AN ALTERNATIVE DECOMPOSITION OF INFLATION IN ALBANIA INTO DOMESTIC AND FOREIGN CONTRIBUTION THROUGH INPUT-OUTPUT TABLES

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## ABSTRACT

In the last decade, Albania has mostly faced lower inflation rates if compared with the 2000s. This seems associated both with weak cyclical conditions as well as with the presence of mostly negative imported inflation. Therefore, both the domestic and external environments foster low (even negative) inflationary pressures. The paper attempts to decompose such contributions in order to better understand their nature. the moments each contributions emerges and, in the case of foreign pressures, changes in terms of pass-through pattern. The decomposition is achieved through Input-Output tables into final and cost related contributions. Compared with the existing literature, the novelty stands into the separation of direct and indirect effects (cost related). Results show that domestic contributions are dominant on overall inflation. On the other hand, foreign pressures emerge at given periods and also determine inflation differentials. In particular, the effects associated with fuel are very important at certain times in particular through the cost channel. Additionally, a separate decomposition angle demonstrates the importance of trade margins and net taxes on inflation.

Keywords: inflation, cost structure, input-output decomposition. JEL: E31, D24, C67.

### 1. INTRODUCTION

During the past decade, inflation rates in Albania have pursued a diminishing trend. Inflation averaged 3.2% in 2008-2011. In the next year, a declining trend followed leading to a minimum of 1.3% in 2016. In the same year, very low inflation rates were observed in certain months (close to zero) which triggered an immediate response from monetary policy.

Both domestic and foreign pressures are believed to have a bearing on overall inflation. On the domestic front, real growth rates have been clearly lower compared with the late 2000s. That enabled weak cyclical conditions with negative and expanding output gaps (including unemployment gaps) (Çeliku, Çela, Metani, 2018). That was the cause behind low domestic inflationary pressures. Although output and unemployment gaps have been closing, spare capacities in the economy have continued to push inflation down.





Source: INSTAT.

In regard to the external environment, statistics point towards low and sometime negative import deflators. That is associated both with diminishing foreign prices as well as a continuous appreciation trend of the domestic currency. On this point, the appreciation trend has continued for several years becoming stronger and stronger and thus, contributing to negative import deflators.



Therefore, both domestic and foreign pressures have contributed towards lower inflation rates. The intensity probably differed from period to period. At the same time, domestic factors have probably improved as a result of better cyclical conditions in the last years. At the same time, foreign pressures remain on the opposing side considering the still low import deflators.

The material puts forward an inflation decomposition into domestic and foreign (imported) contributions. It represents an accounting approach based on Input-Output tables. The decomposition is carried out on a quarterly basis in the horizon 2014-2020Q2 (based on data availability) for various categories of goods and overall in the case of services. External inflationary pressures are further decomposed into direct (through imported goods and services which are directly sold to the consumer) and indirect through the cost channel. Separate goods and service estimations are aggregated to generate overall inflation contributions. Therefore, the approach joins together both fronts from which the imported impact may derive. Thus, it is unnecessary to make assumptions about "sectors" bearing purely domestic or purely imported effects.

Results indicate that domestic pressures have dominated inflation formation throughout the analysis horizon. They have followed a diminishing trend in 2015-2016 to rise again in 2017-2018, and to diminish again in following years. At the same time, foreign inflationary pressures have been continuously negative and sometimes very determinant in inflation shifts. Also, estimates suggest that the pattern of such pressures has not been uniform throughout the years and this has also affected inflation rates. Aside for the direct impact, a good share of contributions have come through the cost channel. "Fuels" stand as a good example for a category producing very important contributions to inflation through the indirect channel.

As for domestic inflationary pressures, their improvement in 2017-2018 seems to be associated with higher trade and transport margins as well as higher net taxes. At the same time, there not seem to be any higher contributions coming from sectors themselves (aside for the first quarter of 2018 which again is associated with particular price categories).

## 2. LITERATURE REVIEW

Extensive knowledge of domestic and foreign inflationary pressures is tantamount towards economic policy in general and monetary policy in particular (Bernanke, 2007). As globalization processes intensify, the pass-through of foreign prices (including exchange rate) becomes a very common phenomenon (Auer, Levchenko, & Saure, 2017). Foreign inflationary pressures can materialize both via the direct channel of imported consumption goods and services and also through the cost channel (through imported inputs) (McCarthy, 2000).

Accounting decomposition of domestic and foreign contributions comes very early in the empirical literature. The decomposition is based on the price of the imported good (or service) and their share within the consumption basket. An empirical example is the decomposition of domestic and foreign pressures on the Domestic Wholesale Index in the United States in the years 1965-1974 (Nordhau & Shoven, 1977). A more recent example is the contribution by Carluccio, Gautier, & Guilloux-Nefussi (2018) for the impact of imports coming from low-wage countries on France's inflation.

