

# Box 1 The Role of External Pressures in the Recent Behavior of Inflation in Colombia

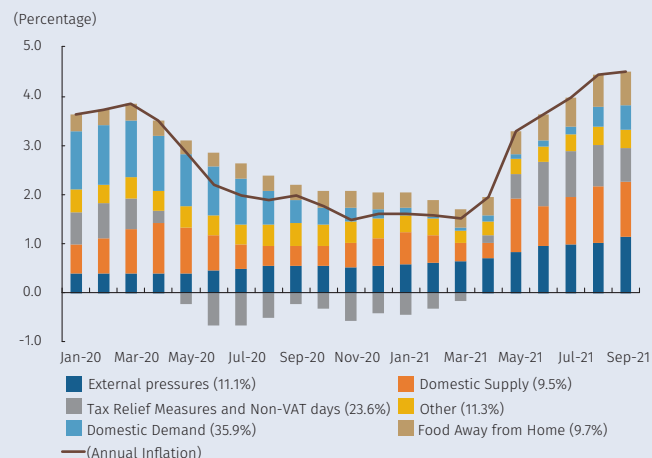
Sergio Restrepo Ángel  
Carlos Huertas Campos  
Sara Naranjo Saldarriaga  
Santiago Forero Alvarado\*

The global economic recovery process, along with global supply chain disruptions and a continuous rise in international prices of commodities, transport and logistics costs, have led to a widespread price acceleration in most economies in the world. Colombia also experienced this phenomenon, with inflation moving from its lowest historical level at the end of 2020 (1.61%) to 4.51% in September 2021, that is, 1.51 percentage points (pp) above the 3.0% target. This increase was explained by several factors that may have been amplified, among other things, by a low statistical base for comparison. This box presents three exercises, two of them empirical and one in the framework of general equilibrium, which seek to identify how much of this increase was due to the aforementioned external shocks.

In the first empirical exercise, each item of the consumer price index in Colombia is classified into disjunct subgroups<sup>1</sup>, according to the probability that its price can rise significantly depending on the shock that may be affecting it. In particular, four sources of pressure (shocks) were identified: The external ones; the recovery of domestic demand due to the end of restrictive measures set forth to deal with the Covid-19 pandemic; the tax-relief and non-VAT days decreed by the national government, and the impacts on domestic supply on account of adverse production cycles or to the roadblocks that took place during May 2021 (Graph B1.1).

Food away from home (FAH) was classified into a separate group as they are being simultaneously affected by all the shocks mentioned above: external pressures via higher

Graph B1.1  
Consumer Price Index  
Breakdown by Origin of the Shock  
(Contribution in percentage points (pp) to annual headline inflation; annual change)



Note: The percentages in brackets in the labels constitute the weight of each sub-group within the total CPI.  
Source: DANE, Banco de la República.

food prices; tax reliefs<sup>2</sup>; domestic supply on account of the closure of thousands of establishments during the pandemic<sup>3</sup>; and the recovery of demand with the return to normalcy and a greater willingness of consumers to return to restaurants. The item for “others” in Graph B1.1 corresponds mostly to the regulated items component of the CPI along with a few additional items.

It is important to note here that the basket of external pressures has been underestimated, since it does not include goods and services whose prices may have been affected by external factors during the pandemic, but which were benefited by changes in subsidies, indirect taxes, etc. For example, items such as electronic devices (computers, television sets, cell phones, etc.) are classified within the group “tax reliefs and non-VAT days”, although they are being strongly impacted by problems with global supply chains and semiconductor shortages. In addition, FAH is an item that is being heavily shocked by external pressures, but which was not included within this sub-group for the reasons already mentioned.

Inflationary pressures from the international context (external pressures, Graph B1.1), have been transmitted and have significantly increased their participation in the recent inflation in Colombia. This passthrough has mainly taken place through the prices of processed food and, to a lesser extent, transportation goods (vehicles, motorcycles and bicycles, etc.), furniture and household goods, beauty products, and a few services (vehicle insurance, laboratory tests, etc.), replicating the trends observed in other countries. Additionally, external factors have also

\* The authors belong to the Programming and Inflation Department and Macroeconomic Models Department of Banco de la República. The opinions expressed herein are of their sole responsibility and do not necessarily reflect those of the Central Bank or its Board of Directors.

