Box IV.1: **Inflation dynamics, demand shocks and the role of supply factors**

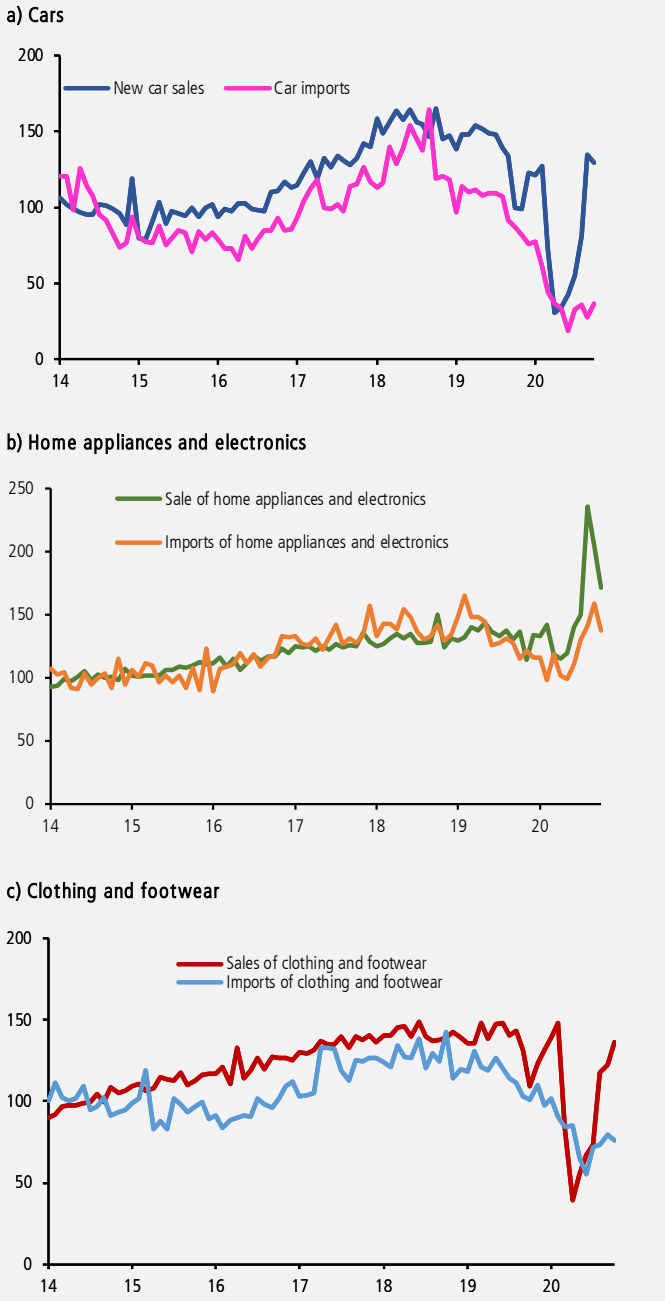
In September and October, inflation in Chile was significantly above the projections in the last MP Report and markets' expectations, in a context of a major positive demand-side shock associated with the withdrawal of pension savings. The inflationary pressures driven by this increase in aggregate demand has coupled with a limited reaction capacity of supply due to the effects of the pandemic-related confinements. Plus, short-term factors associated with a rapid inventory depletion that even resulted in stock-outs in some products. It is also possible that medium-term factors exist causing the destruction of productive relationships among firms triggered by the sharp fall in economic activity after the pandemic outbreak. This box describes the recent dynamics of inflation while it examines the role of associated demand- and supply-side factors, and outlines possible developments for the short and medium term.

The role of inventories

The inventories of certain categories of goods saw a significant depletion after the approval of the withdrawal of pension funds, even causing some stock-outs. This is confirmed by the perceptions gathered in November Business Perceptions Report and the IMCE. The comparison between sales and imports of goods not produced domestically is also revealing in this regard: between August and October sales showed a strong upturn, which was not matched by import increases of a similar magnitude (figure IV.9). This can be explained by the sudden nature of the increase in demand: since import orders typically take months to arrive, the available supply will depend more on the available inventories.

