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THE HIDDEN GEOGRAPHY OF TOURISM FIRM SPENDING: TRACKING ECONOMIC LEAKAGES WITH FIRM-TO-FIRM TRANSACTIONS

Stjepan Srhoj[1] & Josip Mikulić[2]

Abstract

Tourism influences local economies through direct, indirect, and induced effects. Using novel firm-to-firm transaction data, we shed light on tourism's indirect effects. We find that tourism firms primarily source inputs locally or from the capital, with limited purchases from distant, poorer regions. While direct imports by tourism firms are relatively small, indirect imports—those embedded in supply chains—are substantial, comprising 54.2% of total supplier costs. Our findings suggest that overlooking indirect imports may lead to an overestimation of tourism's true economic contribution.

Keywords: firm-to-firm transaction data; economic leakages; supplier spending; indirect imports; local economic impact
JEL: L83; R12; F14; D22; O18

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Introduction

A positive impact on local economic development is widely regarded as a fundamental benefit of tourism activity (Faber & Gaubert, 2019; Song & Wu, 2022). The economic contribution of tourism to a local economy is channeled through direct, indirect and induced effects. The direct effects stem from tourists' initial spending. At the same time, indirect effects are activated through "*tourism frontline businesses*"' spending towards their suppliers and then further multiplied via subsequent spending by these suppliers on their own inputs. However, the indirect effects can be diminished by leakages such as imports. For instance, Pratt (2011) employs a *Computable General Equilibrium* (CGE) model to demonstrate that tourism's economic impact is influenced by the import propensity of tourists' spending, the import intensities of tourism-oriented sectors, and their backward and forward linkages. Greater economic "leakages" through imports can diminish tourism's potential multiplier effects, underscoring the importance of understanding these leakages when estimating tourism's economic impacts (e.g., Pratt, 2011; 2015; Chaitanya & Swain, 2024; Nowak & Sahli, 2024). To accurately estimate the share of tourism-related expenditures that exit the local or national economy, it is essential to trace the geographic origins of suppliers and their associated transactions.

Previous research highlights that a small proportion of large firms dominate direct import activity (Melitz, 2003; Blaum et al., 2018), while a broader range of firms engage in indirect imports via domestic intermediaries that rely on imported inputs (Dhyne et al., 2021). While input-output tables provide insights at the sectoral level, their aggregation may obscure critical details (Pratt, 2011, p. 648). Firm-level heterogeneity in sourcing behaviour—both in terms of supplier composition and sectoral reliance—suggests that tourism firms may vary substantially in their supply chain structures, further complicating the use of aggregated input-output data (Pratt, 2011; Dhyne et al., 2021; Diem et al., 2022; Pichler et al., 2023). Therefore, a nuanced understanding of tourism firms' direct and indirect import behaviours is essential to assess tourism's full potential as an *in-situ* (i.e. at-source) export sector and its capacity to drive local economic development (Faber & Gaubert, 2019).

To address this methodological gap, this study employs firm-to-firm transaction data, a novel approach in tourism research that allows for more precise insights into the economic interactions within the sector. Pichler et al. (2023) recently highlighted the benefits of transaction-level data for tackling complex research questions, with its use becoming increasingly prevalent in leading economic studies (e.g., Dhyne et al., 2021). Therefore, this research focuses on an important and underexplored issue: the extent to which tourism firms rely on imports.

Using transaction-level data from firms in Croatia, we trace tourism firms' input purchases, capturing both direct imports and imports embedded within domestic suppliers' purchases. Given the critical role

of tourism in supporting domestic industries, such as agriculture, manufacturing, and services, our findings provide a more granular and previously unavailable measure of tourism firms' import intensity. These insights offer valuable information for policymakers, enhancing their ability to design strategies that foster sustainable local economic development.

Data

Our research setting is in Croatia. To analyze tourism firm spending (see Appendix for a definition) patterns comprehensively, this study uses three administrative datasets:

1. Transaction data (form URA) for 2019, obtained from the Tax Authority. This census dataset captures all firm-to-firm transactions in the Croatian value-added tax system. The data includes details like date, value, and supplier identification and provides information on the buyer's sector and municipality.

