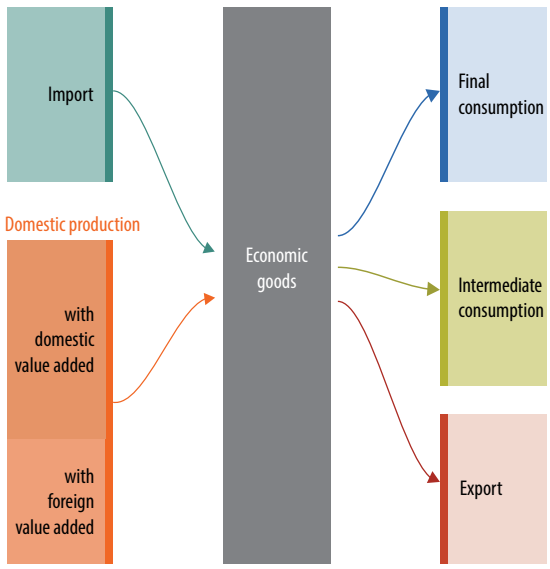
Box 1. External influences on the inflation rate in Romania – several coordinates

Introduction

International price developments are highly relevant for domestic consumer price dynamics, given Romania's status as a small, open economy. Global inflationary pressures over the past two years, but especially since mid-2021, have fuelled concerns about the external component of inflation in Romania.

The external environment can impact CPI via several channels. The first refers to a "direct influence", which is exerted through the import of goods in the consumer basket. Implicitly, the magnitude of this effect increases as imports make up a wider share of household consumption (in other words, as the direct dependence on imports is stronger); however, the inflation differential between the domestic and external environments is also relevant. From a broader perspective, the gap between the prices of imported goods and those of locally-produced goods is also part of the equation, to the extent that a reshaping of consumer habits favours the substitution between the two categories of goods. Nevertheless, this kind of impact tends to become relevant for CPI dynamics over the longer term.

Figure A. Economic goods: origin and destination



Aside from the direct influence, there is a wide range of indirect effects, mostly tied to the production process. In the short run, the most relevant mechanism is similar to that described above, as the structure of production costs resembles that of the consumer basket, both having an internal and an external component (Figure A). Specifically, there are two important factors: the share of external inputs in total production (indirect dependence on imports) and the dynamics differential between the prices of external and internal inputs; over a somewhat longer horizon, due to the possibility of input substitution, the price differential may also play a part in the production process. Exchange rate developments are reflected in the direct influence, as well as in the indirect effect mentioned above.

This analysis aims to paint a clearer picture of how the two channels work. A first step in this direction is to estimate the import content of consumption as well as the imported value added of local production – the above-mentioned direct and indirect dependence. To this end, the calculation method is based on information regarding actual production, international trade flows, and input-output relations, referring to multiple sources (PRODROM – NIS, Comext – Eurostat, TiVA – OECD, WIOD[1]). The lower

[1] World Input-Output Database.

availability of certain data (actual production data are only available up to 2020 and input-output tables even earlier) is a deterrent, but such variables as those analysed usually exhibit low volatility, therefore the difference between current and calculated values is most likely small. At the same time, the analysis includes a brief comparison between domestic and import prices – PRODROM and Comext data allow for estimations of price levels (based on which price dynamics can then be calculated). In this case, identifying the purpose of a certain good (i.e. final or intermediate consumption) presented a challenge, given that numerous categories can serve both uses. Therefore, differences can be calculated in terms of price level or dynamics, yet it is harder to establish the extent to which they have a direct or indirect impact on inflation. The technical assumption made was that all products that are also consumer goods exert their influence via the direct channel.

Direct dependence

The ratio of consumer goods imports to actual final consumption, determined at a very disaggregated level of data (over 1,000 consumer goods), was used for estimating the direct dependence. The indicator was calculated by reconciling disaggregated data on domestic production, imports, and exports by each product category. At the same time, given that the vast majority of products can have multiple purposes, an adjustment was necessary to differentiate between final and intermediate consumption.

Specifically, for a good i in the local economy whose purpose can be final consumption, its sources and uses can be shown in a simplified manner as follows:

$$\underbrace{Y^i}_{VA_l^i+VA_f^i} + M^i = FC^i + IC^i + X^i \tag{1}$$

where Y^i is the production of good i in Romania (which includes the local value added VA_l and the foreign value added VA_f), FC^i and IC^i represent the domestic final and intermediate consumption of the said good, X^i stands for exports, and M^i denotes imports. The composition of final consumption is important for determining the direct dependence. It can be written as:

$$w_{FC}^{prod} Y^i + w_{FC}^{imp} M^i = FC^i \tag{2}$$

where w_{FC}^{prod} and w_{FC}^{imp} indicate the shares of production and imports, respectively, used in domestic final consumption, so that the direct dependence on imports for each good (DD^i) will result from:

$$DD^i = \frac{w_{FC}^{imp} M^i}{w_{FC}^{prod} Y^i + w_{FC}^{imp} M^i} \tag{3}$$

Here, the denominator is the total final consumption in Romania, whereas the ratio shows what percentage of this comes directly from imports. Implicitly, the entire approach to determine the import content of consumption differs from one based on a survey, yet the results should not diverge significantly.

