# Consumption expenditure during the COVID-19 pandemic: an analysis based on Portuguese card transaction data

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**Abstract**
The objective of this article is to assess developments in private consumption in Portugal during the first year of the COVID-19 pandemic, using detailed information on domestic card payments. Similarly to the literature for other countries, we find evidence of asymmetrical impacts across types of goods and services purchased, consumption groups and regions. These appear to reflect differences in the impact of containment measures, agents' mobility and change in consumption habits. A statistically significant although small role can be attributed to the incidence of the virus itself. (JEL: D12, E21)

## 1. Introduction

The COVID-19 pandemic implied significant and abrupt changes in private consumption in Portugal. This exogenous shock impacted the economy from March 2020 onwards and was felt through several channels, including the impossibility of consuming goods and services, as a result of direct restrictions to activity in trade and services sectors, and the effects via lack of confidence. From the end of the second quarter of 2020 until October, there was a recovery in private consumption. A new wave of the virus prompted new restrictions in the last months of 2020 and especially in the beginning of 2021, with additional negative impacts on consumption.

This article examines developments in private consumption during the first year of the pandemic, using information on purchases made with Portuguese payment cards until February 2021, with a breakdown by type of goods and services consumed, consumption groups and municipalities. Card transaction data allow for an almost real-time monitoring of consumption expenditures. Given the relevance of timely and

reliable information on the current state of the economy, this type of data has been used previously in Banco de Portugal for economic analysis and nowcasting (e.g., Rodrigues and Esteves 2010, Esteves 2011, Duarte *et al.* 2017, Lourenço and Rua 2021).

Our main results are in line with the evidence observed in other countries. We find marked differences in expenditure developments across types of goods and services consumed, across consumption groups and across regions. The services sector, the high consumption group and the Lisbon region were the most affected by the shock. The more pronounced impact in the latter two reflects to some extent a structure effect associated with the higher share of services' consumption in this group/region, but was reinforced by behavioural responses. Regression results corroborate these findings and also those on the differential impacts over time, in particular the effects of the two waves of the virus. There was an abrupt fall in the value of payments during the first lockdown, which was followed by a period of slow recovery where impacts became less negative. By the end of the year, spending decreased again. While the impact of the second lockdown seems to have been less marked compared to the first one, those differences are not statistically significant.

The article is organised as follows. Section 2 discusses some of the related literature that frames this study. Section 3 describes our database. The detailed analysis of the evolution of Portuguese card payments across different sectors, consumption groups and regions is reported in Section 4. Section 5 complements the previous section by estimating some multivariate regressions. Section 6 concludes.

## 2. Related literature

Since the outbreak of the pandemic, a recent and growing literature has resorted to high-level transaction data to examine the evolution of consumption expenditures in different countries. Several papers analysed consumer spending during the COVID-19 pandemic in the United States using this type of data (e.g., Bachas *et al.* 2020, Baker *et al.* 2020, Chetty *et al.* 2020 and Dunn *et al.* 2020). Other papers used data on electronic payments to study consumer spending in China (Chen *et al.* 2020), Denmark (Andersen *et al.* 2020), France (Bounie *et al.* 2020), the Netherlands (Golec *et al.* 2020), Spain (Carvalho *et al.* 2020), Switzerland (Kraenzlin *et al.* 2020), the United Kingdom (Hacioglu-Hoke *et al.* 2021 and Davenport *et al.* 2020), among others.

Overall, there is a striking similarity in the responses of consumer spending across countries in the initial months of the pandemic. There is a common finding of a large reallocation of expenditure across categories of goods and services. Spending on essential goods increased during the outbreak of the pandemic. In contrast, expenditure on services that require physical interactions declined sharply. This great heterogeneity in the severity of the shock by sector of activity is unprecedented when compared with previous recessions. The subsequent recovery was also not uniform by sector (Bounie *et al.* 2020, Hacioglu-Hoke *et al.* 2021 and Davenport *et al.* 2020). In most countries, there were also regional differences in the responses of consumer spending, particularly

during the outbreak period (e.g., Carvalho *et al.* 2020, Golec *et al.* 2020 and Kraenzlin *et al.* 2020).

The evidence that reductions in expenditures during the pandemic were greater among higher-income consumers is common to various studies (e.g., Chetty *et al.* 2020, Hacioglu-Hoke *et al.* 2021, Bounie *et al.* 2020). As discussed by Bachas *et al.* (2020) for the US and Crawford *et al.* (2020) for the UK, a possible explanation for the finding of a larger spending decline among higher-income individuals is that their basket features a larger share of non-essential goods and services, whose consumption is typically either easier to postpone or whose provision has been disrupted the most. An additional reasoning is provided by Chetty *et al.* (2020) that find that higher-income households apparently self-isolate more, perhaps by working remotely or because they have larger living spaces.

As far as we know, there are at least three studies that use detailed transaction data and a differential approach to examine how private consumption in Portugal was affected by the COVID-19 pandemic. Eichenbaum *et al.* (2020) use a detailed database of consumption expenditures from the Portuguese tax authorities until May 2020 and find that older consumers reduced spending more than younger ones.

Our article is mostly related to Carvalho *et al.* (2020a,b), who also use data on electronic payments from SIBS to model the impact of the pandemic on consumer spending in Portugal. Carvalho *et al.* (2020a) find a massive causal effect of the pandemic in March and April 2020, showing that the sign and magnitude of the impact varies considerably across sectors. Carvalho *et al.* (2020b) complement and update the previous study until August 2020, concluding that the impact is less severe after May, but year-on-year rates of changes in August are still below pre-pandemic levels. They also show that the crisis is concentrated on more central and urban municipalities.

Our main contribution is to use a database with a greater sectoral detail and with an additional dimension, by consumption group, which can be interpreted as a proxy for a distribution of consumption expenditure. In addition, our data extends up to February 2021, allowing the analysis of the recovery phase of consumption and the new decline in the end of 2020 and beginning of 2021.

## 3. Database

The database used in this article was provided by SIBS Forward Payment Solutions, the main payment cards processor in Portugal, and covers all purchases made through the physical *Multibanco* terminal network (point of sale (POS) terminals and ATMs) with cards issued in Portugal. In the SIBS original data, the unit of observation is an anonymised debit or credit card and, hence, an individual can be overrepresented if he/she has multiple cards. In 2019, this network accounted for 85% of the retail payment transactions processed in the national system, so these data cover the overwhelming majority of payments carried out with Portuguese cards. The selection of transactions with only Portuguese cards is the one that best approximates the national accounts' private consumption concept.

The dataset only includes operations that involve physical terminals. Therefore, it excludes homebanking operations and online purchases, except those for which the order is submitted online but actual payment is made in an ATM. The database also excludes cash withdrawals. These are necessary limitations in order to allow for the identification of both the regional location of the operation and the sector of activity of the seller. Cash withdrawals and online trade evolved in opposite directions during the pandemic, with the former falling and the second rising in importance. This type of substitution between payment methods may have been asymmetric across sectors, consumption groups or even municipalities, constituting a potential limitation of the analysis.

The database made available to us groups together individual card transactions into monthly observations by sellers' sector of activity, according to the Portuguese industrial classification Rev 3 (*Classificação Portuguesa das Actividades Económicas*, Portuguese acronym: CAE); by municipality (total of 308 municipalities); and by quartile of average card expenditure. Hence, an observation in this article refers to a sector-municipality-group of consumption-month-year information. The municipalities correspond to the place of highest usage of the card over the previous 12 months.

The analysis looks at three consumption groups, based on quartiles of cards ordered by their average expenditure at national level over the previous 12 months: Group A – high consumption, given by the fourth quartile; Group B – medium-high consumption, given by the third quartile, and Group CD – medium/low consumption, aggregating the 50% of cards with the lowest consumption. The average monthly spending per card in 2019 corresponds to 726, 292 and 148 euros, respectively, for groups A, B and CD. As expected, the large majority of spending belongs to groups A and B (67.7% and 20.7% in 2019 respectively) with a much smaller amount accounted for by group CD (11.5% in 2019).