The input output approach at national, regional and global level has become even more applicable in empirical literature. That is associated with the fact that such matrixes reflect a very clear picture of sectoral inter-connections in a given economy which enables to identify how prices (domestic and foreign) are passed-through between sectors. An additional advantage is that this approach enables the identification of domestic and foreign contributions even in the case of sector which can be considered a priori as purely domestic of imported (as in the case of nontradables). This avoids common mistakes that identify a sector as purely domestic or foreign at a time foreign and domestic elements might be incorporated within their cost structure. The input-output approach has been vastly applied to decompose domestic and foreign contributions in the case of consumption as well as production prices. Auer, Levchenko, & Saure (2017) conduct a multi-industrial approach to determine the pass-through of input associated foreign inflation on production prices in the case of several industrialized countries. Aside for national matrixes, authors also apply border input-output tables (when available). Results indicate a certain synchronization of inflation rates between countries because of imported inputs which bear both effects of prices and the exchange rate.

Input-output based cost pass-through approach is also applied by Ahn, Park, & Chanho (2016) in the case of the Korean Republic and several European countries. The input-output model is combined with an Error Correction Approach to identify short-term and longterm pass-through. Result demonstrate a 70% pass-through in the case of Korea and almost 100% in the selected European countries. Another example of foreign pressures (exchange rate in this case) transmissions on production prices, features the case of industrial sectors in Japan (Hoang & Kiyotaka, 2016). Results indicate that when imported intensity increases, higher transmission of exchange rate pressures occurs. The transmission is even higher in the case of exporting sectors.

Empirical literature on foreign inflationary effects on aggregate demand component prices (consumer prices), takes into consideration the presence of final consumer goods as well as intermediate consumer goods (Sharify, 2012). The approach is based upon Leontief Standard Prices Models (Leontief, 1936) which assumed that inflationary pressures are transmitted simultaneously through the direct purchase and cost channels. Several modified models were advanced by Levy (1985) and Sharify & Sancho (2011). Empirical examples include the contribution from Ajakaiye & Ojowu (1994) in the case of Nigeria. Gunluk-Senesen, Kaya, & Senesen (2018) apply a similar model in the case of the construction sector in Turkey to determined imported impacts on it. On the other hand, Hara, Hiraki, & Ichise (2015) apply input-output models (coupled with other approaches) to determine whether higher import intensity was behind higher exchange rate impacts on domestic prices. Accounting decomposition techniques for foreign inflation pressures have been applied also in the case of Albania. Certain examples include Çeliku (2003) and Skufi & Çela (2017). In both cases, analysis is conducted upon consumer basket groups and sub-groups without taking into consideration the cost channel. On the other hand, it is assumed that the indirect impact could be important considering the high intensity of intermediate goods imports (Çela, 2016). What goes missing in the domestic literature is an approach that combines both channels (direct and indirect) enabling a better disaggregation and identification of both. That would omit a priori (and mostly erroneous) identification of inflation categories as purely domestic or purely imported.

## 3. METHODOLOGY

The empirical approach aims the decomposition of domestic and foreign contributions on sectoral and overall inflation rates. It is based on the input-output and supply-use tables for Albania. Further statistics include Consumer Prices Indices based on the consumer basket, Import Price Indices and Gross Domestic Product national accounts. Decomposition is carried out on a quarterly basis in the time horizon 2014-2020Q2. Foreign pressure are further decomposed into direct and indirect. The base formula for the decomposition is the following:

$$P_t = P_d * W_d + P_i * W_i \qquad (eq. 1)$$

Based on equation 1, the sectoral Consumer Price Index ( $P_i$ ) is a function of the domestic product/service price and respective weight ( $P_d$  and  $W_d$  respectively) and the import product/service price and weight ( $P_i$  and  $W_i$  respectively). The imported contribution is further disaggregated into the direct and indirect impact.

The input-output table represents the main database which enables the calculations of domestic and imported shares. The matrix encompasses all economic transactions for final and intermediate demand in a given year by economic sectors (35 sectors base of NACE classification). It enables the calculation of sectoral multipliers for value added and import (Miller & Blair, 2009). The value added sectoral multiplier indicates the domestic contribution for 1 lek (domestic currency) final demand for the sector's product/ service. The import multiplier indicates the same for imports. In order to provide a common base between input-output tables and the other statistics, the 35 sectors are integrated into 14 and respective multipliers are displayed in the following graph:



#### Chart 3. Value added and import multipliers by sector

These multipliers represent the weights for domestic and imported product (service) shown in equation 1. They do not solely represent the domestic and foreign product (service) for the sector itself. They also incorporate value added and imports from other sectors of the economy which provide inputs for the sector in question. In other words, the direct and indirect effects (previously explained) are embedded within the multipliers. For example, the impact of "fuel" as a cost element in "Agriculture", is included in the import multiplier of "Agriculture".

From Graph 3, it is observed that the domestic output is dominant in the case of "Agriculture", "Mining", "Textiles" and "Services". Import domination is observed in the case of "Machinery", "Food Manufacturing", "Pharmaceuticals", "Fuels" and "Wood and Paper products". The other sectors provide more balanced contributions between the two.