2. Intra-EU trade transaction data (form PDVS), sourced from the Tax Authority. This dataset details all imports of Croatian firms from firms in other European Union member states. The dataset includes details at the monthly level, such as foreign supplier identification, the value of imported goods and services, and the supplier's country.

3. Firm balance sheets and profit and loss statements (form GFI), provided by the Financial Agency. This dataset encompasses census information for firms in Croatia for 2019, including firm ID, sector, total costs, and labour costs. This data can be beneficial for linking supplier information with firm characteristics, potentially revealing patterns related to firm size or industry.

These diverse datasets provide a robust foundation for investigating the hidden geography of tourism firms' spending (detailed variable descriptions in Table A3). Our sample is composed of 9,681 tourism firms, of which 74% have less than € 150,000 total costs, while 3% have more than € 1,000,000 total costs (Table A2). These tourism firms had more than 4 million transactions with 34,365 unique suppliers in the first connection (these suppliers then had their own suppliers, and so on).

Indirect imports

The URA dataset includes all domestic inter-firm transactions. Domestic transactions can be transformed into annual domestic supplier costs between firm *j* and supplier *i*. Annual supplier costs of firm *j* can be written as SC_j. The PDVS dataset includes all transactions from domestic firms to foreign

firms in the EU, i.e. IC_j. Therefore, our cost structure can be divided into costs towards other domestic firms and costs towards firms in the EU. The share of imports (i.e. costs towards firms in the EU) in the sum of imports and domestic costs is informative lower bound of the firms' import share:

$$s_{F_j} = \frac{IC_j}{SC_j + IC_j} \qquad (1)$$

Dhyne et al. (2021) also include labour costs. Since we do not have labour costs in our original datasets (URA and PDVS), we approximate it using the GFI dataset. In the GFI dataset, we calculate the NACE 4-digit share of total labour costs in total costs:

$$LC_h = \frac{\sum_j^n LC_{jh}}{\sum_j^n TC_{jh}} \qquad (2)$$

Where *j* is the firm, *h* is the sector, *n* is the number of firms *j* in the sector *h*, *LC* is labour costs, *TC* is total costs, and finally, the LC_h is the share of labour costs in total costs of each NACE 4-digit sector. Since the sector of each firm is known from the URA dataset, LC_h is used to estimate each firm's labour costs, $e(LC)_j$:

$$e(LC)_j = (SC_{jh} + IC_{jh}) * (\frac{1}{(1 - LC_h)} - 1) \qquad (3)$$

Finally, estimated labour costs are used to calculate the firms' import share:

$$s_{F_j} = \frac{IC_j}{SC_j + IC_j + e(LC)_j} \qquad (4)$$

Equation 4 provides a lower import share than Equation 1. We also calculate the industry-region labour cost share for robustness check since we have data on each firm's location in the URA dataset. The estimates remain very similar.

