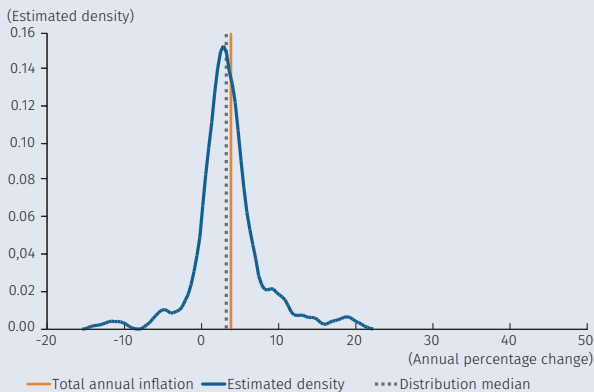


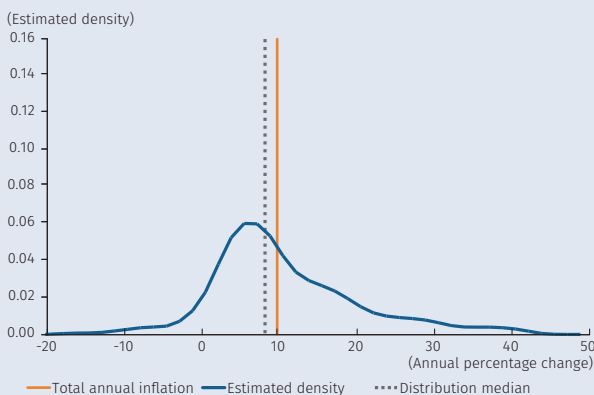
Box 2: Common Inflationary Trends in Colombia

Graph R2.1
Evolution of inflation diffusion in Colombia

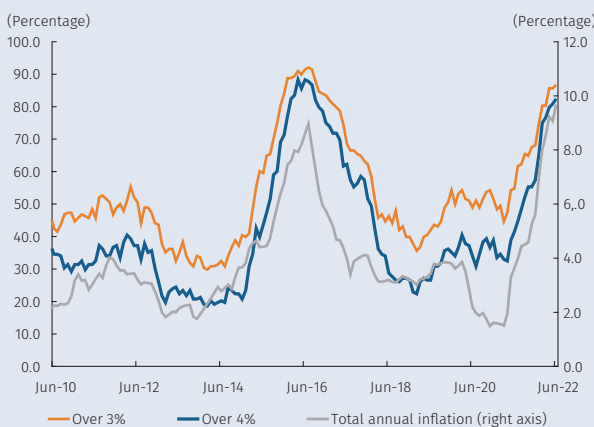
A. Distribution of the annual change in CPI subclasses in December 2019



B. Distribution of the annual change in CPI subclasses in June 2022



C. Total annual inflation and percentage of CPI subclasses with annual changes above 3.0% and above 4.0%



Sources: DANE and Banco de la República. Authors' calculations.

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As of the second quarter of 2021, inflation in Colombia has risen sharply, with results that have consistently surprised the market consensus to the upside. There are various causes for this escalation, which have prompted various lines of questioning. Some of these are related to the persistence of the current inflationary phenomenon, and whether this is a generalized price increase or if it is specific to certain goods and services. This Box suggests a quantitative approach to resolve this line of inquiry.

A first approach to address the issue at hand is provided in Graph R2.1, which shows that the distribution of the annual variation of the consumer price index (CPI) subclasses changed significantly between December 2019 (panel A) and June of this year (panel B), becoming more dispersed and widening mostly towards its right tail. Meanwhile, the median annual change among subclasses increased from 3.2% to 8.0% between these two periods. Furthermore, the percentage of CPI subclasses adjusting above 3.0% and 4.0% in annual terms (panel C) have had a significant increase since the mid-2021. These indicators point to more widespread inflationary pressures.

1. Methodology

To quantitatively identify the extent of the generalized increase in prices, a dynamic factor model was used, estimated from 25 disjunct sub-baskets that together comprise all CPI items between December 2001 and June 2022. The model is a simplified version of those presented by Almuzara and Sbordone (2022), and Stock and Watson (2016). The fundamental idea behind this approach is to disaggregate the annual change in the price index of each sub-basket ($y_{i,t}$) between a factor (f_t) common to all sub-baskets and an idiosyncratic component ($e_{i,t}$). That is:

$$y_{i,t} = c_i + \alpha_i f_t + e_{i,t}$$

with

$$\begin{aligned} f_t &= \eta_1 f_{t-1} + u_t & u_t &\sim i.i.d.N(0, \sigma_f^2) \\ e_{i,t} &= \rho_1 e_{i,t-1} + \varepsilon_{i,t} & \varepsilon_{i,t} &\sim i.i.d.N(0, \sigma_i^2) \end{aligned}$$