1 This refers to the impossibility of finding an item simultaneously in two subgroups.

2 A 0% rate was decreed on the consumption tax until 31 December 2021, as per Law 2068 of 2020, with the purpose of contributing to the reactivation of this sector, having been affected during the periods of major contagion of Covid-19.

3 See the Bogotá Chamber of Commerce report: <https://www.ccb.org.co/Clusters/Cluster-de-Gastronomia/Noticias/2020/Noviembre-2020/Cuestion-de-supervivencia-22-mil-restaurantes-han-cerrado-sus-puertas>

generated upward pressures in FAH via the notable increase in food inflation, both for perishable and processed<sup>4</sup> foods. On the other hand, the regulated component of the CPI, particularly the price of fuels, is under strong pressure due to the high international oil prices observed in recent months.

On the domestic front (Graph B1.1), since May 2021, there has been greater upward pressure on prices on account of a domestic demand that has recovered more vigorously than anticipated. On the other hand, supply pressures that persist due to the roadblocks in May and to a downward cycle of agricultural production of some items in Colombia (with meat and fruit among the most outstanding) have also exerted upward pressures to food prices. The return of some reliefs decreed in 2020 in the context of the pandemic, which had exerted downward pressure between May 2020 and March 2021, are now a major bullish factor for inflation.

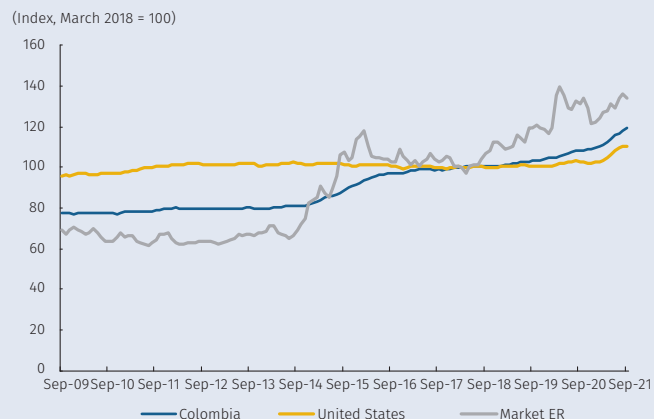
The second empirical exercise is descriptive and aims to detect external pressures on a small subgroup of CPI items for imported goods, whose prices are determined exogenously in international markets and should be affected by the behavior of the exchange rate. To this end, the price index of the subgroup of external pressures for the United States ( $CPI^{Ext/USA}$ ) was constructed<sup>5</sup> with the same items as for the external pressures' basket for Colombia ( $CPI^{Ext/COL}$ ) made in the first exercise. Also, an index of the nominal exchange rate for the two countries ( $ERI^{COL/USA}$ ) was calculated. In this way, it was possible to estimate what proportion of an increase in the  $CPI^{Ext/COL}$  is due to external factors ( $CPI^{Ext/USA}$  and  $ERI^{COL/USA}$ ) for a given period (Graph B1.2, panel A). It is important to note that this exercise is not intended to infer the exchange rate passthrough to the total CPI in Colombia, which has typically been low, and should be way lower than that of a small subset of imported goods.

First, the period between July 2014 and March 2018 was taken as reference, which covers from the time when international oil prices fell sharply<sup>6</sup>, until the end of a period of relative stability in the exchange rate between May 2016 and March 2018. Thus, between July 2014 and March 2018, the Colombian peso recorded a nominal depreciation of 53.5% ( $\Delta ERI^{Col/USA}$ ), while the ( $CPI^{Ext/USA}$ ) was characterized by very low volatility and fell by 2.1%, and the ( $CPI^{Ext/COL}$ ) increased by 23.8%. These estimates suggest that only 46.3% ( $23.8 \div 51.4$ ) of the aggregate between the increase in external prices and the depreciation of the peso (51.4%) was transmitted to domestic prices for this small set of goods.