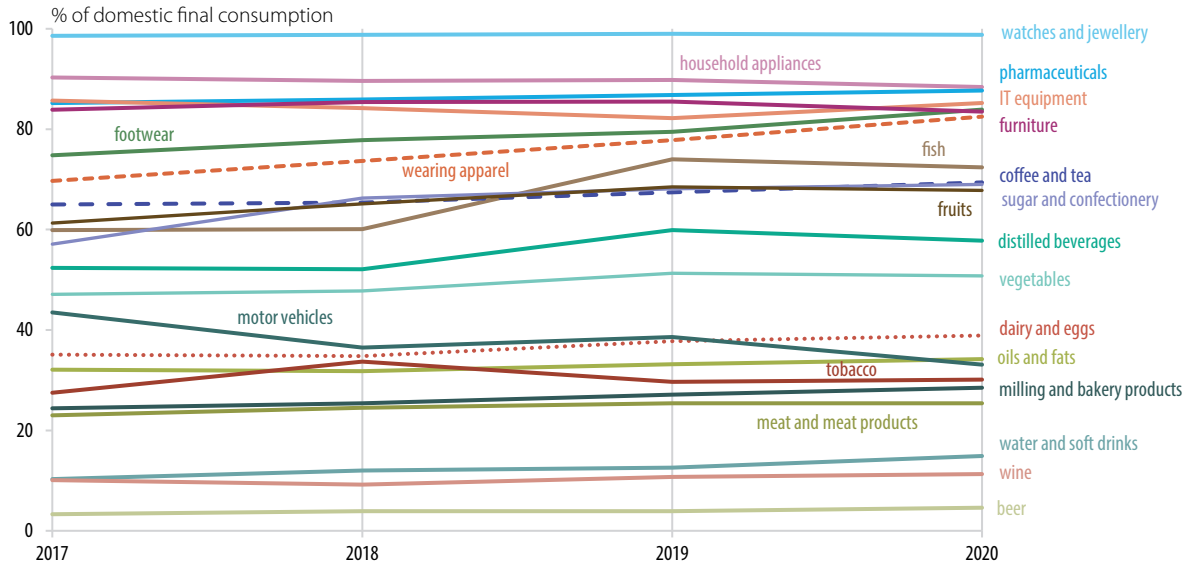
Table A. Use of goods by source industry

	% of domestic production used for domestic final consumption	% of imports used for domestic final consumption
Food, beverages and tobacco products	73.3	84.5
Light industry	7.5	31.6
Pharma	62.4	66.0
Chemicals	4.3	21.1
Rubber and plastic products	1.1	18.6
IT equipment	5.5	11.3
Electrical equipment	0.9	14.1
Automotive industry	11.1	11.0
Other transport equipment	10.7	0.0
Furniture	4.8	47.1

Source: Eurostat, NBR calculations

The actual calculation implied determining the domestic industrial production of goods for final consumption purposes (Source: PRODROM), covering the 2017-2020 period, while Eurostat data were used for imports. To allow for comparison, the PRODROM data were converted from lei to euro at the average annual exchange rate. In addition, a conversion was made to show individual consumption by purpose according to the COICOP classification, used to calculate the CPI. The next step consisted in calculating the weights w_{FC}^{prod} and w_{FC}^{imp} at the level of NACE division, i.e. the shares of production and imports used for final consumption purposes; they were extracted from symmetrical input-output tables available in the Eurostat database[2]. These shares are presented in Table A.

Chart A. Direct dependence on imports



Source: NIS, Eurostat, NBR calculations and estimates

The direct dependence on imports of several groups of goods relevant for the consumer basket is illustrated in Chart A. The breakdown shows high heterogeneity, the indicator varying from less than 10 percent for light alcoholic beverages to close to 100 percent for some personal goods. Also, within the food group, the consumption of meat products shows a direct import content of approximately 25 percent, whereas the external contribution for fish is close

2 2015 is the latest year with available data for these I/O tables, which allow for the differentiation between local production and imports; the structure of the economy by the purpose of goods produced is assumed to have remained largely unchanged in the following years as well.

to 75 percent. Looking at the food group as a whole, the direct dependence on imports followed a slight uptrend in the reviewed period, from approximately 28 percent in 2017 to 31 percent in 2020.