In order to obtain a measure of inflation comparable to total and core inflation (in this case, the CPI excluding food and regulated items), trend inflation is defined as:

$$Trend\ inflation = \sum_i \omega_{i,t} (c_i + \alpha_i f_t)$$

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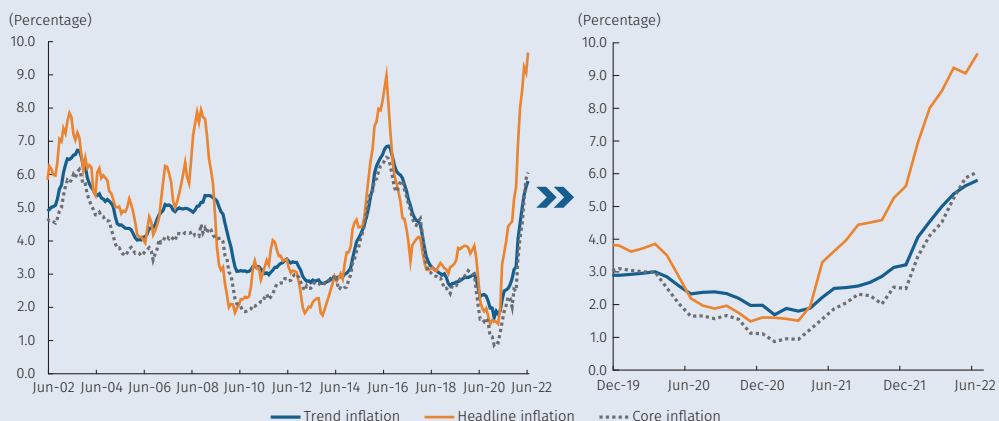
where $\omega_{i,t}$ is the weight of sub-basket i in period t . Note that these vary over time as a consequence of changes in the CPI basket.¹

2. Trend, headline, and core inflation

Trend inflation seeks to eliminate transitory and short-term variations in the inflation of the different sub-baskets. This is desirable insofar as the measurement aims to estimate the persistence and underlying components of the price variation. In other words, the goal is to filter out specific short-term changes that do not establish common trends. Typically, these changes have been caused by various supply shocks on food prices; however, more recently, indirect tax reliefs resulting from the Covid-19 pandemic have been applied to several goods and services, as well as subsidies or deferrals in the payment of public services.

Graph R2.2 compares trend inflation obtained with headline and core inflation, the latter measured by the annual change in CPI excluding food and regulated items. In general, the behavior of trend inflation is quite like that of core inflation, in particular from 2013. However, during the pandemic, their behavior exhibited drops of different magnitudes: while core inflation reached a low of 0.87% in January 2021, trend inflation stood at 1.69% during that period. Subsequently, the acceleration in core (and headline) inflation in mid-2021 and especially in 2022 coincides with a sustained increase in trend inflation, suggesting a further generalization of inflationary pressures between sub-baskets.

Graph R2.2
Trend, total and core annual inflation



Sources: DANE and Banco de la República. Authors' calculations.

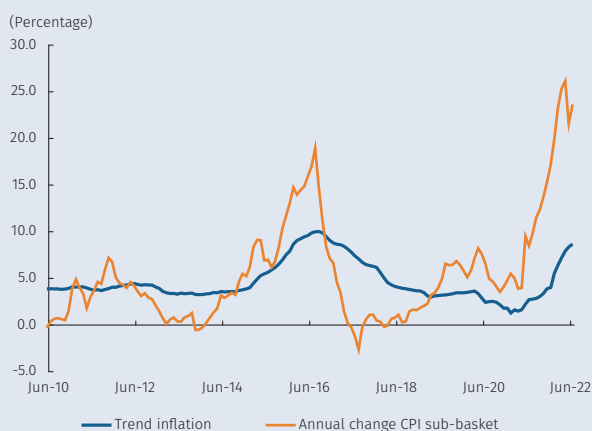
For June of this year, the trend indicator stands at 5.8%, while the annual change in CPI excluding food and regulated items stands at 6.1%, the average core inflation indicators tracked by Banco de la República stand at 7.1%, and headline inflation at 9.7%.