Part of the card transactions included in the database relates to business-to-business activity and not to private consumption expenditure. In order to minimise this issue, only payments associated with retail trade and services activities were considered in our sample. These sectors represented around 90% of all card payments in 2019. Moreover, the analysis of card expenditure is carried in nominal terms, not considering any adjustment for price developments.

Despite potential caveats of the database, the evolution of card payments is very much in line with private consumption: the correlation between the year-on-year rates of change of a longer series of the values of cards' transactions and the national accounts' series of residents' consumption is around 80% in the period 2002-19. The close relationship occurs despite card expenditure accounting for only 38% of the value of private consumption. Hence, card payments appear to capture particularly well the most cyclical portion of consumption. The data also mirror well the structure and distribution of consumption expenditures. Results from the Household Expenditure Survey (*Inquérito às Despesas das Famílias* Portuguese acronym: IDEF), provide detailed information on households expenditure and income used in private consumption weights in national accounts (see, for example, Alves *et al.* (2020)). The structure of the sample used in this article is broadly similar to the one in IDEF, across types of goods

and services consumed and the shares of consumer expenditure and monetary income corresponding to the groups considered (A, B and CD).

Finally, in the regressions of Section 5, we use the monthly average of new COVID-19 cases in each municipality, computed from the data of the dashboard of COVID-19 of the Public Health Authority (*Direcção-Geral da Saúde*, Portuguese acronym: DGS) compiled by `https://github.com/dssg-pt/covid19pt-data`.

## 4. The evolution of Portuguese card payments during the pandemic

For the purpose of structuring the analysis, we divide the period under review into 5 phases, taking into account the main containment measures in place in each time period. Phase 1 corresponds to the pre-pandemic period of 2020, January and February, as the first confirmed COVID-19 case in Portugal was reported on March 2, 2020. Phase 2 covers the first mandatory lockdown in March and April 2020. During the state of emergency (19 March to 2 May 2020), the mobility of citizens was severely restricted and teleworking was mandatory whenever possible. Retail trade and service establishments were closed, with the exception of those associated with basic needs. Phase 3, from May to October of 2020, corresponds to a gradual de-confinement period. Throughout May and June, a phased lifting of the restrictions took place, although some measures were never fully lifted. The Metropolitan Area of Lisboa (A.M. Lisboa) kept restrictions for longer due to a more unfavourable epidemiological evolution. Phase 4 applies to November and December 2020 and corresponds to a period of increasing tightness of restrictions, given the progressive rise in the number of cases. In early November, a new state of emergency was declared, and measures became regionally segmented: for high risk municipalities (amounting to about 70% of population at the time), partial lockdowns were imposed and teleworking became again mandatory. Finally, phase 5, January and February 2021, is characterised by a second mandatory lockdown, similar in stringency to the lockdown of early 2020 (phase 2).

The decline in private consumption during the pandemic crisis was much larger than suggested by its usual determinants, in particular disposable income. Nominal private consumption declined by 6.4% in 2020, while disposable income decreased by 0.7%, which translated into a significant increase in the household savings rate (to 12.8%, a maximum since 2002). The abrupt developments in private consumption during this period point to the relevance of explanatory factors directly associated with the pandemic, such as fear of contagion and the consequent search for social distancing, as well as restrictions on personal mobility and on various economic activities.

The total value of payments with domestic cards fell by 13.3% year-on-year in March and 33.4% in April (Figure 1; detailed monthly tables are included in Appendix A). Over the following months, there was a gradual recovery, from a negative rate of change of 19.2% in May to slightly positive ones in August-September 2020 (all rates of change in this article refer to the same period of the previous year). Subsequently, the worsening of the pandemic and consequent containment measures led to a new declining profile. The second lockdown had a somewhat weaker impact on card payments compared to

the first one, with a 18.7% decline in January-February 2021. There is evidence that firms and consumers have adapted, creating or reinforcing alternative channels of distribution like direct home delivery. The number of transactions showed a similar behaviour to payment values but with stronger declines during periods with more restrictions (30.2% and 25.1%, respectively, in the first and second lockdowns), reflecting a lower shopping frequency and an increase of the average amount of each purchase.
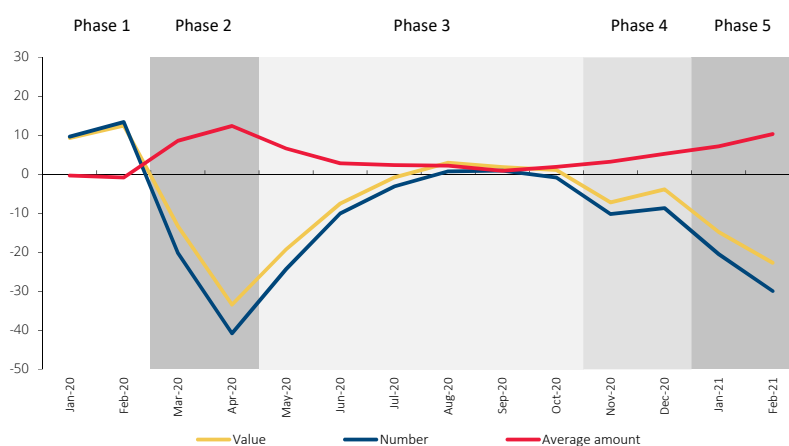


FIGURE 1: Payments with Portuguese cards - Total value, number and average amount | Year-on-year rate of change, in percentage

Notes: The shaded areas correspond to different phases, with darker shading corresponding to periods of stricter containment measures. Phase 1: January-February 2020; Phase 2: March-April 2020; Phase 3: May-October 2020; Phase 4: November-December 2020; Phase 5: January-February 2021.

The pandemic implied also a significant change in the consumption basket. Across broad expenditure categories, expenditure on durable goods and services declined quite strongly in phase 2, while card spending on non-durable goods remained broadly stable (Table 1). The recovery in phase 3 was incomplete for services, while expenditure on goods stood above levels recorded a year earlier. In phase 5, there was a broad-based decline, but of a smaller scale than in the first lockdown in the case of durable goods and services. Card spending on non-durable goods declined during this phase, which had not happened in phase 2. However, this sector showed greater resilience over the period under analysis, which was largely driven by developments in food expenditure. Food purchases increased substantially during the first lockdown, especially in smaller-sized establishments, which are likely to have benefited from the advantages of proximity (Figure 2). Aside from the substitution of restaurant trips for home-cooked meals, the increased spending on food in the first lockdown is likely to have been inflated by hoarding behaviour. Consumption of products from pharmacies and parapharmacies also increased sharply during the first lockdown, likely reflecting new demand for disinfectants and personal protection equipment.

As regards durable goods, the expenditure recovery during phase 3 was favoured by the need to adapt to new routines, like teleworking, remote schooling and indoor entertainment. These needs boosted expenditure in office and information

| | Weight | Year-on-year rate of change | | | | |
|---|---|---|---|---|---|---|
| | 2019 | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 |
| Total | 100 | 10.9 | -23.3 | -3.6 | -5.4 | -18.7 |
| *By type of good/service* | | | | | | |
| Durable goods | 15.4 | 5.9 | -37.2 | 1.4 | 1.5 | -16.0 |
| Non-durable goods | 43.2 | 13.2 | 0.7 | 7.8 | 0.5 | -4.3 |
| Services | 41.3 | 10.2 | -45.3 | -16.4 | -15.7 | -34.6 |
| *By consumption group* | | | | | | |
| Group A – high consumption | 67.7 | 11.1 | -25.0 | -6.4 | -5.9 | -19.9 |
| Group B – medium-high consumption | 20.7 | 9.7 | -21.6 | 0.3 | -4.4 | -17.4 |
| Group CD – medium/low consumption | 11.5 | 11.7 | -16.8 | 6.4 | -4.5 | -14.1 |
| *By NUTS II region* | | | | | | |
| Alentejo | 5.5 | 10.9 | -13.8 | 5.9 | 3.2 | -7.9 |
| Algarve | 5.1 | 10.9 | -20.8 | -2.9 | -2.7 | -16.8 |
| R.A. Açores | 2.1 | 11.5 | -20.2 | -1.1 | 1.2 | -3.5 |
| Centro | 24.3 | 11.6 | -19.5 | 1.2 | -0.3 | -13.5 |
| A.M. Lisboa | 32.2 | 9.7 | -29.6 | -11.2 | -12.2 | -28.4 |
| R.A. Madeira | 1.9 | 11.7 | -20.3 | -0.9 | 0.6 | -8.2 |
| Norte | 29.0 | 11.4 | -22.0 | -1.2 | -5.2 | -16.4 |