Alternatively, for goods mainly used for final consumption purposes (so that the adjustment by the w_{FC}^{prod} and w_{FC}^{imp} weights only implies marginal changes), the direct dependence can be determined based on a simple ratio of imports to the sum of domestic production and net imports, the denominator being a proxy for final consumption in the economy. In the case of food items (holding a prevailing share in the CPI basket), the results of this method are very similar to those obtained previously when using equation (3).

Indirect dependence

Another facet of import dependence is given by the foreign value added content of domestic output.

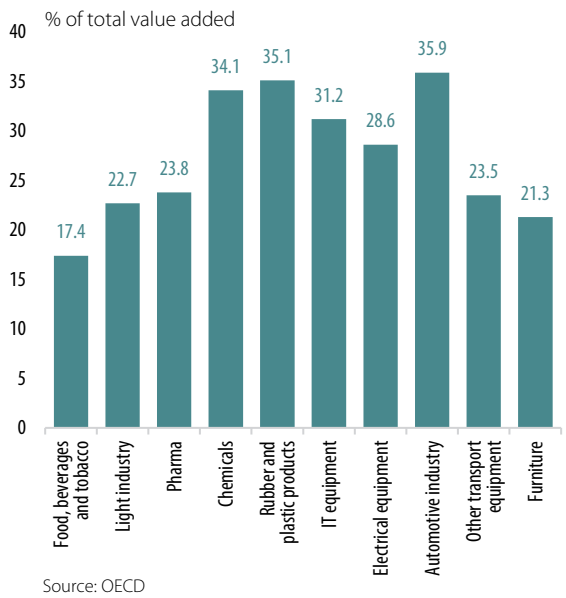
Building on the previous rationale and notations, indirect dependence (ID^i) is defined as follows:

$$ID^i = \frac{VA_f^i}{VA_l^i + VA_f^i} = \frac{VA_f^i}{Y^i} \quad (4)$$

The world input-output tables enable the calculation of this indicator (the national input-output tables provide the import content of intermediate consumption, which might however include reimported domestic value added as well). In this vein, the OECD's TiVA (Trade in Value Added) database systematises manufacturing processes at the global level, offering a clearer picture of the breakdown of value added by industry in each country. The indicators in the aforementioned database also include the foreign value added content of exports. Assuming that the output for the domestic market has the same structure of value added as that intended for export, the indirect dependence ranges between around 17 percent for food items and over 35 percent for motor cars or rubber and plastic products[3] (Chart B). The robustness of these values was tested by additionally calculating the indicator using world input-output data derived from the World Input-Output Database (WIOD), the results obtained being similar.

The indirect dependence on imports is a natural consequence of the interconnectedness between global value chains and is not necessarily a matter of concern: domestically-produced goods use

Chart B. Indirect dependence on imports (2018)



Source: OECD

3 The figures mirror output breakdown in 2018, the last year of available data.

imported inputs in the same way as intermediate goods exported by Romania will be used in production processes in other countries. In addition, the foreign value added content of domestic output is generally among the lowest in EU Member States.

Domestic prices and import prices

The comparison between domestic producer prices and import prices provides information about the influence of imports on inflation in Romania both directly (when comparing consumer goods) and indirectly (when comparing intermediate goods). The actual comparison is however hampered by the issue of differentiating between the purposes of goods, given that many of them may be intended for both final and intermediate consumption. This analysis focuses on the group of goods that may be used for final consumption (in other words, on direct dependence), given that an ad hoc weighing like the previous one would increase, in this case, the imprecision of estimations. Additional research aims to address the problem building on a model-imposed structure.

Import prices were calculated based on Eurostat data, being expressed in EUR/kg. As far as domestically-produced goods are concerned, given the unavailability of value and quantitative data by output destination (domestic market and external market), the hypothesis of the same selling price on the two markets was employed, while retaining solely the goods that are mostly sold on the domestic market. Therefore, the analysis sample comprised only those groups of goods that concurrently meet the following conditions:

(i) include imports;

(ii) include domestically-produced goods;

(iii) at least 50 percent of domestically-produced goods are intended for the domestic market;

