Measuring resident households' consumption abroad using payment card transactions data

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Abstract:
The direct purchases abroad by residents include all purchases of goods and services made by residents while travelling abroad for business or pleasure. A large part of this item covers expenditure by other resident travellers on personal trips which are accounted as final consumption of households and imports of services. The main data source is the tourism questionnaire in Hungary. In 2020, because of the pandemic Covid19, new data source was involved in estimation, namely payment card transactions data. We analysed the dataset for the period between the first quarter of 2020 and the second quarter of 2022 covering all payment transactions which realised in territory of Hungary as well as all transactions of Hungarian households abroad. These payment card data are available quarterly, providing an indicator of household spending. The data include the channel of acceptance and the Merchant Category Codes (MCCs) as well. With the help of the channel of acceptance, not only spending related to tourism, but also online purchases from abroad can be identified. Three quarters of Hungarian households' purchases abroad are made via the Internet, while approx. a quarter is connected to other physical terminals. We found that aggregated Hungarian households' payment transactions data abroad which are settled especially at POS terminals shows a close correlation (0.85) with the tourism questionnaire data. The main difference is caused by online purchases and most of them refer to services whose accounting in foreign service trade and households' consumption has been missing until now due to the lack of reliable data. The MCCs of dataset allow a deeper analysis and so the classification of merchants and businesses by the type of goods or services provided. We created a correspondence table between MCC and COICOP in order to analyse spending data based on the type of products and services. We found that the Hungarian spending abroad covers several types of goods and services, not only accommodation and restaurant services and services provided by museums, libraries, and cultural sites, but also education services, financial services, goods relating to games, toys and hobbies, major durables to recreations, jewellery and watches etc. We note that these payment card transactions are not necessarily representative of total spending, but we emphasize the benefits of using the payment card transactions data by obtaining a timely and relatively accurate estimate of households' spending abroad in a given quarter.

Keywords:
Household consumption, payment card, MCC, COICOP

1. Introduction:

The direct purchases abroad by residents include all purchases of goods and services made by residents while travelling abroad for business or pleasure. A large part of this item covers expenditure by other resident travellers on personal trips which are accounted as final consumption of households and imports of services. The main data source is the tourism questionnaire in Hungary. In 2020, because of the pandemic COVID-19, new data source was involved in estimation, namely payment card transactions data. The other reason of the analysis is connected to the digitalization, namely more and more buyers have been ordered goods and services online from abroad which is not covered by tourism questionnaire.

During the COVID-19 pandemic, several national statistical institutes - among Bureau of Economic Analysis (BEA) in USA - have started researching the use of the payment card transaction data as an early barometer of spending. The reason for the research is the need of policymakers and the public for more frequent and timely economic data. Since COVID-19 pandemic BEA is presenting its estimates using daily payment card data to measure the effects of the pandemic on spending, updated approximately every two weeks. (BEA (2023)

Dunn et al (2020) argue that card spending data series in USA are highly correlated to national retail trade categories, restaurants, and accommodations. They used the method presented by Aladangady et al. (2019). They found large effects of COVID-19 pandemic on sectors such as accommodations and restaurants.

Aastveit et al (2020) analysed the weekly- and from 2019 daily- Norwegian debit card data as an indicator of household consumption in national accounts. They found that debit card data are an accurate and reliable predictor of household consumption not only on average but also during periods of high uncertainty caused by large exogenous and unanticipated shocks.

The studies presented above emphasize primarily the nowcast of domestic consumption. However, we argue that payment card data are suitable for measure of households' spending abroad, too.

2. Data

The payment card data in Hungary is collected by Hungarian National Bank at quarterly basis which is also taken over by the Hungarian Central Statistical Office (HCSO). The dataset includes two different tables, on the one hand, the number and value of transactions made with payment cards issued in the country by type and place of transactions and on the other hand, the number and value of payment card transactions at the domestic acceptance network by type of transactions. The first type includes the total payment transactions settled by Hungarian (domestically issued) bank cards and the second type covers the total payment card transactions in territory of Hungary. The tables have the following structure which is presented in Table 1.

Table 1
The structure of the payment card transactions dataset

| Reference period (year, quarter)	Type of transactions	Place of transactions (country)	Transaction channel	Card-holder	Normal or contactless transactions	MCC merchant code	Value and number of transactions
	Payments, Cash withdrawals, Cash deposits	Country code in case of European member states, Non-EU country	ATM, POS, soft POS, Internet, MO/TO, Imprinter, Mobile phone application	Household or Business		0001, ..., 9950	

Source: HCSO

Merchant category codes (MCCs) are four-digit numbers that describe a merchant's primary business activities. MCCs are used by credit card issuers to identify the type of business in which a merchant is engaged. MCCs are available only in POS transactions and have more than 1300 different values in our dataset. For a deeper analysis, we tried to organize the expenses into a COICOP'2018 structure.

3. Methodology:

The analysis had the following steps included in the Figure 2.