TABLE 1. Value of payments with Portuguese cards | Year-on-year rate of change, in percentage

Notes: Durable goods include expenditure on information and communication technology (ICT) equipment, office machinery and equipment, optical and photographic equipment, decor and home equipment, building materials and DIY supplies, household appliances, sports, recreation and leisure supplies, games and toys, books and records, vehicles and accessories. Non-durable goods include expenditure on food (e.g. super and hypermarkets, grocery stores, butchers, fish shops, among others), clothing and footwear, perfume and cosmetics, pharmacies and parapharmacies, and petrol stations. The expenditure in super and hypermarkets is included in the food component. NUTS II refers to the second level of the Nomenclature of Territorial Units for Statistics, 2013. Phase 1: January-February 2020; Phase 2: March-April 2020; Phase 3: May-October 2020; Phase 4: November-December 2020; Phase 5: January-February 2021.

and communication equipments and in sports and recreation goods, in addition to building materials and DIY (Figure 2). Spending in vehicles is likely to have benefited from an increased preference for individual means transportation, in detriment of public transport services that had persistent and significant negative rates. This is also corroborated by the recovery in fuel consumption. Services took the largest toll from the pandemic, given that some were practically closed during lockdowns. In-person services consumption, such as hotels, restaurants, and leisure, culture and sports, showed substantial decreases. While the first two sectors recovered strongly during phase 3, containment measures and fear of contagion continued to impair the latter. Phase 4 was characterized by a slightly higher reduction in total payments than phase 3, reflecting developments in non-durable goods (supermarkets). Expenditures related to hotels and restaurants also recorded strong declines in their rates of change between phases 3 and 4. During the second lockdown, the majority of sectors showed negative rates in the amount of payments, but declines were less marked than in the first one. The most notable difference concerns health services, where payments decreased almost 60% in March-April 2020 while barely falling in January-February 2021.

Spending behaviour during the first year of the pandemic varied by consumption group. Results show that the lowest consumption group (group CD) was the one that reduced spending the least during lockdowns and whose expenditure recovered the
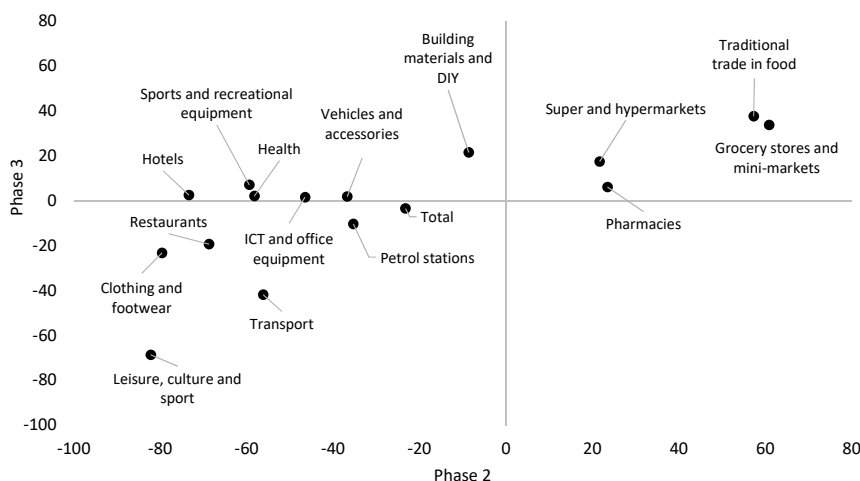
FIGURE 2: Value of payments with Portuguese cards by type of good/service in phases 2 and 3 | Year-on-year rate of change, in percentage

Note: Phase 2: March-April 2020; Phase 3: May-October 2020.

most in phase 3 (Table 1). Contrastingly, and in line with findings for other countries, the largest negative impact was seen in the amounts spent by the highest consumption group (group A). This group maintained negative or virtually nil rates of change in consumption during the period under analysis. Differences in monthly rates of change of payments across groups were stronger in April 2020 and in much of phase 3 and more muted during the second lockdown. The impact of the second lockdown was less marked than the first for all consumption groups.

A shift-share analysis was performed for the three consumption groups by type of good/service consumed, broken down in 23 categories. This type of analysis decomposes the difference in the rate of change of total expenditure of a consumption group relative to the national average (Total Effect) into two terms: (i) the Structure Effect, which captures the influence of differences in the structure of consumption of the group vis-à-vis the overall economy; (ii) the Behavioural Effect, which assesses, for each type of good/service consumed, how different are the rates of change of the consumption group from the national average. The behavioural effect aims to capture the reaction to government-imposed restrictions and to the pandemic risks. The description of the methodology and the detailed results are included in Appendix B.

The structure effect explains about half of the difference in the rates of change of groups A and CD vis-à-vis the overall economy average, while for group B this share amounts to about one-third (Figure 3). The high consumption group has a higher share of services and durable goods in its consumption basket (Table A.2). Given that services decreased the most over the period under analysis, this has a stronger impact on total spending of the high consumption group. A symmetrical reasoning can be derived from expenditure on food items, which weighs more on the low-consumption basket than in other groups. In fact, the strongest contribution to the positive structure effect of group CD comes from non-durable goods, most notably from supermarkets.
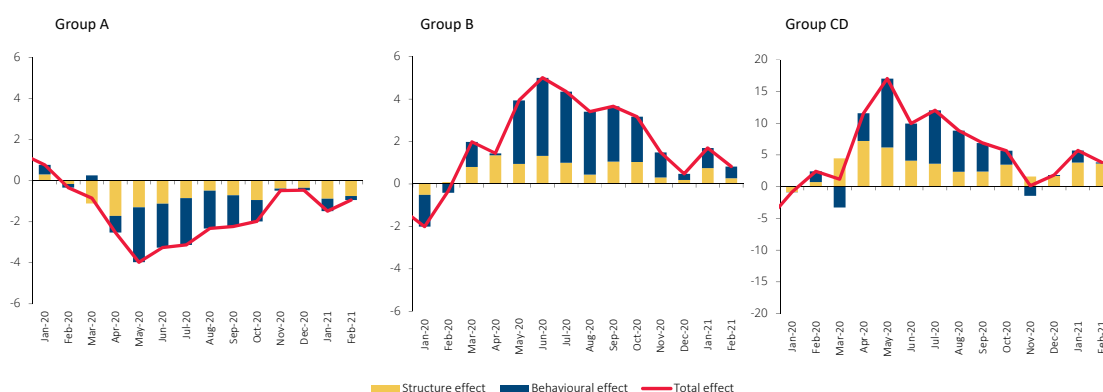
FIGURE 3: Value of payments with Portuguese cards by consumption group - Shift-share analysis | In percentage points

Notes: The total effect corresponds to the difference between the rate of change of total expenditure of a consumption group and the national average and is decomposed into the structure and behavioural effects. The description of the methodology used and the detailed results are included in Appendix B.

During most of the period under analysis, the behavioural effect reinforces the structure effect. However, comparing April 2020 and February 2021, the months more affected by lockdowns, the behavioural effect is smaller in February both in absolute terms and in comparison to the structure effect for consumption groups A and CD.