After weights have been determined, it is necessary to determined overall prices for the sector and separate prices for the domestic and imported product. Consumer Prices Index statistics are applied for the total price. As the consumer basket structure is category based and not sector based (differs from input-output tables), detailed basket sub-categories are re-integrated to resemble the sectors in the input-output table. The specific grouping is shown in the table of Appendix 1.

The import price proxy is generated from Imported Price Index statistics (INSTAT). In this case, indices are reported on a sectoral base matching the input-output table. The application of import indices is carried out under the assumption that final and intermediate products of a certain sector have a common price. The assumption is dictated by the unavailability of more detailed data.

The import indices do not include two sectors: Agriculture and Services. In the case of Services, foreign prices are proxied by the service import deflator generated from the national accounts of expenditure side GDP. In the case of Agriculture, the index is calculated based on external trade statistics for agriculture products provided both in value and quantity.

The final unknown in equation 1 is the domestic price index. This is calculated as a residual from all known elements are subtracted from the total price. The disaggregation is first conducted on sectoral level and afterward integrated into overall inflation level. In the following section, results are reported in terms of domestic and foreign contributions. In the case of imported effects, both direct and indirect impacts are reported. The final steps, incorporates a special decomposition into purely sectoral and those coming from trade and transport margins as well as net taxes.

# 4. **RESULTS**

### 4.1 Intro

In the following sections are reported the results for domestic and foreign contributions by categories of goods and for services overall. Foreign pressures are further decomposed into direct and indirect. In the second step, individual results are aggregated into overall inflation and overall domestic and foreign contributions.

Total foreign pressures are also aggregated into total direct and total indirect effects. Imported pressures coming through the cost channel are additionally separated in terms of cost bearer (the sector purchasing the imported input) and cost creator (the sector which supply the imported input). Total aggregation is also carried out for this case. Finally, total domestic pressures are disaggregated into sectoral contributions, effects from margin (trade and transport) and effects from net taxes (taxes less subsidies).

## 4.2 Agriculture and Food Manufacturing

As explained in the methodology appendix, "Agriculture" incorporates "Unprocessed food" and "Fire-wood" from the inflation basket items. On the other hand, "Food Manufacturing" includes "Processed food". Domestic and foreign contributions are shown below for each sector.



Chart 4. Domestic and foreign contributions (pp) on overall inflation (%) for "Agriculture"

Source: INSTAT and author's calculations.

Save for very rare occasions, domestic contributions dominate inflation formation for "Agriculture". That is hardly surprising considering the low share of imports and the high share of domestic output for this sector. Domestic contributions tend to be stable across time.

A different picture appears in the case of "Food Manufacturing". In this case, foreign inflationary pressures are more common and in higher magnitude. However, domestic pressures are still the most dominant. In certain cases, contributions are symmetrically opposite: positive domestic contributions coupled with negative domestic contributions. Only in the final three quarters, direct imported contributions enter positive territory.

Chart 5. Domestic and foreign contributions (pp) on overall inflation (%) for "Food manufacturing"



#### 4.3 Sectors with regulated and semi-regulated prices

The group includes "Water supply and sewage" which price is regulated. The other sector includes "Power and Gas" which incorporates 2 subsectors: one with regulated prices (Power) and the other non-regulated (Gas). Regulated prices are also present in "Pharmaceuticals", but they feature higher frequency of change.

Chart 6. Domestic and foreign contributions (pp) on overall inflation (%) for "Water supply and sewage"



In the case of "Water supply and sewage" (graph 6), imported inflation can only impact through the cost channel and they are compensated by domestic contributions (symmetrically). In 2018, a price hike was administered which was reflected on a higher inflation rate. In the case of "Power and Gas" (graph 7), symmetrical contributions are once again present. The difference is that in this case, direct imported pressures are present. The symmetrical nature of contributions is less vivid compared with the previous case due to the presence of un-administered "Gas" prices.



Chart 7. Domestic and foreign contributions (pp) on overall inflation (%) for "Power and Gas

In the case of "Pharmaceutical" (graph 8), they include administered categories but with a more frequent changing pattern. The symmetrical shape of contributions is clearer in the years 2016-2019. Foreign contributions come mostly in the direct form, unsurprising considering the high intensity of such imports (for final demand). A higher contribution is observed in the first half of 2020. That could be related to more expensive medicines associated with the Covid-19 pandemic.

Source: INSTAT and author's calculations.



Chart 8. Domestic and foreign contributions (pp) on overall inflation (%) for "Pharmaceuticals"

#### 4.4 Other sectors of "Manufacturing"

The sectors featured in this section include "Textiles", "Furniture", "Machinery", "Wood and paper" (furniture is separate), "Plastics" and "Metals". In the case of "Textile and clothing" (graph 9), domestic inflationary contributions dominate and they are mostly negative throughout the analysis horizon. The only exception is year 2018, when large positive contributions are observed. As for foreign contributions, they also appear mostly negative both direct and indirect. Very marginal positive contributions are visible only in the final quarters.