Figure IV.9

Real sales and imports (*)
(index, 2014=100, seasonally adjusted)



(*) CPI-deflated imports of new cars, clothing and footwear, and electronics (includes: home appliances, fax machines, audio equipments and cell phones) as appropriate. Imports of home appliances and electronics includes cell phones, computers, television sets and electric appliances.

Sources: Central Bank of Chile and National Statistics Institute (INE).

When confronted with a stock-out situation due to a transitory demand shock, prices will naturally overreact[1]/. If in the face of such transitory shock inventories are sufficient, price increases will be limited and inventories will be used up until the demand goes back to its "normal" level; if excessive, stock-outs will occur and the prices will exhibit a stronger response.

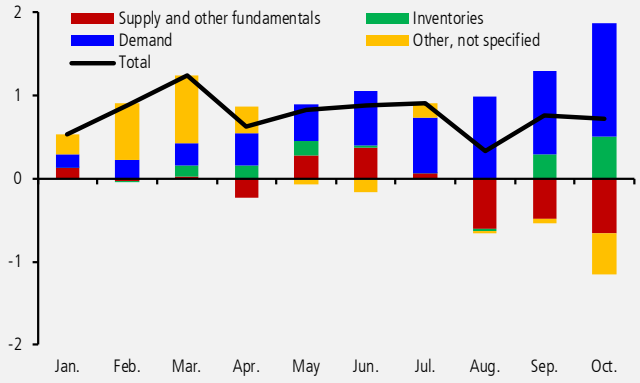
To quantify the effect of the demand shock and inventory stock-out on prices, the Arroyo et al. (2020) strategy is used, which allows estimating the contribution of these factors to the monthly price variation in different areas of the economy.

In the case of electronic goods and appliances, the combined effects of the demand shock and inventory depletions were the main source of upward pressure on prices in last September and October. For automobiles, the price increase observed in October was almost entirely explained by stock depletion. Finally, in the clothing sector, the contribution of both elements was also significant in September and October, explaining just over half of the price increase of said months (figure IV.10).

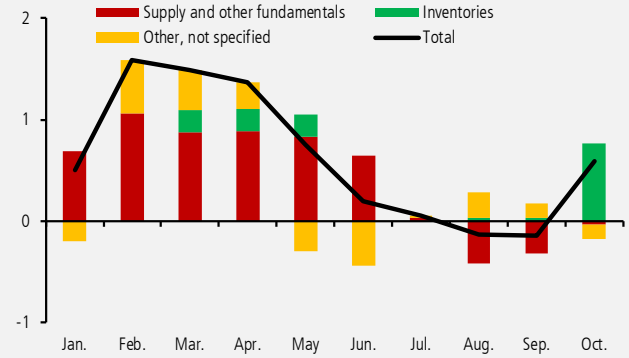
Figure IV.10

Breakdown of price changes in selected sectors (*)
(monthly change, moving quarterly average, percent)

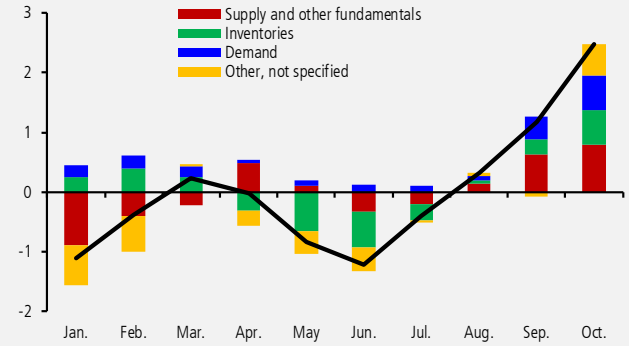
a) Home appliances and electronics (2.5% of CPI)



b) Cars (2.9% of CPI)



c) Clothing and footwear (4.1% of CPI)



(*) Other fundamentals include: exchange rate, consumers' expectations and the inertial series dynamics. Other not specified are variables not explained by the model.