Over the whole period, a positive behavioural effect stands out in the case of group CD and is likely related to a lower incidence of remote work in this group, along with a change in consumption habits. Fuel consumption contributed consistently to the positive behavioural effect in group CD, signalling higher mobility for this group. According to Statistics Portugal, the proportion of workers in teleworking was lower in some sectors that tend to pay below-average wages.[1] Durable goods also contributed to the positive behavioural effect of group CD, especially from April to August. This stems from expenditure carried out by this group to adjust to the pandemic, with a stronger reliance on personal transport and a more housebound way of living. Employment and income protection policies are likely to have played a key role in supporting spending for this group.

The behavioural effect for group A is broadly negative across spending categories and time. This points to a common driver in behaviour. In fact, there is evidence in the literature that higher income individuals tend to self-isolate more, which besides higher fear of contagion, may also reflect more remote working (Chetty *et al.* 2020 and Eichenbaum *et al.* 2020).

There are also regional differences in card spending patterns. A.M. Lisboa stands out as the region with systematically below average rates of change, while Alentejo is consistently above the national average (Table 1). One factor contributing to these differences is the structure of regional consumption by sector, with a higher than average

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1.  `https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=493705905&DESTAQUESmodo=2&xlang=pt.`

weight of services in A. M. Lisboa and of non-durable consumption in Alentejo. During the second lockdown, all regions showed smaller declines than during the first one, with Madeira and Açores faring much better in phase 5 than in phase 2, due to a more favourable pandemic situation and less stringent restrictions. On the contrary, the decline in A. M. Lisboa was the closest to the first lockdown.

## 5. Regression analysis

The descriptive analysis of the previous section is strongly suggestive of the key results emerging from the data. In this section, we further explore and quantify the impact of the pandemic on cards' payments in a multivariate framework. However, no causal inference can be withdrawn from the regression results.

We estimate the following equation at municipality-sector-consumption group level with monthly data from January 2019 to February 2021:

$$Y_{isct} = \beta_0 + \beta_1 y\text{20-21} + \sum_{j=2}^{5} \beta_j phase_j + \beta_6 covid_{it} + \beta_7 covid_{it}^2 + \gamma_i + \gamma_s + \gamma_c + \varepsilon_{isct}, \quad (1)$$

where $Y_{isct}$ is the monthly year-on-year rate of change of the outcome variable defined for municipality $i$, sector $s$ and consumption group $c$, in each monthly period $t$ from January 2019 to February 2021. The outcome variable may either be the total amount of money spent or the number of card payments. $y\text{20-21}$ is a dummy variable taking the value 1 for the years of 2020 and 2021. $phase_j$, with $j = \{2, 3, 4, 5\}$, are the four phase dummies to be estimated, with $phase_1$ defined as the base level. Given the inclusion of the $y\text{20-21}$ dummy, the estimated parameters for the phase dummies are interpreted as differences in percentage points in relation to the average year-on-year rate of change of $phase_1$. $covid_{it}$ is a vector that includes the monthly average number of new confirmed cases per municipality $i$ and $covid_{it}^2$ is its quadratic term, which was included to capture possible non-linear relations. $\gamma_i$ are municipality fixed effects (308 municipalities), $\gamma_s$ are sector fixed effects (23 sectors) and $\gamma_c$ are consumption group fixed effects (3 groups). $\varepsilon_{isct}$ is the error term. Robust standard errors are clustered at the NUTS III and period $t$ (pair month-year) level.[2] Overall, standard errors are adjusted for 51 clusters (25 NUTS III and 26 monthly periods). As an outlier treatment, we winsorised the top and bottom 1 percentiles of the dependent variables. Given the differences in terms of dimension of the various municipalities, sectors and consumption groups, all regressions are weighted according to the respective value of the outcome variable in the same month of 2019.

Columns (1) to (4) of Table 2 include the regression estimates using as dependent variable the monthly rate of change for the total amount of money spent. Starting with the total sample, there is a negative impact in every phase considered, but

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2. NUTS III refers to the third-level of the Nomenclature of Territorial Units for Statistics, 2013. In Portugal, there are 25 NUTS III regions.

the effect peaks during lockdowns. All else constant, phase 2 (March-April 2020) is associated with a decrease in average rate of change of 33.9 pp when compared with phase 1. In the second lockdown (phase 5), there was a decline of 26.8 pp vis-à-vis the pre-pandemic period of 2020. However, the differences between lockdowns are not statistically significant. In contrast, there is evidence of statistically significant differentiated impacts when we compare lockdowns with non-lockdown periods.

| | Value of transactions | | | | Number of transactions | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Group A | Group B | Group CD | Total | Group A | Group B | Group CD |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| phase 2 | -33.860*** | -35.969*** | -30.717*** | -27.788*** | -41.132*** | -41.130*** | -39.639*** | -43.168*** |
| | (6.837) | (7.282) | (7.232) | (4.266) | (7.084) | (6.943) | (7.427) | (7.146) |
| phase 3 | -13.880*** | -17.021*** | -8.601** | -4.555 | -16.935*** | -17.791*** | -13.732*** | -18.439*** |
| | (3.614) | (3.581) | (3.854) | (4.346) | (4.229) | (3.688) | (4.686) | (5.914) |
| phase 4 | -13.497*** | -15.067*** | -10.227*** | -10.751*** | -16.067*** | -16.462*** | -13.607*** | -17.996*** |
| | (2.048) | (1.786) | (2.710) | (3.663) | (2.343) | (1.803) | (2.901) | (4.117) |
| phase 5 | -26.786*** | -29.037*** | -23.190*** | -20.712*** | -31.754*** | -32.054*** | -29.660*** | -33.462*** |
| | (4.424) | (3.892) | (5.350) | (6.142) | (5.460) | (4.676) | (5.964) | (7.485) |
| $covid$ | -0.005*** | -0.004** | -0.007*** | -0.008*** | -0.007*** | -0.005*** | -0.009*** | -0.013*** |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) | (0.002) | (0.002) | (0.004) |
| $covid^2$ | 0.000** | 0.000* | 0.000*** | 0.000** | 0.000** | 0.000** | 0.000*** | 0.000** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| N | 548 264 | 183 885 | 183 118 | 181 261 | 548 268 | 183 885 | 183 120 | 181 263 |
| Adj. $R^2$ | 0.293 | 0.322 | 0.287 | 0.232 | 0.450 | 0.480 | 0.435 | 0.417 |

TABLE 2. Change in the value and number of card transactions, total, January 2019 - February 2021

Notes: Results of weighted least squares regression of Equation (1) using the levels of the outcome variable in the same months of 2019 as weights. The reported number of observations refers to the unweighted count. All regressions include a constant and the vectors of municipality, sector and consumption group fixed-effects, when applicable. See the main text for more details. Standard errors in parenthesis are clustered at the regional and month-year level and are robust to heteroscedasticity. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

Despite having a small magnitude, there is also statistical evidence that the monthly number of new COVID-19 cases in each municipality is negatively associated with the dependent variable. We also found evidence of a positive quadratic effect, albeit very small, which indicates that this relation becomes a bit less negative as the number of cases increases. This supports the idea that people tend to change less their consumption behaviour as they get used to living in a high incidence environment, becoming less sensitive to the fear of contagion. Another possibility is that the major adjustments in behaviour took place when the number of cases was still moderate, leaving less room for further changes as cases increase.

Looking at the individual regressions, the fact that phase 2 always displays the highest negative estimate is common to all consumption groups. Next, coefficients associated with phase 3 are smaller, which indicates a gradual but incomplete return to "normal life" after the first lockdown period. Afterwards, the tightening of restrictions in phase 4 and the new lockdown in early 2021 (phase 5) translate again into more negative parameters. All phase dummies are negative and statistically significant, except

the one of phase 3 for the low consumption group. The high consumption group reduced the value of card payments the most in all phases. Lastly, COVID-19 variables are statistically significant in all groups.