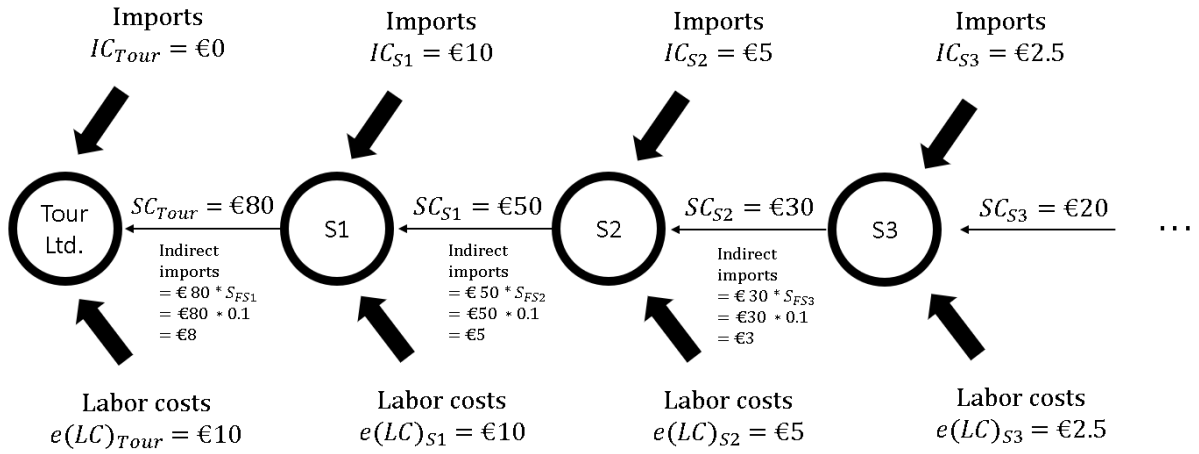
We use s_{F_j} from Equation 4 to calculate the indirect imports. In Equation 5, we keep the firm *j* and supplier *i* notations but add several important variables based on the seminal work by Dhyne et al. (2021; p. 647), which leverages our unique transaction data.

$$s_{F_j}^{Total} = s_{F_j} + \sum_{i \in Z_j^D} s_{ij} \underbrace{\left[S_{F_i} + \sum_{k \in Z_i^D} s_{ki}(s_{Fk} + \cdots) \right]}_{s_{F_i}^{Total}} \qquad (5)$$

Specifically, the total share of tourism firm's j imports, denoted as $s_{F_j}^{Total}$, has two components. First, it includes the direct import share of its inputs, s_{F_j}. Second, it encompasses the inputs acquired by other domestic firms, multiplied by these suppliers' shares of imports. Here, Z_i^D represents the domestic supplier-set of firm j, and s_{ij} is the proportion of j's inputs bought from firm i. Therefore, the $s_{F_j}^{Total}$ is the aggregate of s_{F_j} and the portion of inputs sourced from domestic suppliers, adjusted by their total import shares. Importantly, $\sum_{i \in Z_j^D} s_{ij} \left[S_{F_i} + \sum_{k \in Z_i^D} s_{ki}(s_{Fk} + \cdots) \right]$ accounts for the import shares of firm j's suppliers, their suppliers, and so on, each weighted by the inputs-share purchased from other domestic suppliers. Consequently, $s_{F_j}^{Total}$ is elevated if a significant portion of firm inputs are directly imported or indirectly imported via domestic suppliers with high import shares.

Figure 1 provides a visual explanation of the firm j – *Tour Ltd* and its supplier (S1), S1's supplier (S2), and S2's supplier (S3). While *Tour Ltd*. does not import directly, it imports indirectly (€16). The calculation of indirect imports assumes that a firm's composition of inputs used in production remains consistent across all its buyers (Dhyne et al., 2021).

Figure 1. From direct to indirect imports



Results

The analysis reveals several surprising trends regarding how tourism firm spending is distributed geographically. First, direct imports from the EU constitute a surprisingly low share (8.4%) of total supplier spending by tourism firms (Table 1; direct imports by tourism firms account for 8.4% of the total supplier spending and about 6% of total costs). This suggests a lower reliance on direct EU imports by coastal tourism firms than initially anticipated. Second, the majority of domestic spending of tourism firms occurs within the Adriatic region (55.7%), while a significant portion (32.1%) benefits suppliers in the Capital. This highlights a geographically diverse network of suppliers, with a substantial flow of spending reaching beyond the immediate coastal region. Lesser-developed regions like Northern and Pannonian Croatia receive very small spending (1.9% and 2.0% of total spending, respectively). This result indicates limited economic benefits of coastal tourism activity for Northern and Pannonian Croatia.