Chart 9. Domestic and foreign contributions (pp) on overall inflation (%) for "Textiles and clothing"



Source: INSTAT and author's calculations.

As for "Furniture" (graph 10), domestic pressures are dominant and in certain cases serve as counter-balance for foreign ones. That is particularly visible in the years 2018 and 2020. That might imply that foreign price shocks are fully absorbed in the domestic market (possibly through trade margins) to enable an unchanged final price.



2016Q4 2017Q1 2017Q3 2017Q2 2017Q4 2018Q1 2018Q2 2018Q3 2018Q4 2019Q1

2019Q2 2019Q3

-Total inflation

Source: INSTAT and author's calculations.

2019Q. 2020Q

2016Q3

2016Q

Import direct

-2 -3 -4 201

2014Q:

Domestic

2015Q

2015Q 2015Q3 2015Q2 2016Q2

201

14Q.

201

I4Q

4Q

Chart 10. Domestic and foreign contributions (pp) on overall inflation (%)

Import indirect

In the case of "Machinery" (graph 11), foreign pressures are more dominant and that is clear considering the high import intensity in the sectors. Domestic pressures are visible in certain quarters, but giving the absence of the domestic output base, these contributions are possibly associate with trade margins. In the first half of 2020, these pressures were on the rise and represented the main source for inflation formation in the sector.



Chart 11. Domestic and foreign contributions (pp) on overall inflation (%) for "Machinery"

In the case of "Wood and paper" products (graph 12), positive domestic contributions are joined by negative foreign contributions. In the years 2018-2019, domestic contributions are on the the rise, while foreign ones drop to negative territory. Domestic contributions falter since 2019Q4 and remain low through the first half of 2020. Foreing ones are almost non-existent in the same period.

Chart 12. Domestic and foreign contributions (pp) on overall inflation (%) for "Wood and paper"



Foreign pressures are dominant in the case of "Plastics" (graph 13) first through the cost channel (2014-2016) and afterward through the direct channel (2017-2018). The indirect contribution is primarily associated with "fuel" prices being an important cost component. In all cases, positive domestic contributions are always present with the exception of 2015.





Source: INSTAT and author's calculations.

Lastly, "Metal" products (graph 14) feature dominant foreign contributions appear both directly and indirectly. In 2016, high positive domestic contributions were able to compensate for large negative imported ones. Considering the high import intensity in this sector, domestic contributions probably come mostly through margins and net taxes.



Chart 14. Domestic and foreign contributions (pp) on overall inflation (%) for "Metals"

#### 4.5 Fuels

Fuels (in this case regards processed fuel and not crude oil which is included in mining) represent a very important sector whose relevance with become more evident later when aggregate inflation impacts are shown. It is important to remind that the importing intensity is very high for this sector. Domestic contributions come mostly through trade margins and taxes which affect how foreign prices are passed-through to the domestic consumer. Graph 15 shows high negative imported inflation in 2014 and 2016. The difference between the two years is that in 2014, domestic pressures blocked the pass-through of foreign inflation (overall inflation for fuel remained in positive territory in spite of highly negative imports prices). That was not the case in 2016 when the fall in import prices was fully transmitted with domestic contributions on the same trend. In the following years, the sectoral inflation has mostly followed import prices trends. The foreign contributions were again positive in 2018-2019, only to falter again in the first half of 2020.



Chart 15. Domestic and foreign contributions (pp) on overall inflation (%) for "Fuels"

#### 4.6 Services

Estimations in the case of services are provided for the overall sector and not disaggregated as unlike goods, there is only one overall import deflator for services. Additionally, as services are regarded as non-tradable, foreign pressures are usually neglected. Foreign pressures come both through the direct and indirect channels. In the case of direct pressures, one must not forget that service import constituted on average 14.5% of GDP with travel services (part of household consumption) at 8.0% of GDP. Additionally, input-output tables suggest that services feature high usage imported inputs (even compared with goods), and in particular fuels. Therefore, the indirect cost channel is also relevant in transmitting foreign inflationary pressures.

Results from graph 16, witness the presence of negative indirect imported contributions. Those are mostly associated with fuel. In 2014, it is also present a large contributions coming from the domestic side. It is important to remembet, that in this particular year, foreign negative fuel prices were compensated by domestic ones and this was reflected in services as well. On the other hand, in 2016, negative cost imported prices have provide a strong shock in regard to lower and even negative service inflation. Domestic pressures have increased in 2017-2018 with negative foreign pressures turning positive. Year 2019 witnessed falling domestic contributions which revitalized again in the first half of 2020.

Chart 16. Domestic and foreign contributions (pp) on overall inflation (%) for "Services"



# 4.7 Aggregate contributions and the domestic contribution

The aggregation of sectoral contributions is carried out by applying the weight that each sector bears on the consumer basket. Both domestic and foreign sectoral conributions are augmented to generate the impact on overall inflation. The results are shown in the graph below.