Comparing the estimates of the regressions in value and in number of Table 2, all coefficients are more negative in columns (5) to (8), pointing to a more negative impact of the pandemic in the number of payments than on their monthly value. Once again, lockdown periods show the most abrupt falls. The rate of change of the number of card transactions during phase 2 reduced by 41.1 pp vis-à-vis phase 1. The decline in the number of card payments in all phases is common to the three consumption groups. Again, the COVID-19 variables are statistically significant in all cases.

Given that some sectors had distinct behaviours during the pandemic, specific regressions were estimated for some of them. The two cases that we further explore are the food sector – which includes super and hypermarkets, grocery stores and mini-markets, and traditional trade in food – and the sector of petrol stations.

The food sector is interesting since it allows us to quasi-directly infer about people's fear, given that these stores were open even during lockdowns. Goods sold in these establishments are mostly essential ones and given that there are online alternatives to physical shopping, people could opt whether to go outside and get exposed to the virus or not. Coefficients of the phase dummies for the value spent are mostly positive meaning that people tended to spend more money on food, when compared to the pre-pandemic period (Table 3, columns (1) to (4)). Nonetheless and broadly speaking, the estimates were mostly only statistically significant in phase 2, with the exception of the low consumption group whose coefficient for this phase is not significant. In contrast, there is strong statistical evidence of a decline in the number of visits to food stores (Table 3, columns (5) to (8)). The combination of these two factors in phase 2 - the increase in the amount of money paid and the decrease in the number of payments - signals that individuals optimised their visits to these stores, by increasing the average amount of each purchase. This may have reflected the desire to reduce exposure to the virus but also some hoarding phenomena in these goods.

The sector of petrol stations is also an interesting case to study because it allows some inference about people's mobility. Table 4 shows that almost all phases have associated negative and significant impacts for all consumption groups. In terms of value of transactions, estimates for the various groups are very similar in phase 2, which is a plausible result because during the first lockdown people stood mostly at home. Looking at the evolution of all coefficients of the phase dummies, it can be inferred that, in phases 3 and 4, there was some increase in mobility since the impact on the rates of change became less negative. Overall, spending of the low consumption group on petrol stations was the least affected: the coefficients of phase 3 in terms of value and of phases 3 and 4 in terms of number are not statistical significant. Hence, it seems that the low consumption group was the one that displayed higher rates of mobility, which is consistent with less remote work possibilities for this group.

| | Value of transactions | | | | Number of transactions | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Group A | Group B | Group CD | Total | Group A | Group B | Group CD |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| phase 2 | 9.625*** | 9.780*** | 14.254*** | 3.124 | -21.708*** | -20.362*** | -18.776*** | -28.508*** |
| | (2.614) | (3.194) | (3.247) | (4.857) | (4.834) | (4.922) | (5.196) | (4.455) |
| phase 3 | 3.351 | 1.071 | 10.260*** | 2.133 | -10.179*** | -10.122*** | -5.287 | -16.047*** |
| | (3.225) | (2.620) | (3.554) | (5.157) | (2.860) | (2.048) | (3.387) | (4.542) |
| phase 4 | -1.550 | -1.978 | 4.168 | -7.715* | -10.424*** | -9.676*** | -5.998* | -17.755*** |
| | (3.266) | (2.815) | (4.071) | (4.460) | (2.458) | (1.927) | (3.114) | (3.608) |
| phase 5 | 2.903 | 2.408 | 8.991* | -3.578 | -13.648*** | -12.561*** | -9.421** | -21.484*** |
| | (4.717) | (4.086) | (4.936) | (6.797) | (3.708) | (2.793) | (4.016) | (5.817) |
| $covid$ | -0.009*** | -0.008*** | -0.010*** | -0.009*** | -0.009*** | -0.006*** | -0.010*** | -0.012*** |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) | (0.002) | (0.002) | (0.004) |
| $covid^2$ | 0.000*** | 0.000*** | 0.000*** | 0.000** | 0.000*** | 0.000*** | 0.000*** | 0.000** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| N | 71 819 | 24 011 | 23 969 | 23 839 | 71 819 | 24 011 | 23 969 | 23 839 |
| Adj. $R^2$ | 0.198 | 0.162 | 0.324 | 0.284 | 0.233 | 0.230 | 0.194 | 0.308 |

TABLE 3. Change in the value and number of card transactions, food sector, January 2019 - February 2021

Notes: Results of weighted least squares regression of Equation (1) using the levels of the outcome variable in the same months of 2019 as weights. The reported number of observations refers to the unweighted count. All regressions include a constant and the vectors of municipality, sector and consumption group fixed-effects, when applicable. See the main text for more details. Standard errors in parenthesis are clustered at the regional and month-year level and are robust to heteroscedasticity. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

| | Value of transactions | | | | Number of transactions | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Group A | Group B | Group CD | Total | Group A | Group B | Group CD |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| phase 2 | -44.622*** | -44.601*** | -45.324*** | -42.985*** | -38.836*** | -41.308*** | -36.120*** | -31.398*** |
| | (9.898) | (10.018) | (9.855) | (9.595) | (5.895) | (6.225) | (5.600) | (5.333) |
| phase 3 | -19.547*** | -21.799*** | -17.790*** | -3.770 | -12.354*** | -16.646*** | -9.313** | 6.112 |
| | (3.793) | (3.908) | (3.976) | (4.915) | (3.276) | (3.181) | (3.543) | (4.832) |
| phase 4 | -23.146*** | -24.900*** | -21.528*** | -11.869*** | -15.646*** | -19.086*** | -13.196*** | -1.644 |
| | (2.194) | (2.655) | (1.512) | (3.135) | (0.900) | (0.981) | (0.795) | (3.013) |
| phase 5 | -32.028*** | -34.003*** | -29.861*** | -21.129*** | -27.014*** | -30.616*** | -24.428*** | -13.240*** |
| | (2.641) | (2.838) | (3.150) | (4.336) | (2.777) | (2.553) | (3.023) | (4.479) |
| $covid$ | 0.002 | 0.003 | -0.002 | -0.005*** | -0.004** | -0.003* | -0.004*** | -0.008*** |
| | (0.003) | (0.004) | (0.002) | (0.002) | (0.001) | (0.001) | (0.001) | (0.002) |
| $covid^2$ | -0.000 | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000* | 0.000** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| N | 24 013 | 8 008 | 8 007 | 7 998 | 24 013 | 8 008 | 8 007 | 7 998 |
| Adj. $R^2$ | 0.326 | 0.328 | 0.355 | 0.211 | 0.384 | 0.425 | 0.355 | 0.190 |

TABLE 4. Change in the value and number of card transactions, petrol stations, January 2019 - February 2021

Notes: Results of weighted least squares regression of Equation (1) using the levels of the outcome variable in the same months of 2019 as weights. The reported number of observations refers to the unweighted count. All regressions include a constant and the vectors of municipality, sector and consumption group fixed-effects, when applicable. See the main text for more details. Standard errors in parenthesis are clustered at the regional and month-year level and are robust to heteroscedasticity. Stars indicate significance levels of 10% (*), 5% (**), and 1%(***).

## 6. Concluding remarks

This article describes the impact of the pandemic on consumption expenditure in Portugal using a detailed database of card purchases until February 2021. The heterogeneity of the response of consumer spending to the shock is important for policy makers, allowing for more targeted policy design. The results of the analysis are in line with and complement the findings of recent empirical literature for other countries and for Portugal.

The shock had very differentiated effects by type of goods and services, reflected in the change in the basket consumed by Portuguese households. The consumption of essential goods increased during the beginning of the pandemic. Durable goods - which by their nature allow their acquisition to be more easily postponed - registered a sharp fall but also a marked recovery between lockdowns. On the other hand, in service sectors that require social interaction and for which intertemporal substitution of consumption is difficult, expenditure fell sharply and the recovery was slow. The impact was also differentiated at a regional level, with Lisboa always showing the lowest rates of change throughout the first year of the pandemic.

By consumption groups, we find that the reduction in expenditure was more pronounced and the subsequent recovery slower for the high consumption group compared to the low consumption group. The analysis suggests that these differences between groups are related to differences in their consumption baskets, in the incidence of remote working and in adjustment needs in life style imposed by the pandemic. The more muted impact for low consumption group suggests that income protection and support measures to the most vulnerable households were effective.

