin



Difference in Price Changes across Takealot and OpenPrice Engine for Domestos



Difference in Price Changes across Takealot and OpenPrice Engine for Nestle Hot Chocolate

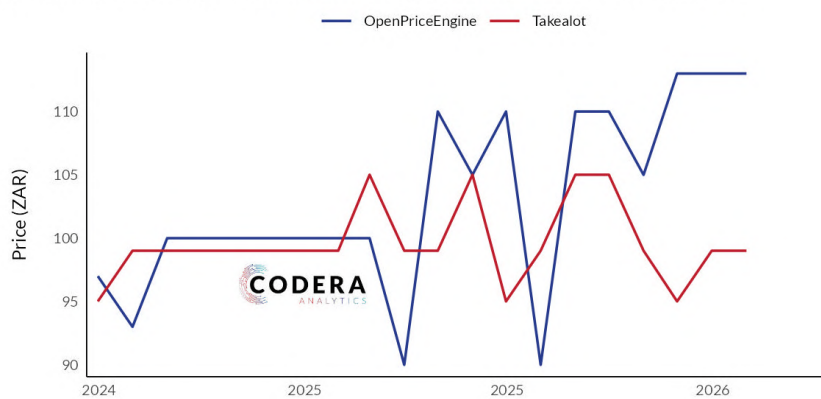
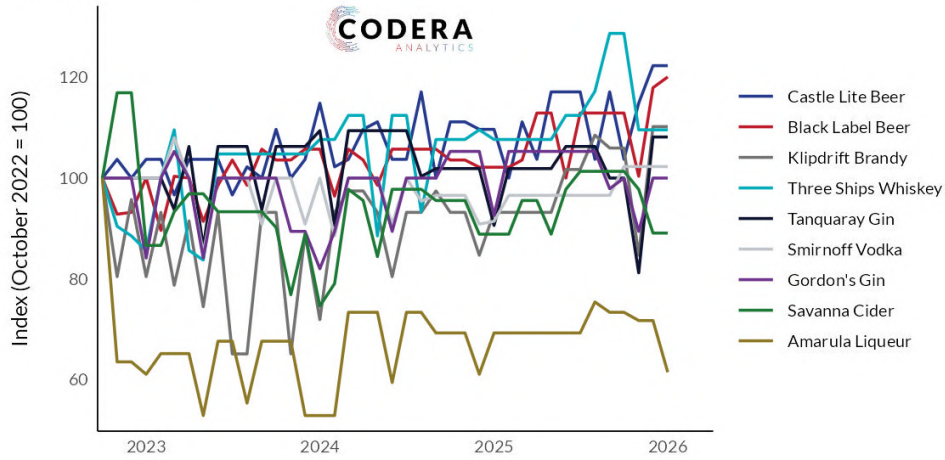


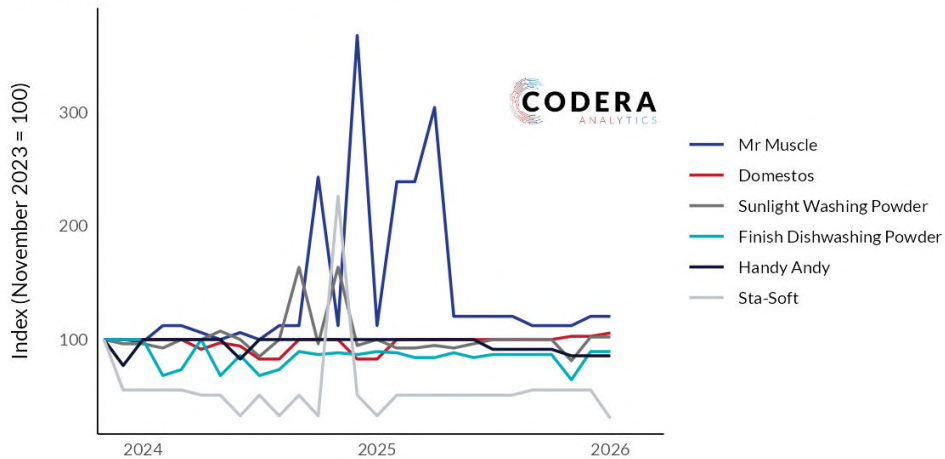
Figure 7: Price developments for specific products