Chart 17. Domestic and foreign contributions (pp) on overall inflation (%)

The result indicate the dominance of domestic inflationary pressures throughout the analysis horizon, in line with the finding from Skufi & Çela (2017). They have fallen in 2015-2016 compared with 2014. In the first and second quarter 2016 (when inflation displayed very low rates), it is observed a substantial reduction in domestic contributions. They rebounded again in the 2016Q3 and remained comparatively high until the end of 2018. In 2019, domestic contributions were again on the decline pushing down the overall inflation. On the other hand, in the first half of 2020, domestic contributions were again on the rise reflecting higher overall inflation.

Foreign inflationary pressures come mostly through the direct channel and are predominantly negative. Indirect effects emerge both in 2014 and 2016. As mentioned previously, domestic contributions compensated in 2014 in order not to allow the transmission of foreign ones. In 2019, foreign pressures are almost non-existent, while modest positive contributions (mainly direct) emerge in the second quarter of 2020.

The disaggregation of domestic contributions (graph 18), suggest dominance from "Agriculture". As mentioned previously, the sector includes the category of "Unprocessed food", which for long has generated the most contributions to overall inflation (Monetary Policy Report). At the same time, important contributions also emerge from "Food Manufacturing" which includes "Processed food". Both contributions diminished substantially in early 2016 being an important factor behind low inflation rates during that period. Since the second half of 2016, "Food manufacturing" contributions have risen boosting overall domestic contributions. On the other hand, "Agriculture" contributions have displayed sharp alterations also impacting overall inflation. Their drop in 2019 and expansion in the first half of 2020, represent the main factor behind inflation formation in both periods.

Another sector featuring important contributions is "Services". Also in this case, contributions have diminished throughout 2015 and in the first half of 2016. That is probably associated with domestic cyclical conditions as "Services" mostly reflect direct domestic effects. The general improvement of cyclical conditions, also coincides with increasing contributions from services since the second half of 2016. The strong impact from this category boosted inflation in early 2019 and contributed to falling rates thereafter.



Chart 18. Sectoral domestic contributions on overall inflation (pp)

#### 4.8 Imported inflation contributions

The impact coming from imported inflation can be treated from different points of view. The first impact is the direct one coming from imported final goods and services. The following graph, summarizes direct imported sectoral contributions on overall inflation.



Chart 19. Direct imported sectoral contributions on overall inflation (pp)

Results indicate that direct contributions have been vastly negative throughout the analysis horizon with the exception of 2015 and the first half of 2020. The negative contribution has been particularly large in 2016, when it recorded -0.6 percentage points. On a sectoral base, negative contributions are mostly associated with "Food manufacturing" considering the high import intensity of the sector. "Fuels" also played a major role particularly in 2016. Higher direct contributions in the first half of 2020, are mostly associated with "Food manufacturing" and "Pharmaceuticals". That is probably related to the pandemic.

The second transmission channel runs through costs. In this case, contributions are treated under two points of view. First, they are viewed in terms of the cost bearing sector which buys imported inputs. Therefore, the final price of the product (service) are impacted by the price of imported inputs. Foreign contributions according to this point of view are summarized in the graph below.





In general, the negative indirect contributions of imported inflation are estimated to be lower compared with direct effects. In the early analysis horizon (2014-2016), negative contributions are fairly large and culminating in 2016. The following years witness positive and negative contributions alternating. In early 2020, the indirect impact is once again negative and with increasing magnitude in the second quarter.

By sector, indirect imported effects are mostly transmitted through services. That is related to high intensity of imported inputs (in particular fuel) in this sector. That is also the case for "Food manufacturing". Negative contributions also emanate from the other sectors, but display lower magnitudes.

The other point of view includes indirect contributions by cost creating sector. That is which inputs are generating indirect imported contributions as they arrive from high intensity import sectors. Such indirect contributions on overall inflation are shown in graph 21.





Result indicate that primary contributions emerge from "Fuels". Strong negative contributions are clearly visible in both 2014 and the first half of 2016. Thus, in 2014, indirect imported contributions are estimated at -0.1 percentage points with "Fuel" contributions at -0.2 percentage points. In the first half of 2016, the indirect impact stands at -0.4 percentage points with "Fuel" contribution at -0.3 percentage points. The respective contributions increase in the period 2018-2019Q2 but falter again in the later period. In the first

half of 2020, the international drop in oil prices, has further fostered a negative imported impact on our domestic inflation because of this particular category. To create a connection with graph 20, the fall of fuel prices is reflected in lower indirect contributions from "Services" where fuel stands as a major cost component.





Graph 22 summarizes overall direct and indirect imported inflation contributions. The main impact derive from "Food manufacturing" (mainly direct) and "Fuels" (mainly indirect). The predominantly low foreign inflation contributions in 2016 and 2017 are associated with these sectors. In 2017, negative contributions seems associated with almost all sectors suggesting the impact from exchange rate appreciation. In 2020, positive contributions are related to "Food manufacturing" and negative contributions are associated with "Fuels". Higher positive compared to negative effects have mandated an overall positive impact from imported inflation in this year.