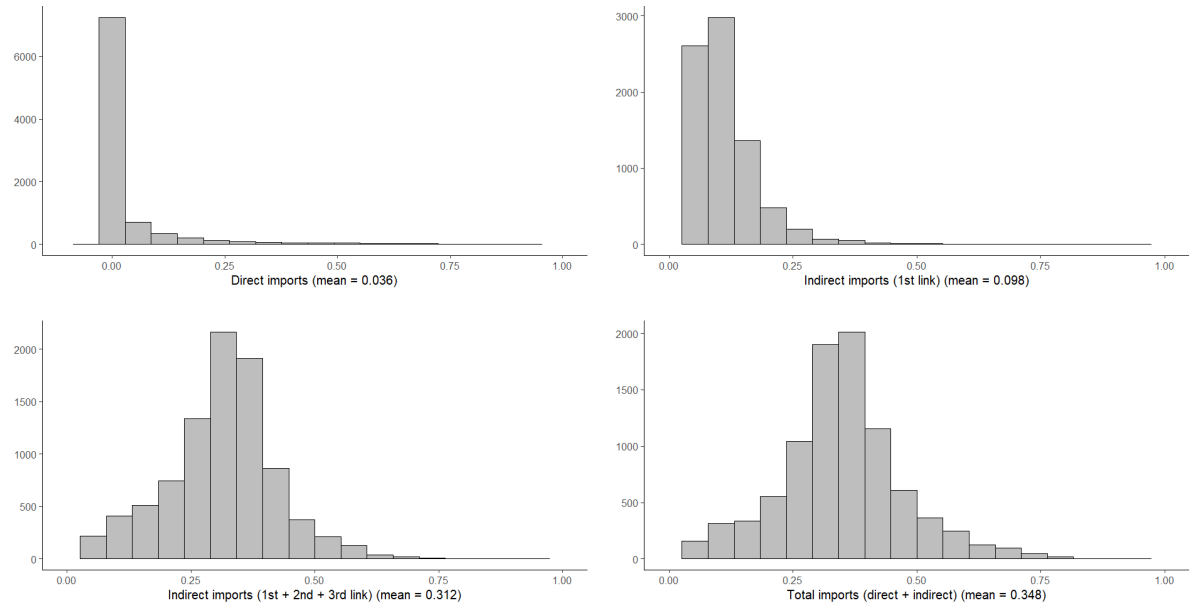
Table 1. Supplier location and spending in 2019

Spending Type	Supplier Costs	Share
Suppliers located domestically		
Northern Croatia	30.57	1.87
Pannonian Croatia	35.74	2.00
City of Zagreb	572.26	32.03
Adriatic Croatia	995.41	55.71
from which:		
Local spending	338.91	18.97
Non-local intra-county spending	405.62	22.70
Non-county intra-region spending	250.88	14.04
Total local spending	1633.98	91.61
Suppliers located in the EU		
Direct EU imports	152.93	8.39
Total	1786.91	100.00

Source: Authors' calculation based on the URA, PDVS and GFI dataset (stemming from Tax Administration and FINA). Monetary values are given in millions of euros.

Third, tourism firms' direct imports compared to their total costs are 3.6% per firm on average (Figure 2). Fourthly, indirect imports of tourism firms' direct suppliers (1st link) are 9.8% per firm on average (2.7 times larger than direct imports share). Fifth, the tourism firm's total imports (direct and indirect imports of 1st, 2nd and 3rd suppliers) divided by total costs average 34.8% per firm (from which 31.2 p.p. are indirect imports share on average). Sixth, the sum of total imports (direct and indirect imports of 1st, 2nd and 3rd suppliers) reaches a staggering 54.2% of total tourism firms' supplier costs or 36.9% when labour costs are added to supplier costs.

Figure 2. Direct and indirect import shares in tourism firms



Source: Authors' calculation based on the URA, PDVS and GFI dataset.

Table 2 provides the distribution of the share and absolute value (in €) of direct imports and total imports. For example, the median firm does not directly import; however, indirectly, it imports 21 thousand euros. The 90th percentile firm directly imports 11 thousand euros while indirectly it imports 129 thousand euros.