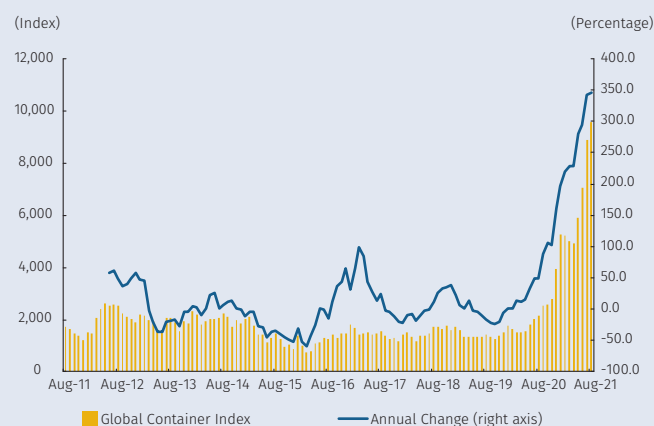
In the next period of nominal depreciation, between March 2018 and September 2021, the ( $CPI^{Ext/COL}$ ) increased 19.1%, while the ( $CPI^{Ext/USA}$ ) and the ( $ERI^{COL/USA}$ ) increased by 10% and

**Graph B1.2**  
Group of Homogeneous External Pressures between Colombia and the United States and Global Container Index  
(Annual rates and variations)

**A. External Pressure Indexes and Market ER**



**B. World Container Index<sup>a/</sup>**



a/ The World Container Index evaluated by Drewry reports spot container freight rates for major trade routes from East to West. The index represents a weighted average of the 11 shipping routes, per volume. Shipping routes include Shanghai - Rotterdam, Rotterdam - Shanghai, Shanghai - Genoa, Genoa - Shanghai, Shanghai - Los Angeles, Los Angeles - Shanghai, Shanghai - New York, Los Angeles - Rotterdam, Rotterdam - Los Angeles, New York - Rotterdam, Rotterdam - New York.  
Sources: Bloomberg, U.S. Bureau of Labor Statistics; DANE; calculations by Banco de la República.

33.9%, respectively. Thus, in this period, the aggregate of increases in external prices and the exchange rate (43.9%) would have been transmitted by about 43.5% to domestic prices; that is, about 2.8 pp less than in the previous period of nominal depreciation. Adding to this the sharp increase in world freight rates observed during the pandemic (Graph B1.2, panel B), it is likely that external pressures will continue to push up the prices of these goods in Colombia.

Finally, a general equilibrium exercise was performed using the 4GM model<sup>7</sup> in which a factor decomposition of the Phillips curves is made for both goods and services sub-baskets, not including food and regulated items. It is important to mention that, while the 4GM does not exactly model the external pressures group built in the

4 As of September 2021, the annual percentage change for processed food prices was 11.7%, and for perishable food prices was 14.8%.  
5 The construction of the "external pressures" index for the United States was done using the same weights as each of the items in the homologous Colombian index.  
6 The Brent variety, a reference for Colombia, fell from USD 115 per barrel to USD 55 per barrel between June 2014 and March 2015. The ER, on the other hand, increased by 37%, from COP 1,888 per dollar to COP 2,586 per dollar, respectively.

7 Semi-structural model for monetary policy analysis and macro-economic forecasting in Colombia. For a description of the model, check the working paper at: <https://repositorio.banrep.gov.co/handle/20.500.12134/9812>

first empirical exercise (Graph B1.1), goods and services sub-baskets (particularly goods), are the ones that have the closest fit. The objective of this exercise is to quantify how much supply shocks (which are more associated with the external pressures described at the beginning of this box) contribute to the inflations of these two sub-baskets.

Equations (1) and (2) describe the Phillips curve of the goods sub-basket, and Table B1.1 shows the contribution to its annual increase, in percentage points, of each of the factors that it comprises.

Phillips curve for the sub-basket of goods:

$$\pi_t^T = \alpha_{1,T} \pi_{t-1}^T + (1 - \alpha_{1,T}) \pi_{t+1}^T + \alpha_{2,T} rmc_t^T + \varepsilon_t^T \quad (1)$$

$$rmc_t^T = \alpha_{3,T} \hat{y}_t + (1 - \alpha_{3,T}) (\hat{z}_t - \widehat{rp}_t^T) \quad (2)$$

$$\alpha_{1,T} = 0,3061 \quad \alpha_{2,T} = 0,1432 \quad \alpha_{3,T} = 0,2598$$

when analyzing the increase in the goods sub-basket inflation so far in 2021 (from 0.64% in the fourth quarter of 2020 to 2.96% in the third quarter of 2021), the results presented in Table B1.1 are explained to a greater extent by the supply shocks of the Phillips curve ( $\varepsilon_t^T$ : from -1.81 to 0.2), followed by the lower downward pressures of the

output gap ( $\hat{y}_t$ : from -0.24 to -0.09). It is important to note that the shocks to the Phillips curve also include the price relief measures provided by the government to deal with the adverse effects of the pandemic, which generated strong bearish pressures from the second quarter of 2020, explaining their sign change to negative.