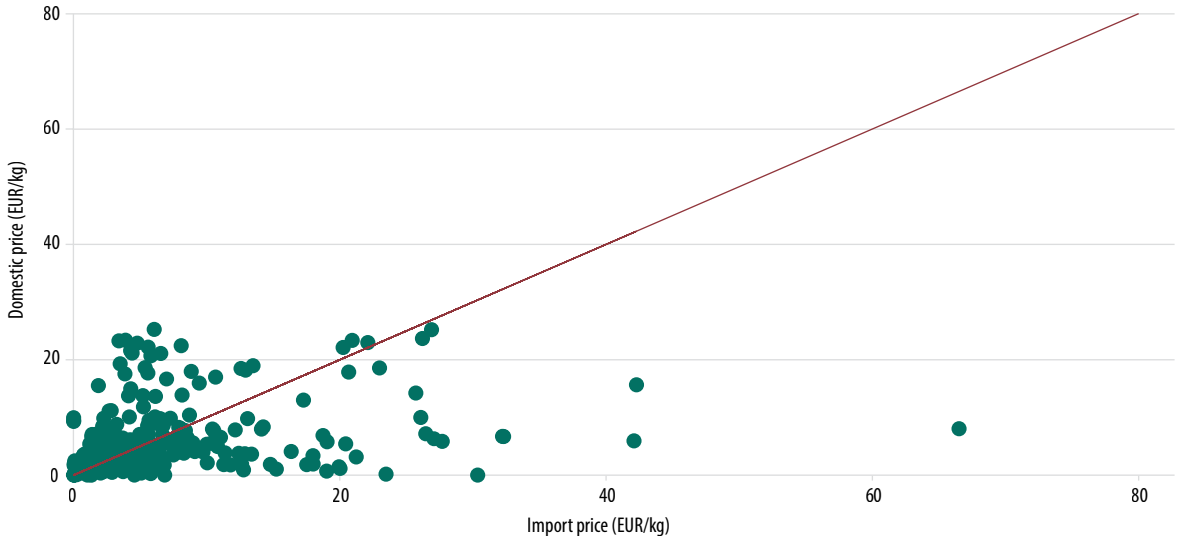
(iv) their domestic output is expressed in weight units.

For each of the four years covered by the analysis (2017-2020), approximately 200 groups of consumer goods[4] that meet these conditions are eventually retained, their prices being shown in Chart C. Even though the size of the sample affects the accuracy of gauging the impact of imported goods on CPI, several preliminary conclusions can be drawn. Thus, there is no systematic difference in terms of price level between domestic output and imports. Nevertheless, in 56 percent of cases, on average, imports are more expensive than domestically-produced goods – the percentage ranges between 50 percent (in 2020) and 60 percent (in 2019). As regards food items, which account for almost half of the goods in the sample, the data paint a different picture: only in 39 to 49 percent of cases, imported goods have higher prices than domestically-produced goods.

4 Corresponding to a NACE classification at 6-digit level.

The aggregate result is therefore influenced by the non-food market, where prices of domestically-produced goods are usually lower than those of imported goods; in some cases, this is valid for three quarters or even more of goods (for example, plastic, paper or fabricated metal products). The groups of goods holding a significant share in the sample used also include chemicals and chemical products and non-metallic mineral products (glass, ceramic products, etc.), where domestic prices and import prices are largely similar. The comparison between import prices and domestic producer prices broadly revealed a balance, which is not exactly surprising, given the local economy's level of integration in the European Union and the global economy, so that the prices of similar products tend to align, especially if annual averages are used. Apart from this, linking these findings to the trade deficit widening over the past years suggests that the latter has been caused by the erosion of both price/cost and non-price competitiveness.

Chart C. Domestic prices and import prices of some consumer goods



Note: The chart shows only goods that cost less than EUR 80 per kg. The red line is the first bisector.
Source: NIS, Eurostat, NBR calculations

The values recorded in the two cases (imports/domestic output) in the period under review are also similar in terms of price dynamics. Looking at imports, the simple average of the distribution for the three years when price changes can be calculated shows a 4.2 percent growth pace, while the same indicator computed for domestically-produced consumer goods runs at approximately 3 percent[5]. The medians of the distributions are however more similar (2.3 percent and 2.6 percent respectively). The breakdown reveals similar dynamics for food items (about 5 percent, on average, per annum), whereas in the case of non-food items the average growth rate of prices was faster for imports (3.5 percent) than for domestic goods (1.4 percent).

5 Outliers, namely price increases of over 100 percent in a year, were excluded from the calculation.

Conclusions

This analysis has looked into the mechanisms whereby import prices influence the dynamics of domestic prices, taking into account both the direct channel (via the import content of consumer goods) and the indirect impact of imported inputs. The calculations showed the significant direct dependence of consumption on imports, particularly in the case of non-food items. The dependence on imports is lower, albeit rising[6], for food items, which have made a substantial contribution to the trade deficit recorded over the past years (all the more as the level of such exports is still very modest). In turn, indirect dependence is not negligible, but ranks among the lowest in the EU. A comparison (in terms of level and dynamics) between the prices of certain groups of consumer goods that are both produced domestically and imported did not show major differences between the two categories. Thus, the influence of external prices on the CPI dynamics domestically builds particularly on the relatively high dependence on imports and to a smaller extent on price differences, bearing in mind however that the sample for the price comparison is rather limited.

6 Nevertheless, the local market makes a prevailing contribution to accommodating domestic food consumption.