Table 2. Indirect imports and tourism firms

	1st perc.	10th perc.	25th perc.	Median	75th perc.	90th perc.	99th perc.
Direct imports (% in total costs)	0.00	0.00	0.00	0.00	1.06	10.76	54.76
Direct imports (€)	0.00	0.00	0.00	0.00	941.07	11,210.15	187,523.27
Total imports (% in total costs)	5.92	19.05	28.33	34.61	40.91	50.02	69.50
Total imports (€)	13.74	575.71	5203.69	21,070.43	55,787.91	129,369.69	1,009,344

Source: Authors' calculation based on the URA, PDVS and GFI dataset (stemming from Tax Administration and FINA)

Conclusion

This study is the first to leverage firm-to-firm transaction data in the context of tourism research, addressing a critical and underexplored question: To what extent do tourism firms rely on imports? In doing so, this study contributes to research on tourism's import dependence and economic leakages. The findings reveal that the majority of domestic spending by tourism firms occurs within the Adriatic region (55.7%), while a significant share (32.1%) benefits suppliers in the Capital, highlighting a geographically diverse supplier network, though with minimal spending reaching lesser-developed regions like Northern and Pannonian Croatia (1.9% and 2.0%, respectively), indicating limited economic benefits of coastal tourism for these areas. Regarding imports, while only a small proportion of tourism firms engage in direct importing—and even fewer are substantial importers—many participate in indirect importing through purchases from domestic suppliers who themselves rely on imports. Notably, 54.2% of tourism firms' total supplier costs are linked to imports, with the majority stemming from indirect imports. Accordingly, without insight into indirect imports, the economic contribution of tourism to domestic economies through its indirect effects might be overestimated.

These results hold significant implications for tourism development strategies as policymakers must navigate a delicate balance. On the one hand, international trade enhances economic efficiency and consumer welfare by providing access to cheaper and diverse goods and services (Nowak & Sahli, 2024). On the other hand, imports shift spending toward foreign firms, potentially reducing the domestic economic multiplier effect (Pratt, 2011; 2015; Chaitanya & Swain, 2024). Future research could build on our findings by analyzing direct and indirect imports across different countries and by calibrating macroeconomic models to explore how varying the tourism sector's import share impacts aggregate economic growth and the growth of other domestic sectors.

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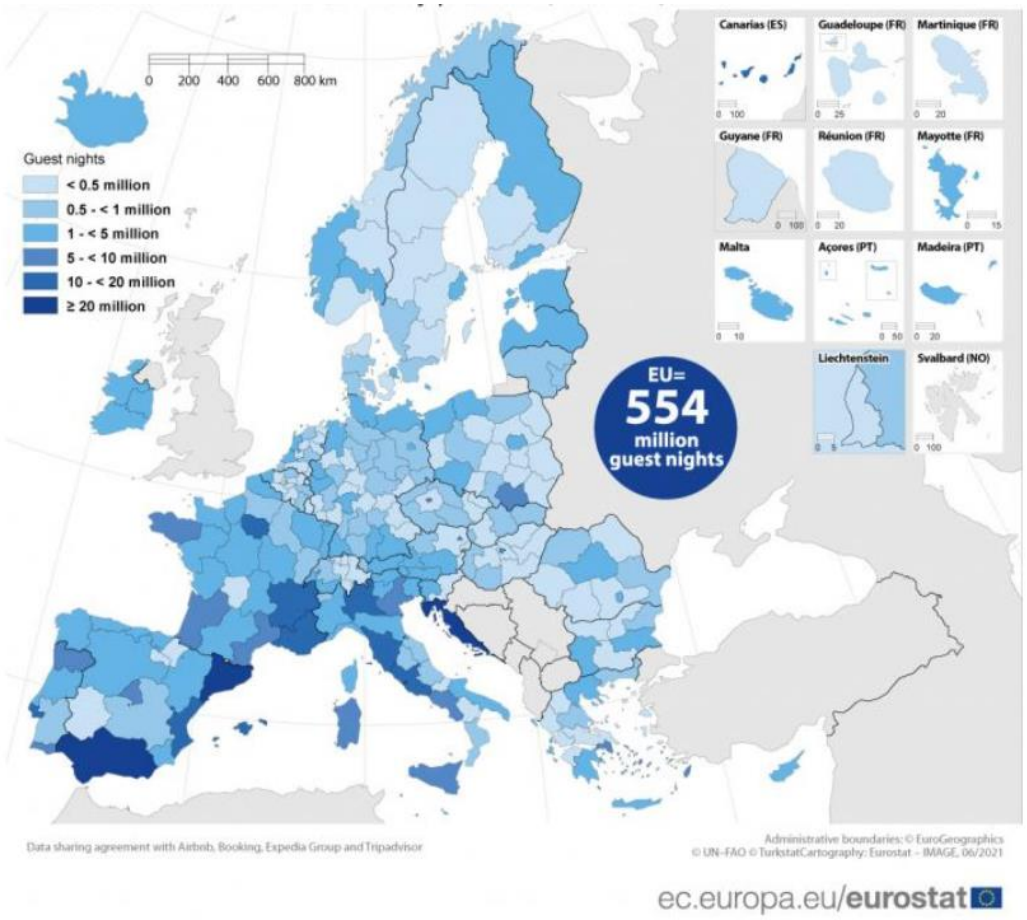
Online Appendix