The econometric results confirm the descriptive findings of different impacts of the pandemic on consumption over time and by consumption group. The regional incidence of COVID appears to play a statistically significant although small role in the results, possibly because consumption is more driven by the perception of risk and by actual containment measures, of which confirmed cases are an imperfect proxy.

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# Appendix A: Detailed tables

| | Weight 2019 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 | Jan-21 | Feb-21 | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 100 | 9.3 | 12.5 | -13.3 | -33.4 | -19.2 | -7.5 | -0.8 | 3.0 | 1.9 | 1.1 | -7.2 | -3.8 | -14.8 | -22.7 | 10.9 | -23.3 | -3.6 | -5.4 | -18.7 |
| | | | | | | | | | | | | | | | | | | | | |
| Durable goods | 15.4 | 4.7 | 7.3 | -28.8 | -45.9 | -15.5 | 6.0 | 4.3 | 3.5 | 4.6 | 3.9 | -2.8 | 5.3 | -12.2 | -20.1 | 5.9 | -37.2 | 1.4 | 1.5 | -16.0 |
| Non-durable goods | 43.2 | 10.5 | 16.2 | 8.2 | -6.9 | 1.1 | 4.2 | 10.3 | 9.2 | 11.3 | 10.7 | -0.3 | 1.1 | 0.0 | -8.6 | 13.2 | 0.7 | 7.8 | 0.5 | -4.3 |
| Services | 41.3 | 9.8 | 10.7 | -31.8 | -59.0 | -38.3 | -25.5 | -13.5 | -2.3 | -8.6 | -10.8 | -16.1 | -15.2 | -31.3 | -37.9 | 10.2 | -45.3 | -16.4 | -15.7 | -34.6 |
| | | | | | | | | | | | | | | | | | | | | |
| Food items | 26.5 | 13.2 | 20.2 | 27.5 | 23.3 | 27.5 | 15.5 | 21.2 | 16.4 | 16.1 | 18.6 | 9.2 | 9.8 | 16.2 | 10.7 | 16.7 | 25.4 | 19.2 | 9.5 | 13.4 |
| Super and hypermarkets | 23.8 | 12.8 | 19.8 | 24.0 | 19.2 | 25.1 | 13.3 | 19.4 | 15.5 | 14.0 | 16.7 | 7.0 | 7.2 | 13.6 | 8.7 | 16.2 | 21.6 | 17.3 | 7.1 | 11.1 |
| Grocery stores and mini-markets | 1.1 | 17.9 | 24.0 | 61.7 | 60.0 | 44.6 | 32.2 | 34.6 | 24.4 | 34.1 | 32.9 | 30.0 | 36.3 | 44.9 | 30.4 | 21.0 | 60.8 | 33.7 | 33.6 | 37.5 |
| Traditional trade in food | 1.5 | 16.8 | 24.2 | 56.8 | 57.7 | 51.5 | 36.9 | 38.6 | 24.7 | 37.7 | 37.3 | 28.9 | 27.9 | 35.7 | 26.9 | 20.5 | 57.3 | 37.6 | 28.3 | 31.2 |
| Pharmacies and parapharmacies | 2.8 | 6.3 | 12.4 | 40.6 | 5.7 | -4.5 | 6.0 | 9.1 | 10.3 | 12.4 | 3.4 | 1.8 | -4.9 | -3.4 | -10.8 | 9.2 | 23.5 | 6.0 | -1.6 | -7.0 |
| Health | 2.9 | 11.5 | 9.1 | -37.7 | -79.6 | -36.1 | 11.4 | 7.6 | 11.5 | 17.9 | 4.9 | 10.9 | 6.0 | -4.8 | -1.7 | 10.3 | -58.3 | 2.0 | 8.5 | -3.3 |
| Passenger transport, vehicle rental | 0.7 | -4.3 | 4.3 | -37.9 | -76.5 | -60.9 | -46.0 | -40.1 | -30.4 | -35.6 | -39.4 | -46.7 | -45.1 | -55.0 | -73.3 | -0.2 | -56.2 | -42.0 | -45.9 | -64.2 |
| Petrol stations | 5.8 | 9.5 | 9.0 | -20.6 | -49.8 | -30.3 | -14.8 | -6.8 | -5.8 | -0.2 | -4.2 | -14.2 | -10.4 | -18.1 | -25.2 | 9.3 | -35.4 | -10.4 | -12.2 | -21.6 |
| Hotels and accommodation | 1.1 | 8.4 | 32.8 | -52.4 | -92.6 | -78.4 | -33.8 | 3.8 | 36.5 | 25.4 | 12.4 | -40.9 | -33.3 | -55.9 | -77.8 | 20.2 | -73.4 | 2.4 | -36.7 | -67.6 |
| Restaurants | 9.2 | 4.4 | 11.0 | -56.5 | -81.7 | -61.4 | -32.1 | -10.6 | -1.4 | -3.1 | -6.6 | -33.7 | -28.9 | -55.0 | -70.5 | 7.7 | -68.7 | -19.4 | -31.0 | -62.9 |
| Leisure, culture and sport | 1.9 | 11.3 | 3.1 | -68.1 | -95.5 | -91.0 | -73.5 | -71.3 | -61.0 | -55.8 | -57.9 | -63.6 | -58.6 | -75.2 | -88.0 | 7.2 | -82.2 | -68.8 | -61.0 | -81.4 |
| ICT, office machinery and equipment | 1.6 | 8.3 | 11.0 | -33.6 | -60.3 | -28.3 | 6.3 | 9.0 | 9.9 | 11.5 | -2.4 | -4.9 | -4.4 | -23.8 | -16.3 | 9.6 | -46.5 | 1.5 | -4.7 | -20.1 |
| Electrical appliances and decor | 6.2 | -4.1 | -2.1 | -38.6 | -45.7 | -16.3 | -6.4 | -11.0 | -9.2 | -10.2 | 1.8 | -3.7 | 9.9 | -5.4 | -16.1 | -3.2 | -42.1 | -8.5 | 3.5 | -10.4 |
| Construction materials and DIY | 2.4 | 9.5 | 15.5 | -8.9 | -8.4 | 21.5 | 28.0 | 21.8 | 20.4 | 21.2 | 15.5 | 6.7 | 16.6 | 3.1 | 3.2 | 12.4 | -8.7 | 21.4 | 11.5 | 3.2 |
| Sports and recreational equipment | 1.6 | 7.5 | 12.8 | -43.6 | -75.3 | -27.3 | 12.2 | 16.4 | 11.4 | 10.3 | 13.9 | -3.7 | 4.3 | -25.4 | -60.8 | 10.0 | -59.4 | 7.0 | 1.1 | -42.5 |
| Vehicles and accessories | 3.7 | 12.8 | 12.0 | -20.0 | -54.1 | -29.3 | 8.5 | 11.8 | 8.6 | 13.8 | -1.5 | -6.3 | -6.5 | -20.8 | -26.5 | 12.4 | -36.8 | 1.7 | -6.4 | -23.5 |
| Clothing, footwear, perfume and cosmetics | 5.7 | 3.5 | 8.7 | -63.2 | -95.4 | -71.0 | -27.6 | -15.9 | -7.7 | -4.4 | -9.2 | -31.0 | -21.3 | -53.4 | -89.5 | 5.8 | -79.6 | -23.3 | -25.2 | -69.8 |

TABLE A.1. Value of payments with Portuguese cards by type of good/service | Year-on-year rate of change, in percentage