Price Indices for Selected Products on Takealot



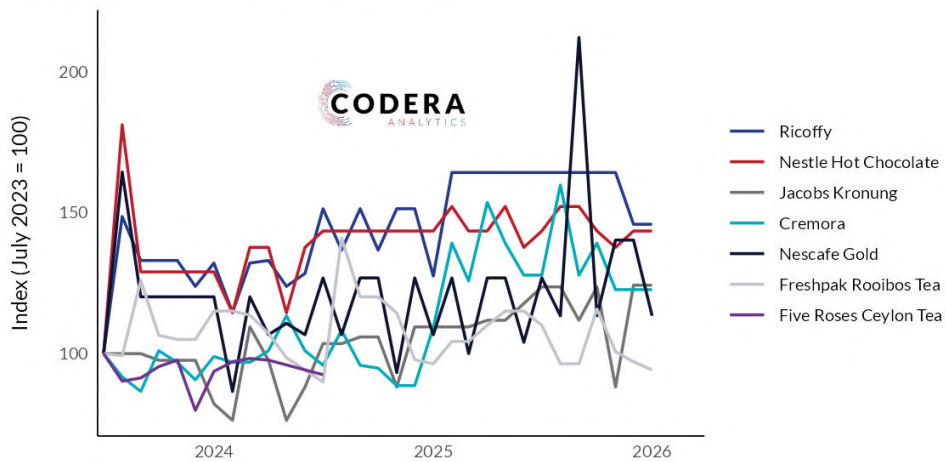
Source: Takealot, Serval, Codera Analytics

Price Indices for Selected Products on Takealot



Source: Takealot, Serval, Codera Analytics

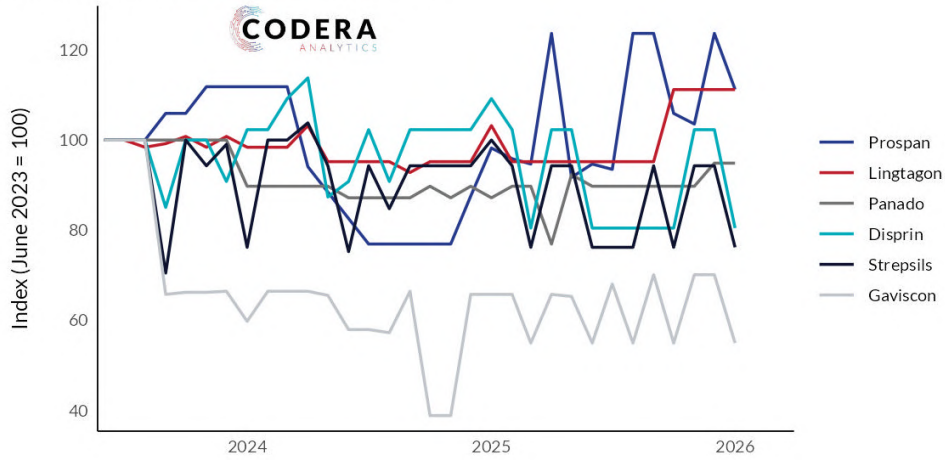
Price Indices for Selected Products on Takealot



Source: Takealot, Serval, Codera Analytics

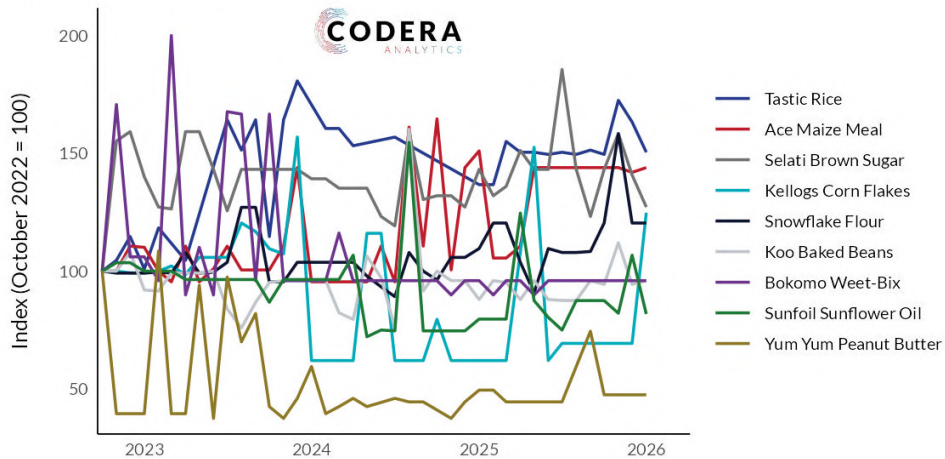
Figure 8: Price developments for specific products