In the section where sectors were treated separately, it was often mentioned the presence of symmetrically opposed contributions. Sometimes, imported contributions are not transmitted due to the presence of domestic counter-balances. For example, graph 21, shows contributions from sectors such as "Power and Gas" or "Water supply and sewage", but those final prices are administered (or partially administered). In these circumstances, it is important to pour together sectoral domestic and foreign contributions in order for them to eliminate each-other when possible. These results are shown in the following graph.





The graph shows an important shifts in contributions during 2016 when extremely low inflation rate showed up. Contributions from "Agriculture" diminish substantially while those from "Fuels" turn negative altogether. "Fuels" already displayed negative values before but the passthrough was the strongest in 2016 (graph 14). At the same time, falling contributions are associated with "Food manufacturing" and "Services". In both cases, the phenomenon is related to domestic contributions (graphs 5 and 6).

Inflation rates have increased since the third quarter of 2016. Increasing contributions came from "Food manufacturing" and "Services". In both cases, that is related to domestic contributions. An important shift is observed in "Fuels". Imported inflation for this category jumped to positive territory since the fourth quarter of 2016 and has maintained relatively higher values until in 2018 as well. As mentioned previously, passthrough from fuel price has been stronger during this period (compared with 2014). In the end, domestic inflationary pressures remain dominant during the analysis horizon. These pressures have increased in 2017 and 2018, however at a lower rate in the second year. The tilt in domestic pressures was compensated with imported inflation. The respective contributions were higher in 2018 compared with 2017. For this reason, overall inflation rates in both rates were very similar. The fall in domestic contributions from "Agriculture" and "Services" was behind the fall in overall inflation in the following year. On the other hand, rebounding contributions from the same sector enabled higher inflation rates in the first half of 2020.

# 4.9 An alternative decomposition of domestic inflationary pressures

This section analysis domestic inflationary pressures from a different point of view. Once again we remind that domestic inflationary pressures are sub-divided into three price-formation components. First, the purely sectoral pressures reflect the business decisionmaking on costs and profit margins. Second, trade and transport margins are associated with the process of moving and selling the product (and for certain categories of services) from the original provider to the consumer. Third, there are the net indirect taxes (taxes less subsidies) on products and services. All three elements are domestic, however the manner they are imposses shifts on case by case basis. The disaggregation of such effects is important in better understanding domestic pressures and determining the appropriate policy response.

This particular type of disaggregation is carried for overall (not by sector) and is based upon Supply Tables which identify the nominal value of "Trade and Transport margins" as well as "Net taxes" for each sector. That allows the determination of the share for this two components on the overall value of the product or service merchandized. Sectoral levels are aggregate based on their weights in the consumer basket to determine that share of each component on overall consumtion. These shares are reported in the table below:

Year	Trade and Transport Margins	Net Taxes
2014	13.1	6.5
2015	13.1	6.5
2016	12.6	6.7
2017	11.1	6.1
2018	11.1	6.1
2019	11.1	6.1
2020	11.1	6.1

Table 1. Share of "Trade and Transport margins" and "Net Taxes" in the consumer basket (%)

Source: INSTAT and author's calculations.

Aside for the shares, it is also required a price series for each component. The price must reflect purely domestic effects and the best indicator to do so is the value added deflator from national accounts. In the case of Net Taxes, there is a single deflator applied. On the other hand, Trade and Transport Margin include several components which are also obtained from Supply Tables.

Sector	Share on total margin
Wholesale	43.6
Retail	29.4
Land transport	15.4
Vehicle repair	8.7
Air, water transport and storage	3.0

Table 2. Trade and Transport margins by sub-component (% nga totalit)

Source: INSTAT and author's calculations.

In order to determine a single price index for the margin, value added deflators for the respective sectors (from national accounts) are weighted according to the shares in table 2. They are further augmented by the weight the margins feature in the consumer basket (Table 1) to obtain the effect on overall inflation. Such calculations are conducted for overall inflation only as there are only overall deflators for the two components. The purely sectoral contributions are calculated as a residual after margin and net-tax effects are subtracted from overall inflation.



Chart 24. Disaggregated domestic contributions (pp) on total inflation

According to graph 24, purely sectoral contributions have been dominant in terms of domestic inflationary pressures. These contributions have been on a diminishing trend in the period 2015-2017. Therefore, the sectoral contribution on inflation is estimated at 2.3 percentage points in 2015, to drop to 1.9 percentage points in 2016 and 1.7 percentage points in 2017. The drop is particularly evident in the first quarter 2016, as it fell to 1.2 percentage points down from 2.4 percentage points in the previous quarter. During the same time, the domestic contributions dropped from 2.2 to 1.8 percentage points. The fall would be even sharper if it wasn't for the higher effects from net-taxes.