Notes: Durable goods include expenditure on information and communication technology (ICT) equipment, office machinery and equipment, optical and photographic equipment, decor and home equipment, building materials and DIY supplies, household appliances, sports, recreation and leisure supplies, games and toys, books and records, vehicles and accessories. Non-durable goods include expenditure on food (e.g. super and hypermarkets, grocery stores, butchers, fish shops, among others), clothing and footwear, perfume and cosmetics, pharmacies and parapharmacies, and petrol stations. The expenditure in super and hypermarkets is included in the food component. The database does not allow the distinction by type of goods acquired in these stores. It is possible to acquire another type of goods in these establishments, including some durable ones, but the sale of food products is dominant in this activity. Phase 1: January-February 2020; Phase 2: March-April 2020; Phase 3: May-October 2020; Phase 4: November-December 2020; Phase 5: January-February 2021.

| | Weight 2019 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 | Jan-21 | Feb-21 | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 100 | 9.3 | 12.5 | -13.3 | -33.4 | -19.2 | -7.5 | -0.8 | 3.0 | 1.9 | 1.1 | -7.2 | -3.8 | -14.8 | -22.7 | 10.9 | -23.3 | -3.6 | -5.4 | -18.7 |
| | | | | | | | | | | | | | | | | | | | | |
| Group A - high consumption | 67.7 | 10.1 | 12.2 | -14.1 | -35.9 | -23.2 | -10.7 | -3.9 | 0.7 | -0.4 | -0.9 | -7.7 | -4.3 | -16.2 | -23.6 | 11.1 | -25.0 | -6.4 | -5.9 | -19.9 |
| Group B - medium-high consumption | 20.7 | 7.3 | 12.2 | -11.3 | -32.0 | -15.3 | -2.5 | 3.6 | 6.4 | 5.5 | 4.3 | -5.7 | -3.3 | -13.1 | -21.8 | 9.7 | -21.6 | 0.3 | -4.4 | -17.4 |
| Group CD - medium/low consumption | 11.5 | 8.4 | 14.9 | -12.1 | -21.8 | -2.2 | 2.5 | 11.2 | 11.8 | 8.8 | 6.8 | -7.1 | -2.0 | -9.1 | -18.8 | 11.7 | -16.8 | 6.4 | -4.5 | -14.1 |
| | | | | | | | | | | | | | | | | | | | | |
| *By type of good/service* | | | | | | | | | | | | | | | | | | | | |
| Group A - high consumption | 100 | | | | | | | | | | | | | | | | | | | |
| Durable goods | 15.4 | 4.8 | 7.7 | -27.9 | -46.9 | -18.6 | 3.8 | 2.5 | 1.8 | 4.3 | 3.6 | -2.0 | 5.8 | -13.0 | -21.5 | 6.1 | -37.3 | -0.2 | 2.1 | -17.1 |
| Non-durable goods | 39.9 | 10.9 | 15.3 | 7.8 | -10.1 | -3.2 | 1.6 | 6.5 | 6.3 | 9.0 | 8.1 | -1.0 | 0.1 | -1.7 | -9.9 | 13.0 | -1.2 | 4.7 | -0.4 | -5.7 |
| Services | 44.7 | 11.3 | 11.0 | -30.7 | -57.7 | -39.8 | -27.6 | -14.8 | -3.5 | -9.9 | -11.3 | -15.6 | -14.0 | -30.4 | -35.9 | 11.1 | -44.2 | -17.6 | -14.8 | -33.2 |
| | | | | | | | | | | | | | | | | | | | | |
| Group B - medium-high consumption | 100 | | | | | | | | | | | | | | | | | | | |
| Durable goods | 15.3 | 5.4 | 9.8 | -29.0 | -46.1 | -11.3 | 10.5 | 8.8 | 6.9 | 6.8 | 6.5 | -2.0 | 6.8 | -10.9 | -20.2 | 7.5 | -37.4 | 5.1 | 2.7 | -15.3 |
| Non-durable goods | 48.2 | 8.6 | 15.1 | 10.2 | -6.2 | 3.4 | 8.0 | 14.2 | 12.7 | 14.9 | 13.9 | 1.9 | 2.0 | 1.4 | -6.7 | 11.7 | 2.0 | 11.2 | 1.9 | -2.6 |
| Services | 36.5 | 6.4 | 9.4 | -33.6 | -62.2 | -36.8 | -22.4 | -12.1 | -0.7 | -6.9 | -10.3 | -17.3 | -18.8 | -33.7 | -42.5 | 7.9 | -47.8 | -15.0 | -18.0 | -38.1 |
| | | | | | | | | | | | | | | | | | | | | |
| Group CD - medium/low consumption | 100 | | | | | | | | | | | | | | | | | | | |
| Durable goods | 15.7 | 3.5 | 0.9 | -33.4 | -39.5 | -3.5 | 10.8 | 7.6 | 6.9 | 2.1 | 1.1 | -8.3 | 0.3 | -9.9 | -11.4 | 2.2 | -36.4 | 4.3 | -3.9 | -10.6 |
| Non-durable goods | 53.9 | 11.8 | 21.4 | 6.8 | 5.7 | 16.8 | 9.5 | 21.3 | 16.6 | 15.7 | 16.5 | -0.5 | 4.0 | 5.1 | -6.4 | 16.6 | 6.3 | 16.0 | 1.9 | -0.9 |
| Services | 30.4 | 5.2 | 10.5 | -36.6 | -62.5 | -29.0 | -14.9 | -3.7 | 6.4 | 0.4 | -7.9 | -18.1 | -17.7 | -34.3 | -45.2 | 7.9 | -49.3 | -8.7 | -17.9 | -39.9 |

TABLE A.2. Value of payments with Portuguese cards by consumption group | Year-on-year rate of change, in percentage

Notes: Durable goods include expenditure on information and communication technology (ICT) equipment, office machinery and equipment, optical and photographic equipment, decor and home equipment, building materials and DIY supplies, household appliances, sports, recreation and leisure supplies, games and toys, books and records, vehicles and accessories. Non-durable goods include expenditure on food (e.g. super and hypermarkets, grocery stores, butchers, fish shops, among others), clothing and footwear, perfume and cosmetics, pharmacies and parapharmacies, and petrol stations. The expenditure in super and hypermarkets is included in the food component. The database does not allow the distinction by type of goods acquired in these stores. It is possible to acquire another type of goods in these establishments, including some durable ones, but the sale of food products is dominant in this activity. Phase 1: January-February 2020; Phase 2: March-April 2020; Phase 3: May-October 2020; Phase 4: November-December 2020; Phase 5: January-February 2021.

| | Weight 2019 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 | Jan-21 | Feb-21 | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 100 | 9.3 | 12.5 | -13.3 | -33.4 | -19.2 | -7.5 | -0.8 | 3.0 | 1.9 | 1.1 | -7.2 | -3.8 | -14.8 | -22.7 | 10.9 | -23.3 | -3.6 | -5.4 | -18.7 |
| Alentejo | 5.5 | 9.1 | 12.8 | -6.1 | -21.7 | -8.0 | 2.7 | 8.3 | 11.8 | 10.8 | 9.4 | 1.3 | 4.8 | -5.4 | -10.6 | 10.9 | -13.8 | 5.9 | 3.2 | -7.9 |
| Algarve | 5.1 | 8.9 | 13.0 | -10.3 | -31.3 | -19.5 | -6.6 | -0.2 | 4.3 | 2.4 | 1.4 | -5.3 | -0.1 | -12.8 | -20.9 | 10.9 | -20.8 | -2.9 | -2.7 | -16.8 |
| R.A. Açores | 2.1 | 10.4 | 12.6 | -9.6 | -30.5 | -16.7 | -4.2 | 2.0 | 3.5 | 4.2 | 5.0 | 0.9 | 1.4 | -5.8 | -1.0 | 11.5 | -20.2 | -1.1 | 1.2 | -3.5 |
| Centro | 24.3 | 9.9 | 13.4 | -10.5 | -28.6 | -13.8 | -2.2 | 3.8 | 6.8 | 6.5 | 5.9 | -2.0 | 1.1 | -9.7 | -17.4 | 11.6 | -19.5 | 1.2 | -0.3 | -13.5 |
| A.M. Lisboa | 32.2 | 7.9 | 11.7 | -17.8 | -41.7 | -28.9 | -15.7 | -8.1 | -3.4 | -5.2 | -6.0 | -13.9 | -10.7 | -23.8 | -33.0 | 9.7 | -29.6 | -11.2 | -12.2 | -28.4 |
| R.A. Madeira | 1.9 | 10.6 | 13.0 | -7.9 | -32.6 | -13.9 | -4.0 | 1.7 | 4.0 | 2.7 | 4.7 | 1.5 | -0.1 | -8.8 | -7.6 | 11.7 | -20.3 | -0.9 | 0.6 | -8.2 |
| Norte | 29.0 | 10.3 | 12.5 | -12.9 | -31.1 | -15.7 | -5.1 | 1.5 | 4.7 | 4.0 | 2.8 | -7.4 | -3.4 | -12.1 | -20.8 | 11.4 | -22.0 | -1.2 | -5.2 | -16.4 |