Price Indices for Selected Products on Takealot



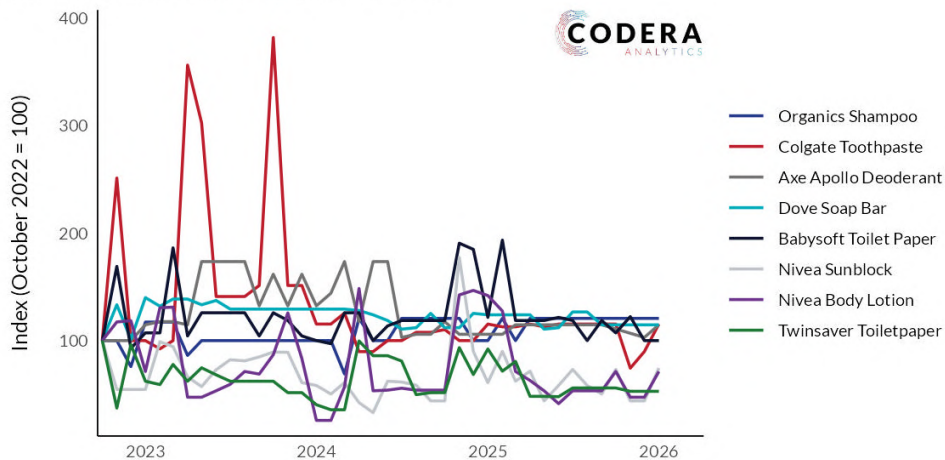
Source: Takealot, Serval, Codera Analytics

Price Indices for Selected Products on Takealot



Source: Takealot, Serval, Codera Analytics

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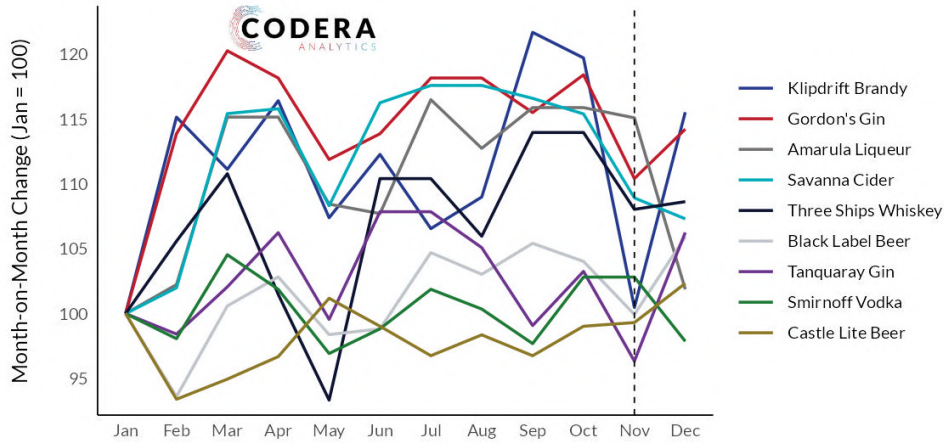
## 4 Online Discounting

Our study indicates that online discounts during Black Friday sales are, on average, limited at both the product and product-category levels. Since the data in our sample are at a monthly interval, it is difficult to say that a drop in prices in the month of November is attributable to black Friday. However, we plot average price changes for specific products over multiple observations of a given month to assess whether Black Friday periods have been characterised by price discounts. Figures 9 and 10 rebase within-year price changes for each product to 100 in January in each year of the sample, before taking a simple average of all of the corresponding month over the years in the sample, and then presenting month-to-month price changes across selected products to evaluate whether their prices decreased over the November Black Friday period.

We generally do not find price discounts over the month of November, once one accounts for price dynamics for prior months. There are some exceptions that show larger than average monthly declines in November, such as Klipdrift Brandy, Yum Yum peanut butter, Jacobs Kronung coffee, Colgate Toothpaste amongst others. Some products, like Sta-soft and Nivea Body Lotion, have tended to see large price spikes in November. This raises interesting macroeconomic policy questions, such as whether promotions mask underlying price pressures and whether online prices respond faster to shocks than offline prices.