Graph R2.3 separates trend inflation between the main sub-baskets analyzed by Banco de la República (González-Molano et al., 2020). For this purpose, once the model with the 25 initial sub-baskets was estimated, the results were grouped according to class: goods excluding food and regulated items, services excluding food and regulated items, food and regulated items. Expected results were obtained both for the historical and recent domestic inflation characteristics and for the methodology applied. These included a significant smoothing of the movements of the observed variations, mainly for the food sub-basket, a lag in the movements of trend inflation compared to the movements of observed inflation and the detection of periods in which the direction of the trend measures match between

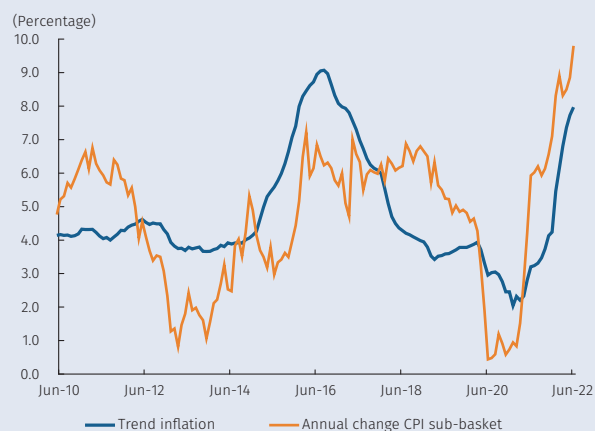
1 The estimate contemplates three methodological and updated CPI baskets: 1998, 2008, and 2018.

Graph R2.3
Annual trend inflation and observed annual changes of the main CPI sub-baskets analyzed

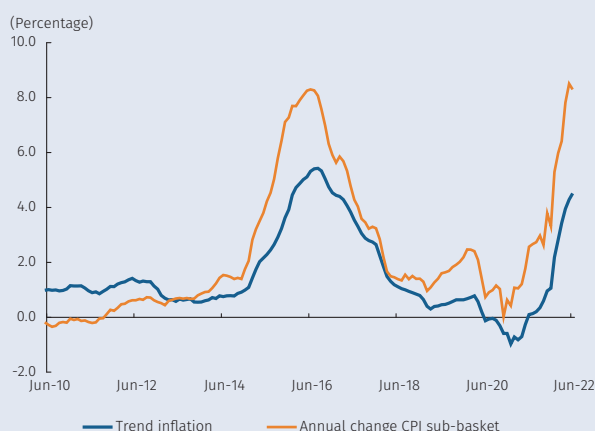
A. Food



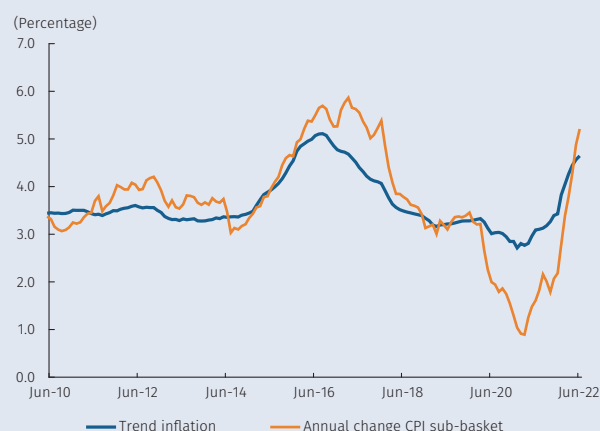
B. Regulated items



C. Goods excluding food and regulated items



D. Services excluding food and regulated items



Sources: DANE and Banco de la República. Authors' calculations.

sub-baskets. In this case, as of mid-2021 onwards, the upward trend inflation of all sub-baskets is worth noting.

The latter reinforces, as suggested by other indicators, that the current upward inflation episode in Colombia affects all sub-baskets, and that it includes a trend or persistent component. This is compatible with the reading of the situation by *Banco de la República's* technical staff. In general terms, an interpretation consistent with these results is that external and internal pressures, some of them of a transitory nature and affecting only some CPI segments (mainly goods excluding food and regulated items), have endured more than expected and have generated additional pressures—some of a less transitory and more generalized nature—via the different indexation mechanisms of the economy (especially on the services excluding food and regulated items, and on regulated items). This has been facilitated by excess demand, a tighter labor market, and rising inflation expectations.

However, as shown by previous episodes (e.g., 2008 and 2016), a significant correction in inflation, faster and sharper than the trend inflation measure estimated in this Box might indicate (Graph R2.2), cannot be ruled out. The monetary policy tightening process and a rapid tempering of external and domestic pressures would contribute thereto.

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