Increasing domestic contributions are observed between the end of 2016 and the end of 2017. Graph 24 suggest that this is predominantly associated with Trade and Transport margins as well as Net-Taxes. These effects have maintainted their presence during 2019 as well compensating from falling sectoral contributions. A reversal is observed in the first half of 2020. Sectoral contributions increase while those from taxes drop to negative territory. Trade and Transport margins show very marginal effects. BOX: INFLATION AT THE TIME OF THE COVID-19 PANDEMIC

The first half of 2020 has displayed higher inflation rates compared with the previous period. Inflation stood at 1.8% up from 1.3% and 1.4% for the second half of 2019 and the whole 2019 respectively. Higher contributions emerged both from the domestic and foreign sector. Domestic contributions are 0.4 percentage points higher compared with the second half of 2019. Imported contributions are only marginally higher and mostly associated with the direct effect.



Chart 25. Domestic and foreign (pp) në inflacion (%)

Higher domestic contributions are mostly associated with "Agriculture" and "Services". At the same time, higher imported contributions are related to "Food manufacturing". All categories might have been impacted from supply side effects leading to higher inflation. On the other hand, falling indirect effects are related to the drop in "fuel prices" which was transmitted to domestic prices. Lastly, the alternative decomposition suggest for the presence of serctoal contributions at a time when trade and transport margins are retreating and net-taxes drop to negative territory. Supply side effects probably determined inflation tendencies in the early pandemic.

## 5. CONCLUSSIONS

The disaggregation results suggest the predominance of domestic contributions during the analysis horizon (in accordance with previous studies). A drop in domestic pressures is observed in 2015 and in the first half of 2016 which coincided with lower inflation rates. Since the second quarter of 2016, domestic pressures have rebounded and enabled higher inflation rates.

Foreign inflationary pressures, although non-dominant, have played an important role in defining inflation dyniamics a certain moments. In particular, during the first half of 2016, substantial negative contributions played a role towards very low inflation rates during this period. "Fuels" stand as an important component of foreign pressures in direct terms.

The presence of foreign pressures did not materialize only through the direct channel, but also through the indirect ones. Once again "Fuels" stand as a prime example considering the importance of this compoment on production costs in the economy. That is not only the case of goods but also "Services".

The analysis emphasizes the asymmetry of transmission of foreign inflationary pressures. Negative imported inflation rates, in particular in the case of "Fuels", were also observed in 2014-2015, but their transmission was impeded by domestic influences. In the first half of 2016, the drop in "Fuel" prices was forcibly transmitted to domestic prices increasing their impact on overall inflation. Since the second half of 2016, negative imported inflation pressures have relented and, in the case of "Fuels", the deflators moved to positive territory. On the other hand, the overall imported contributions remained negative on a broad based suggesting the effect of appreciation. This impact on prices has been somewhat mitigated by opposing domestic influences.

As for the domestic pressures, they have increased in 2017 and also in the first quarter of 2018. An important effects is associated

with "Trade and Transport margins" as well as "Net-Taxes". In the first quarter of 2018, sectorl contributions are on the rise, but that is somewhat related to higher "water supply" prices (administered). For the remaining quarters, moderate domestic pressures are observed in 2019, which have turned up in the first half of 2020. In the last case, it is believed this to be associated with the pandemic.

# 6. DISCUSSIONS, IMPLICATIONS AND FUTURE RESEARCH PROSPECTS

The results support previous findings (Skufi & Çela, 2017) on the predominance of domestic pressures on inflation. The novelty featured in this paper includes the indirect cost channel aside for the direct one. Even considering such impact, domestic pressures remain dominant.

Foreign inflationary pressures have been determinant in certain cases. In particular during the first half of 2016, "fuel" related contributions dragged down the whole inflation. This negative pressures soon turned moderately positive. On the other hand, for the remaining quarter, imported pressures are broadly negative suggesting the impact from appreciation.

An important element associated with foreign pressures relates to the assymetrical nature of transmission. Foreign deflators were negative for most of the analyzed period, however their impact was stronger in the first half of 2016 because of higher transmission. That is related to the passthrough in "Fuel" prices. During the first half of 2016, foreign pressures have been determinant in this category, while before they were balanced by domestic ones. In any case, imported inflation contributions are deeply rooted into "Fuel" prices if passthrough occurs. These pressures represent a very important component of inflation contributions (both direct and indirect) and must therefore be kept under close observation both in terms of tendency and inflation origin.

The conclusions emphasize certain important implications from the analysis. First, there are no "purely domestic" or "purely imported" sectors. Imported influences might affect sectors which are by default considered domestic. That is the case of "Services" where imported input (mainly "Fuel") generates important indirect contributions to the overall inflation rate of the sector. At the same time, the presence of domestic Trade and Transport margins, Taxes and Subsidies, and the eventuality of administered prices, can generate domestic inflationary pressures even in sectors where imports dominate. That is the case of "Fuels", "Food manufacturing", "Pharmaceuticals", "Machinery" etc.