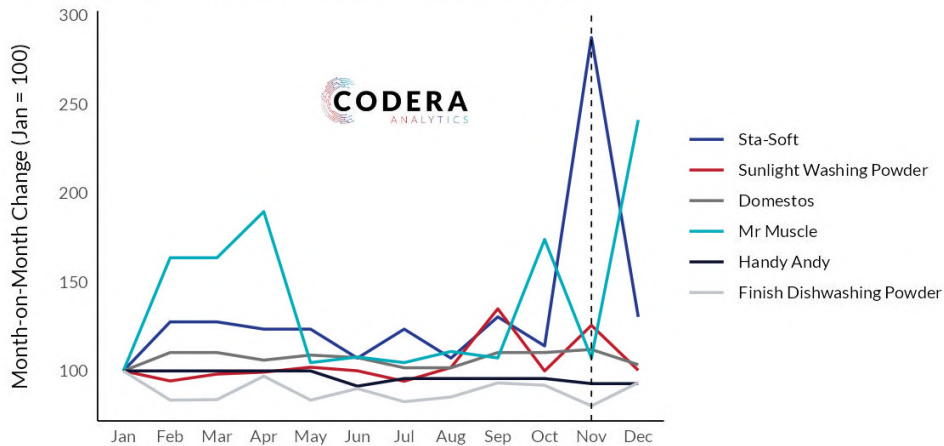
Figure 9: Evidence of discounting for selected products

Average Monthly Price Change for Selected Takealot Products



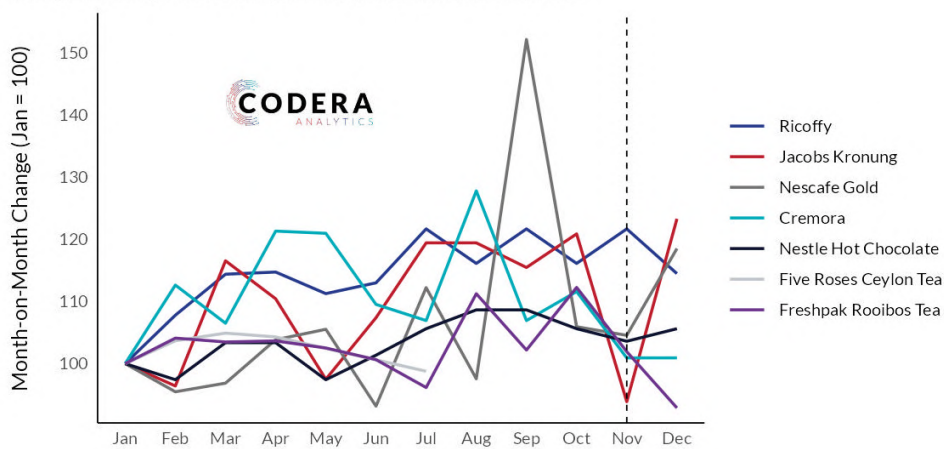
Source: Takealot, Serval, Codera Analytics  
Notes: Prices are over the period between January 2023 and January 2026.

Average Monthly Price Change for Selected Takealot Products



Source: Takealot, Serval, Codera Analytics  
Notes: Prices are over the period between January 2023 and January 2026.

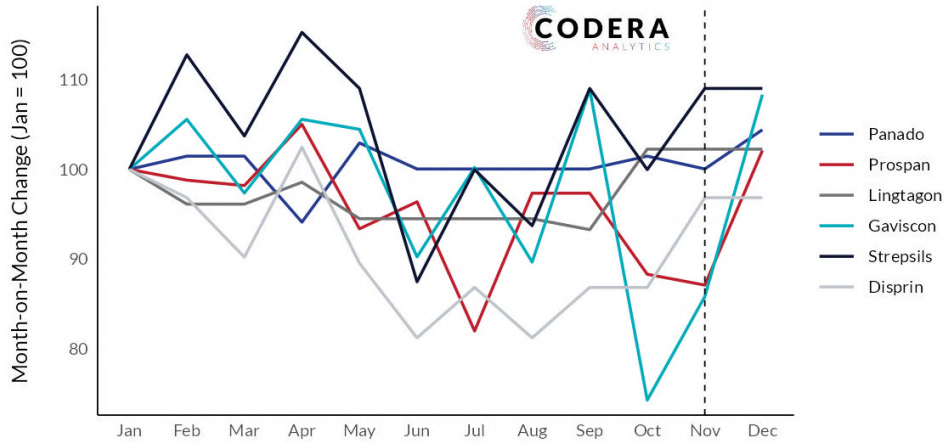
Average Monthly Price Change for Selected Takealot Products