Figure 2
The steps of analysis
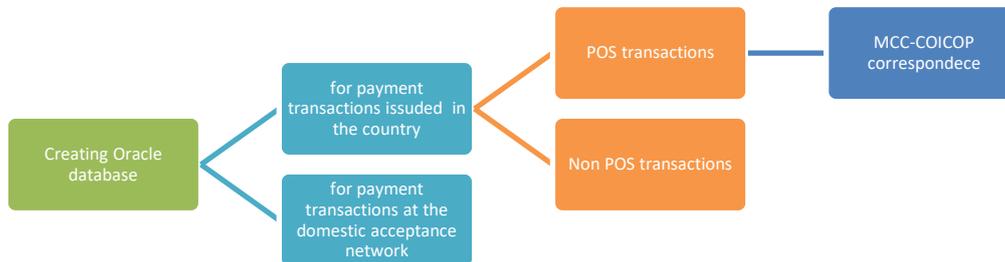
Source: own editing

The largest part of the work was the preparation of the correspondence table between MCC codes at four-digit level and COICOP'2018 at four-digit level (in some cases only at two-digit level) whose extract is presented in Table 2.

Table 2
Extract of the MCC-COICOP correspondence table

| MCC code	COICOP'2018	COICOP'2018 description
0001, 0004, 1372, 1393, 1407, 1419, 1497, 1499, 1500-1501, 2097, 2102, 2419, 2511, 3000-3308	07.3.3	Passenger transport by ai
3351-3441	07.2.4	Other services in respect of personal transport equipment
3501-3999	11.2.0	Accommodation
0008, 0028, 1447, 5094, 5944	13.2.1	Jewellery and watches
5600-5699	03	Clothing and footwear
8211-8299	10	Education

Source: own elaboration

When a supermarket had an own, independent MCC code, it was classified in group 01 Food and non-alcoholic beverages. We realized that the group 12 Insurance and financial services needs a further investigation because of Fintech companies. When somebody uses for example a Revolut payment card in POS transactions then this will be missing in our dataset, only the transfer from the Hungarian bank's issued payment card to the Revolut card is displayed as financial transaction. Financial transactions therefore contain accumulations.

4. Results

The analysis and estimation were prepared by SAS Enterprise Guide and PowerBI. Based on our analysis, we realized that the Hungarians' spending abroad based on tourism survey and payment card transactions data has a similar pattern, but the transactions by internet shows a massive growth, see the Figure 2.

Figure 2
Hungarians' spending abroad
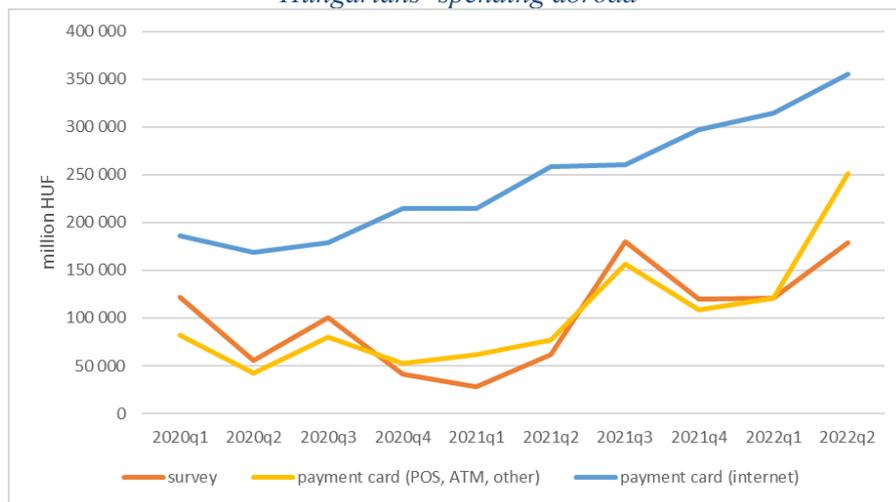
Source: HCSO

If we focus only on the POS transactions, then we can analyse the structure of the spending according to the COICOP'2018 structure. The Figure 3 shows the development of expenditures in years 2020-2021.