Source: Arroyo et al. (2020)

The role of destruction of productive relations

Whenever economic activity suffers a steep downfall, it can take a toll on the firm-supplier relationships. This may occur because suppliers go bankrupt or close down, or because of low demand by end clients that forces the firm to stop purchasing from some suppliers. If these relationships cannot be rebuilt easily, the costs may rise and cause inflationary pressures, especially in an episode of sharp increase in demand.

To quantify this mechanism, we build measures for the creation and destruction of commercial relationships between firms and its providers by using anonymized digital bill data[2]/. These data show that the levels of gross and net creation of

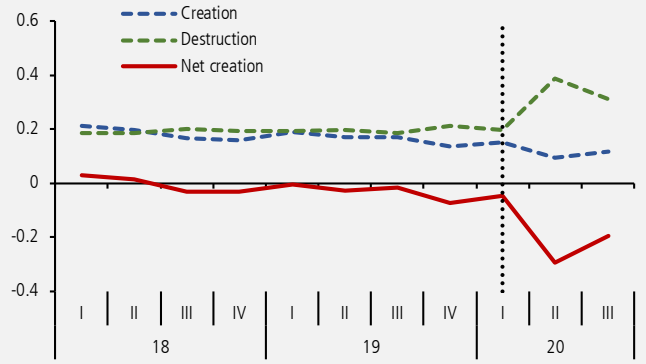
[1]/ The theory that studies the role of inventories in price formation is known as the "competitive storage theory". It states that firms decide on their inventory levels with the purpose of transferring supply between periods to maximize expected profits. Two key elements are involved in this decision: inventory technology and price expectations. Technology refers to the way inventories are accumulated, the cost of accumulating and/or depleting them and their depreciation. At this point there are several modeling alternatives. Regarding the role of expectations, all theories follow a similar logic: if firms expect prices to go up (down), they accumulate (deplete) inventories. The market price will then result from the balance between the current level of demand, the current level of inventories and the expected prices.

[2]/ The methodology is adapted from the standard definitions presented by Davis and Haltiwanger (1992) in the context of job creation and destruction. It must be noted that these measures refer to the number of relationships, irrespective of associated expenditures. Thus, strictly speaking, the destruction may consider relationships that were interrupted by the pandemic, but may be resumed on a future date.

said relationships are the lowest ever in the history of measured digital billing (first quarter 2018) and the levels of gross destruction are the highest (figure IV.11). In the second quarter of 2020, roughly 40% of these relationships with suppliers was destroyed and discounting creation, net destruction is close to 30%. A partial reversal is observed in the third quarter, consistent with the gradual opening of the economy.

Figure IV.11

Creation and destruction of relations with suppliers (1) (2) (3)
(percentage points)



(1) The figure shows quarterly gross creation and destruction, and net creation of productive relationships with suppliers. (2) Companies belonging to the National Accounts directory, excluding those linked to Electricity, gas, and water and Public administration. (3) The vertical dashed line marks the onset of the pandemic.

Source: Central Bank of Chile.

Some background information suggests that in the manufacturing sectors, the net creation of supplier relationships could be negatively correlated with inflation[3]/. The importance of this mechanism for medium-term inflation will depend on how fast the firms manage to rebuild their relationships with suppliers and/or create new comparable ones, a phenomenon that is quite new in the academic literature[4]/.

Conclusion

The high inflation numbers of September and October were concentrated in the goods and services most affected by the demand shock associated with the withdrawal of pension savings and, in the case of goods, inventory depletion in some specific sectors. Likewise, a disruption of productive relations between firms has been observed that may be causing supply disruptions that translate into inflationary pressures. By its very nature, the demand shock will not be permanent —although its impact would extend for a few more months, due to the second pension withdrawal— so the inflationary pressure from this factor should ease as inventories are restored.

[3]/ The lack of relationship in services may be due to a significant number of these components being imputed in the CPI by the INE, given the difficulty of on-site measuring in the context of the pandemic.

[4]/ This notion has been extensively studies in the macro literature on the labor market (e.g., Birinci *et al.*, 2020, Giupponi and Landais, 2018) but less is known on matter in the intermediate input market (some exceptions are Huneeus 2018 and Lim 2019).