In the same way, equations (3) and (4) describe the Phillips curve of the services sub-basket, and Table B1.2 shows the contribution to its annual increase, in percentage points, of each of the factors comprised by it.

Phillips curve for the sub-basket of services:

$$\pi_t^{NT} = \alpha_{1,NT} \pi_{t-1}^{NT} + (1 - \alpha_{1,NT}) \pi_{t+1}^{NT} + \alpha_{2,NT} rmc_t^{NT} + \varepsilon_t^{NT} \quad (3)$$

$$rmc_t^{NT} = \alpha_{3,NT} \hat{y}_t + (1 - \alpha_{3,NT}) (\hat{z}_t - \widehat{rp}_t^{NT}) \quad (4)$$

$$\alpha_{1,NT} = 0,34621 \quad \alpha_{2,NT} = 0,0738 \quad \alpha_{3,NT} = 0,6397$$

The results presented in Table B1.2 show the factor decomposition for the services sub-basket annual change. So far in 2021, the upward pressures of the supply shocks to the Phillips Curve, ( $\varepsilon_t^{NT}$ ), mostly explain the increase of the annual change for this sub-basket. It stands out that this sub-basket contains FAH, which, as mentioned above, has exerted upward pressures, mainly due to disruptions

Table B1.1

Factor Decomposition for the annual Change in Prices of the Goods' Basket according to the 4GM Model (Annual changes; percentage points)

Period		Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021
Inflation of goods	$\pi_t^T$	2.36	0.78	1.13	0.64	1.00	2.60	2.96
Inflation of goods in $t-1$	$\pi_{t-1}^T$	0.66	0.72	0.24	0.35	0.20	0.31	0.80
Inflation expectations for goods	$E_t \pi_{t+1}^T$	1.25	1.49	1.69	1.76	1.89	1.61	1.75
Output gap	$\hat{y}_t$	-0.02	-0.14	-0.21	-0.24	-0.24	-0.16	-0.09
RER gap	$\hat{z}_t$	0.43	0.64	0.70	0.66	0.52	0.34	0.32
Relative Prices	$\widehat{rp}_t^T$	-0.04	-0.03	-0.02	-0.01	0.02	0.05	0.07
Shocks to the Phillips curve	$\varepsilon_t^T$	0.05	-1.88	-1.24	-1.81	-1.32	0.50	0.20

Source: DANE, Banco de la República.

Table B1.2

Factor Decomposition for the annual Change in Prices of the Services' Basket according to the 4GM Model (Annual changes; percentage points)

Period		Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021
Inflation for services	$\pi_t^{NT}$	3.23	2.03	1.83	1.27	0.90	1.63	2.00
Inflation of services in $t-1$	$\pi_{t-1}^{NT}$	1.18	1.12	0.70	0.63	0.44	0.31	0.56
Inflation expectations for services	$E_t \pi_{t+1}^{NT}$	2.18	1.82	1.52	1.31	1.18	1.07	1.31
Output gap	$\hat{y}_t$	-0.03	-0.19	-0.28	-0.32	-0.32	-0.21	-0.13
RER gap	$\hat{z}_t$	0.13	0.18	0.20	0.18	0.14	0.08	0.08
Relative Prices	$\widehat{rp}_t^{NT}$	0.01	0.01	0.00	0.00	0.00	0.01	0.01
Shocks to the Phillips curve	$\varepsilon_t^{NT}$	-0.23	-0.88	-0.29	-0.50	-0.51	0.38	0.18

Source: DANE, Banco de la República.

in supply chains and international prices of commodities (both for processed and perishable foods). This, along with the dissolution of some price relief measures granted during the pandemic, explains the positive contribution to the annual change in the services sub-basket on account of supply shocks to the Phillips curve so far in 2021. Added to this are the lower downward pressures on the account of a slightly closer output gap in the second half of this year ( $\hat{y}$ ).