Figure 3
Hungarians' spending abroad in POS transactions according COICOP'2018 structure, without financial transactions
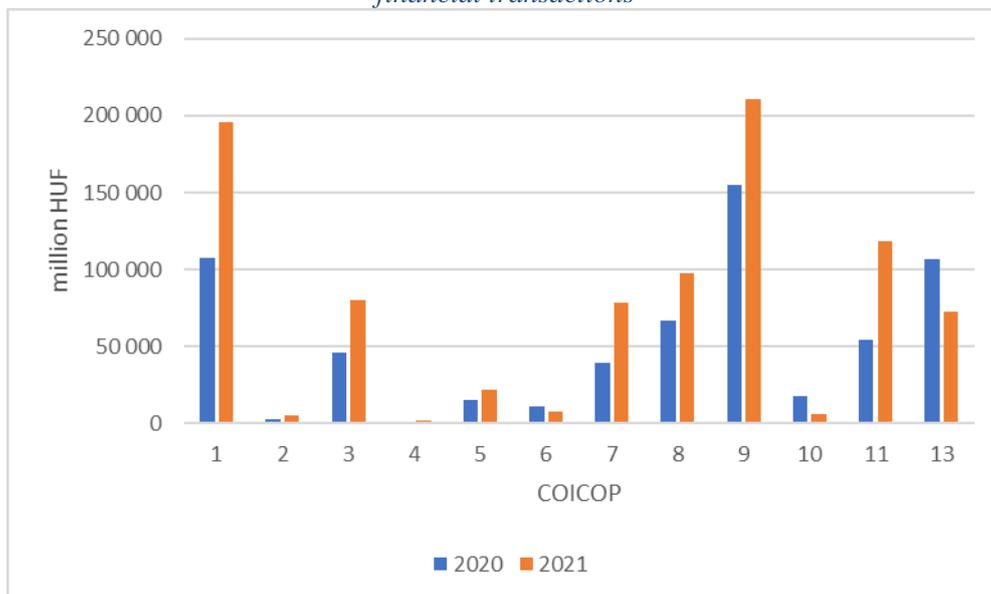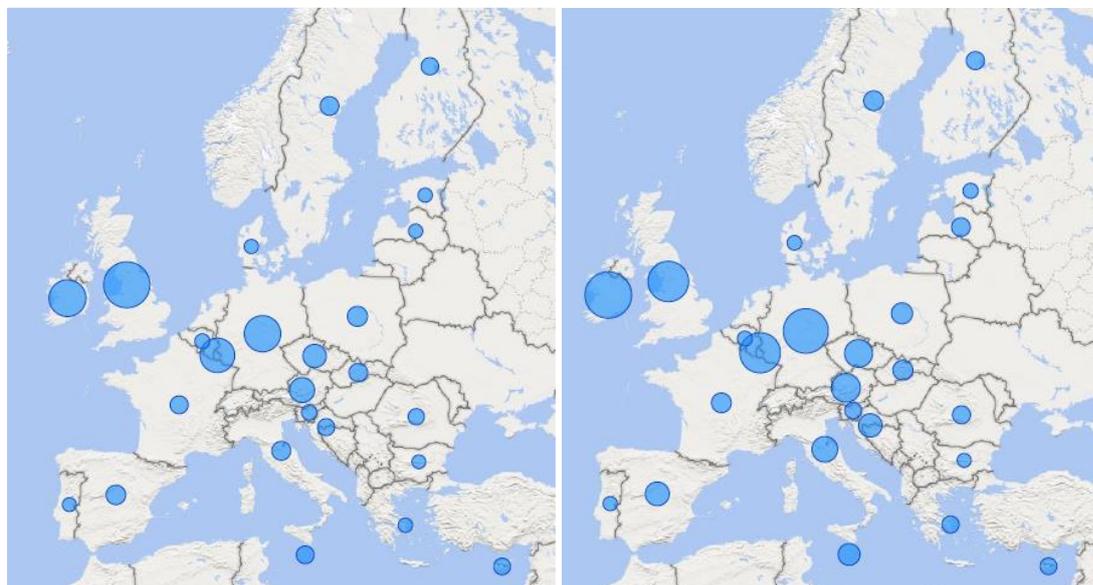
Source: own calculations

The most expenditures were related to recreation, sport and culture (COICOP 09), food and non-alcoholic beverages (COICOP 01) in both years, 2020 and 2021. The expenditure for personal care, social protection and miscellaneous goods and services (COICOP 12) had the similar level as foods and alcoholic beverages in 2020, but it decreased in 2021. The expenditure for restaurants and accommodation services showed a great decline in 2020. However, by 2021, the desire to travel has increased significantly, and the expenditure for restaurants and accommodation services as well as transport (COICOP 07) has been doubled. The expenditures for clothing and footwear (COIOCOP 03) and for information and communication (COICOP 08) have been grown from 2020 to 2021 which can be explained by the increase of the online purchases from abroad. The development of education

spending (COICOP 10) is interesting. It showed a decline to which not only the COVID-19 epidemic contributed, but also Brexit.

Figure 4
Hungarians' spending abroad based on POS transaction in EU-27 countries and UK in 2020 (left side) and in 2021 (right side)

Source: own calculations

It is interesting that the distribution of expenditures of Hungarians' spending in EU countries and UK changed significantly from 2020 to 2021. The Hungarians spent the most in United Kingdom, in Ireland, in Germany and in Luxembourg in both years, but, in the rankings, the United Kingdom and Ireland have switched. This could be caused not only by COVID-19, but also by Brexit. The total spending in Italy, Croatia and Malta has increased because in 2021 more Hungarians chose these countries as holiday destination than in 2020 when no vaccination was available.

5. Discussion and Conclusion:
We note that these payment card transactions are not necessarily representative of total spending, but the use of the payment card transactions data allows a timely and relatively accurate and estimate of households' spending abroad in a given quarter.

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