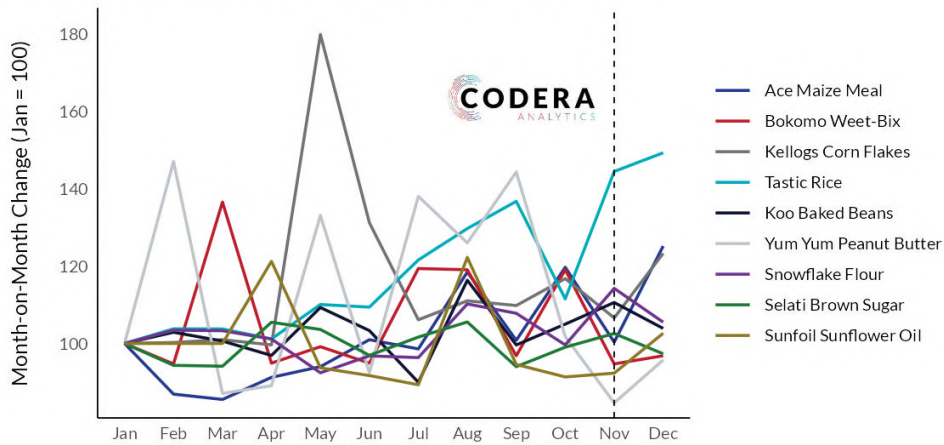
Source: Takealot, Serval, Codera Analytics  
Notes: Prices are over the period between January 2023 and January 2026.

Figure 10: Evidence of discounting for selected products

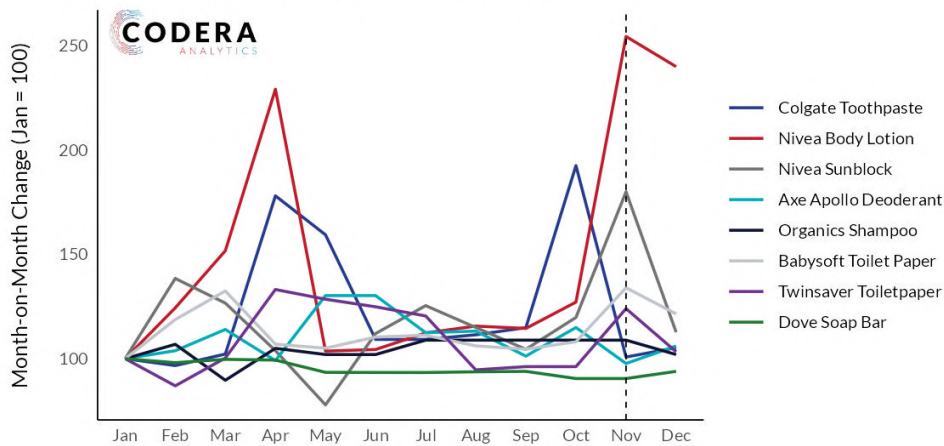
Average Monthly Price Change for Selected Takealot Products



Average Monthly Price Change for Selected Takealot Products



Average Monthly Price Change for Selected Takealot Products



## 5 Price stickiness assessment

Finally, we assess the frequency of monthly price changes in online prices. Economists are very interested in pricing dynamics as price dispersion create inefficiencies that ultimately harm welfare. As we discuss in more detail in [Cleaver et al. \(2025\)](#), inflation dispersion affects assessments of the optimal inflation target and assessment of the appropriate stance of monetary policy.

In Table 1, we define price stickiness as the proportion of months that a product price changes in relation to the number of months that it is available online. Across all product categories, the simple mean of the proportion of months with price changes for all products is 54 percent. Prices are generally quite flexible overall, with many months experiencing declines across product categories, inspite of a general tendency for consumer prices to increase over time.<sup>9</sup> Interestingly, some specific medical and home staples, such as Panado and Dove Soap show very little monthly price variations (see Figures 9 and 10).

How does this compare to the frequency of price changes in the CPI? In [Horn et al. \(2025\)](#) we showed that since 2009, price increases based on official statistics occurred with an average monthly frequency of 56 percent, while price decreases have occurred at a frequency of around 29 percent. Our e-commerce estimates therefore suggest similar price flexibility as official statistics. Our estimates raise a range of methodological and policy questions that have received little empirical attention in South Africa. As we argue in [Horn et al. \(2025\)](#), the central bank should monitor price setting behaviour and drivers of price changes when setting monetary policy and real-time alternative data are important, not just for forecasting, but also for understanding the nature of price dynamics in South Africa (also see [Botha et al. \(2023\)](#)).

Table 1: Frequency of price changes

Category	Price Change Frequency	Price Increase Frequency	Price Decrease Frequency
Media	0.69	0.33	0.36
Personal Care & Fashion	0.48	0.25	0.22
Kids & Babies	0.56	0.27	0.29
Home & Garden	0.47	0.24	0.23
Pets	0.59	0.30	0.28
Electronics & Gaming	0.66	0.30	0.35
Office Supplies	0.65	0.33	0.33
Sport & Outdoors	0.71	0.33	0.38
Travel & Specials	0.61	0.28	0.32

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<sup>9</sup>An important caveat is that since these are prices with discount the discount amount also looks like price change and price less discount would likely be more sticky.

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