An important element associates with "margins" and "Net-taxes". As results suggest, their presence was behind higher inflation rates in 2017 and falling rates in 2018-2019. As they are entirely domestic effects, they could be misrepresented as reflections of cyclical conditions in the economy (improvement or worsening), when in reality are mostly exceptional non-permanent phenomena. The knowledge of such effects, would prevent incorrect reactions from monetary policy.

Another contribution from the research is the identification of assymetries in the pass-through of foreign prices. On several occasions, contributions coming from certain inflation categories, are modeled as constant when the reality differs. Therefore, broadmodel analysis must be joined by micro-inflation analysis to see whether certain behaviors have altered. Again, "Fuels" stand as an example. As shown in the results, imported "Fuel" inflation displayed similar negative values in 2014 and 2016. However, the effects on overall inflation were only visible in the second case due to the pass-through taking place. This case by case knowledge would provide a better understanding of particular episode with very high or very low inflation rates. The analysis is further useful in the cases a cost component is the inflation determinant.

As for future research prospects, it is important to identify certain limitations that can be corrected in the eventuality of improved statistics. First, it is assumed that the materialization of foreign pressures occurs in real time. That might be the case for services, however in the case goods, certain time lags exist between the moment the good is imported and when it is launched on the market. That is the case for both final demand and intermediate demand goods. That is something future research needs to address.

Secondly, in the case of foreign pressures it is interesting to separate price effects from exchange rate effects. That is very important to Albania considering that appreciation has been going on for some time. The process would be very time consuming as separate exchange rate would need to be identified for each sector. It is however a very lucrative research prospect.

Thirdly, an important prospect would be the disaggregation of direct and indirect domestic effects. Certain categories (in particular foodstuffs) feature frequent shocks associated with weather conditions, convergence to foreign price levels and additional demand and supply effects. Such disaggregation would enable to know more on the nature of such domestic influences.

Certain improvements are associated to better statistics in the future. The analysis was based on four data sets: input-output tables, Consumer Price Index data, Import Price Index data and Groos Domestic Product national accounts (for the overall service deflators). Even though all statistics come from the same institution, methodological divergences (in particular in regard to consumer prices) might create problems when aggregate on a common structure. The presence of input-output tables in constant prices (real prices) would enable better estimations for the intermediate consumption. Additionally, the availability of separate tables for domestic and product and imports, would improve the quality of multipliers as they would be separately calculated and later aggregated.

In the end, the analysis points out certain qualities in inflation formation including non-linear transmission, margin effects and net-taxes. Quantified information on such effects is limited buth knowledge of them would improve the understanding of inflationary pressures (in particular domestic ones). This brings up the need for more qualitative information. On example are market survey which specifically ask for margins in trade and transport. Net taxes represent a separate story. Taxes don't only impact when rates changes, but in the case of Albania, when the quality of collection changes. All these considerations must be incorporated into future research.

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#### APPENDIX 1: SECTORAL GROUPING ACCORDING TO INPUT-OUTPUT STRUCTURE AND EQUIVALENT IN CONSUMER PRICE BASKET

Input-Output Structure	CPI basket equivalent		
Agriculture	<ul> <li>Unprocessed food</li> <li>Fire-wood</li> <li>Garden plants and flowers</li> <li>Pets</li> </ul>		
Food Manufacturing	Processed food		
Textiles	<ul><li>Clothing and footwear</li><li>Carpets</li><li>Hourse textiles</li></ul>		
Wood and Paper	Newspaper, books and school items		
Fuels (processed)	• Fuels and lubricants for personal transport equipment		
Pharmaceuticals	<ul><li>Non-durable consumer goods</li><li>Pharmaceutical products</li><li>Other medical products</li></ul>		
Plastics	<ul><li>Personal care produts</li><li>Personal products</li><li>Other personal products</li></ul>		
Metals	<ul> <li>Materials for the maintenance and repair of the dwelling</li> <li>Glassware, tableware and household utensils</li> <li>Small tools and miscellaneous accessories</li> <li>Jewellery, clocks and watches</li> </ul>		
Machinery	<ul> <li>Major tools and equipment</li> <li>Major household appliances whether electric or not</li> <li>Therapeutic appliances and equipment</li> <li>Cars</li> <li>Motorcycles</li> <li>Bicycles</li> <li>Spare parts and accessories for personal transport equipment</li> <li>Telephone and telefax equipment</li> <li>Equipment for the reception, recording and reproduction of sound and picture</li> <li>Photographic equipment</li> <li>Computer equipment</li> <li>Musical instruments and major durables for indoor recreation</li> <li>Games</li> <li>Sport equipment</li> <li>Electric appliances for personal care</li> </ul>		
Furniture	Furniture and furnishing		
Power-Gas	Power     Fuels (gas)		

Water supply and sewage	<ul><li>Water supply payments</li><li>Sewage payments</li></ul>
Services	All service categories

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