TABLE A.3. Value of payments with Portuguese cards by NUTS II region | Year-on-year rate of change, in percentage

Notes: NUTS II refers to the second level of the Nomenclature of Territorial Units for Statistics, 2013. The region corresponds to the place of greatest use of each card in the previous 12 months. Phase 1: January-February 2020; Phase 2: March-April 2020; Phase 3: May-October 2020; Phase 4: November-December 2020; Phase 5: January-February 2021.

# Appendix B: Shift-share analysis: methodology and detailed results

Shift-share analysis is a decomposition technique widely used in regional studies to quantify an industry/structure effect and a competitive/regional effect on the growth of any variable relative to the national average (see Artige and van Neuss (2014) for a recent discussion). While lacking a theoretical basis, this methodology is useful to identify and describe key features of the data.

In this article, we use this technique to take into account the impact of the consumption baskets on the aggregate results of each consumption group. All shift-share analysis computations were performed at a breakdown level comprising 23 distinct sectors.[3]

According to this formulation, the difference in the year-on-year change of total expenditure of consumption group $c$ relative to the national average in each monthly period $t$, the Total Effect (TE), is defined as:

$$TE_c = g_c - g_T = \sum_s \theta_{sc} g_{sc} - \sum_s \theta_{sT} g_{sT}, \tag{B.1}$$

where $g_c$ and $g_T$ are percentage monthly year-on-year rates of change in period $t$ of total expenditures of group $c$ and of the total economy, respectively; $g_{sc}$ is the percentage monthly year-on-year rate of change of expenditures in sector $s$ by consumption group $c$ in monthly period $t$; $\theta_{sc}$ is the share of sector $s$ in total expenditure of consumption group $c$ in monthly period $t-12$; $g_{sT}$ and $\theta_{sT}$ are the equivalent notions for expenditure at the national level.

If the growth of expenditure of group $c$ is higher (lower) than that of national expenditure, the TE will be positive (negative). This TE can be broken down into two terms: one resulting from the effective difference of growth rates in each individual sector, the Behavioural Effect (BE); and another resulting from the influence of the relative structure of consumption of the group, the Structure Effect (SE).

$$TE_c = BE_c + SE_c \tag{B.2}$$

Behavioural Effect (BE) - It is the difference between the growth rate of expenditure of each group and of national expenditure for each individual sector $s$ in each period $t$, taking as given the sectoral structure of consumption of the group:

$$BE_c = \sum_s \theta_{sc}(g_{sc} - g_{sT}) \tag{B.3}$$

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3. These 23 sectors are: Super and hypermarkets; Grocery stores and mini-markets; Traditional trade in food; Petrol stations; ICT equipment, office machinery and equipment; Electrical appliances and décor; Construction materials and DIY; Sports and recreational equipment; Clothing, footwear, perfume and cosmetics; Pharmacies and para-pharmacies; Vehicles and accessories; Other retail items; Passenger transport and vehicle rental; Hotels and accommodation; Restaurants; Telecommunications; Insurance; Leisure, culture and sport; Public administration, defence and mandatory social security; Education; Health; Personal service activities (hairdressers, spas, etc.); Other services.

Structure Effect (SE) - It determines which part of the total difference in expenditure between group $c$ and the total economy resulted from the relative composition of the consumption basket of the group under analysis:

$$SE_c = \sum_s (\theta_{sc} - \theta_{sT})(g_{sT} - g_T) \tag{B.4}$$

In each period $t$, the SE will be positive if the consumption basket of group $c$ is relatively more (less) concentrated in sectors that grow above (below) the national average; the SE will be negative if the consumption basket of group $c$ is relatively less (more) concentrated in sectors that grow above (below) the national average.

| | Weight 2019 | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 | Jan-21 | Feb-21 | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Group A – high consumption** | 67.7 | | | | | | | | | | | | | | | | | | | |
| Total effect | | 0.8 | -0.3 | -0.8 | -2.5 | -4.0 | -3.3 | -3.1 | -2.3 | -2.2 | -2.0 | -0.5 | -0.5 | -1.5 | -0.9 | 0.2 | -1.7 | -2.8 | -0.5 | -1.2 |
| Structure effect | | 0.3 | -0.2 | -1.1 | -1.7 | -1.3 | -1.1 | -0.8 | -0.5 | -0.7 | -0.9 | -0.4 | -0.3 | -0.9 | -0.7 | 0.1 | -1.4 | -0.9 | -0.4 | -0.8 |
| Behavioural effect | | 0.5 | -0.2 | 0.3 | -0.8 | -2.7 | -2.1 | -2.3 | -1.8 | -1.5 | -1.0 | -0.1 | -0.1 | -0.6 | -0.2 | 0.1 | -0.3 | -1.9 | -0.1 | -0.4 |
| **Group B – medium-high consumption** | 20.7 | | | | | | | | | | | | | | | | | | | |
| Total effect | | -2.0 | -0.3 | 2.0 | 1.4 | 3.9 | 5.0 | 4.4 | 3.4 | 3.7 | 3.2 | 1.5 | 0.5 | 1.7 | 0.8 | -1.2 | 1.7 | 3.9 | 1.0 | 1.3 |
| Structure effect | | -0.5 | 0.1 | 0.8 | 1.3 | 0.9 | 1.3 | 1.0 | 0.4 | 1.1 | 1.0 | 0.3 | 0.2 | 0.7 | 0.3 | -0.2 | 1.1 | 1.0 | 0.2 | 0.5 |
| Behavioural effect | | -1.5 | -0.4 | 1.2 | 0.1 | 3.0 | 3.7 | 3.4 | 3.0 | 2.6 | 2.1 | 1.2 | 0.3 | 0.9 | 0.6 | -1.0 | 0.6 | 3.0 | 0.7 | 0.7 |
| **Group CD – medium/low consumption** | 11.5 | | | | | | | | | | | | | | | | | | | |
| Total effect | | -0.9 | 2.4 | 1.2 | 11.6 | 17.0 | 9.9 | 12.0 | 8.8 | 6.9 | 5.7 | 0.2 | 1.8 | 5.7 | 3.8 | 0.8 | 6.4 | 10.1 | 1.0 | 4.7 |
| Structure effect | | -0.9 | 0.7 | 4.5 | 7.2 | 6.2 | 4.1 | 3.6 | 2.3 | 2.4 | 3.5 | 1.6 | 1.7 | 3.8 | 3.6 | -0.1 | 5.8 | 3.7 | 1.6 | 3.7 |
| Behavioural effect | | 0.0 | 1.7 | -3.3 | 4.4 | 10.8 | 5.8 | 8.4 | 6.5 | 4.5 | 2.2 | -1.5 | 0.1 | 1.9 | 0.2 | 0.8 | 0.5 | 6.4 | -0.7 | 1.0 |

TABLE B.1. Value of payments with Portuguese cards by consumption group - Shift-share analysis ǀ In percentage points

Notes: The structure and behavioural effects are expressed in contributions to the total effect. Phase 1: January-February 2020; Phase 2: March-April 2020; Phase 3: May-October 2020; Phase 4: November-December 2020; Phase 5: January-February 2021.