Research context

Croatia is one of the most touristified countries in the World. Croatia has the highest tourism GDP share in the European Union (EU; EU Tourism Dashboard, 2024) and among the highest shares in the World (#5; UN Tourism Dashboard, 2024). Adriatic Croatia, one of 242 NUTS 2 regions in the EU, is a unique phenomenon in that it accounts for approximately 95% of arrivals and overnight stays in Croatia (Croatia has two NUTS 2 regions). Moreover, it is among the top EU regions in tourism density, intensity, and seasonality (Batista e Silva et al., 2018; EU; EU Tourism Dashboard, 2024). Croatian tourism can be described as dominated by inbound tourism (92% of all overnights; Croatian Statistical Bureau, CBS, 2020) and high private accommodations share (64%; CBS, 2020). Due to the large importance of tourism for the Croatian economy, examination of tourism firm spending (and leakage) appears very relevant to more objectively assess tourism's role in the overall economy.

To identify tourism firms, we use information on the firms' sectors and the locations of the firms' headquarters. As for the geographical location, we initially focused only on the firms in Adriatic Croatia (NUTS-2 region in Croatia), one of the most touristic geographical areas in the European Union. Here, we provide two figures that support such a statement. Firstly, we provide a map of the European Union NUTS-2 regions and the number of guest nights spent at short-term accommodation in 2019 (Figure A1). As it is evident from the map, Adriatic Croatia has more than 20 million nights and is one of the few regions in this category (20 million and more). In comparison, the domestic population in Adriatic Croatia is about 1.3 million.

Figure A1. Guest nights spent at short-stay accommodation, 2019



Source: Eurostat

Secondly, below is a table from 2022 (Eurostat) showing the top 20 NUTS-2 regions in terms of annual number of guest nights at short-stay accommodation offered via collaborative economy platforms. As can be seen from Table A1, Adriatic Croatia is the number 1 region in the European Union.

Table A1. Top 20 regions (NUTS 2 level) in terms of annual number of guest nights at short-stay accommodation, 2022

NUTS 2 level regions	Total	Domestic	International	% in EU total
EU	596 546 896	239 294 430	357 252 466	100.0%
Jadranska Hrvatska	29 273 016	1 199 660	28 073 356	4.9%
Andalucía	28 783 258	12 373 643	16 409 615	4.8%
Provence-Alpes-Côte d'Azur	22 645 768	12 299 170	10 346 598	3.8%
Cataluña	19 160 306	4 514 855	14 645 451	3.2%
Canarias	19 015 266	4 959 800	14 055 466	3.2%
Comunitat Valenciana	17 216 154	6 859 983	10 356 171	2.9%
Île de France	16 071 286	4 730 588	11 340 698	2.7%
Rhône-Alpes	16 053 108	10 602 801	5 450 307	2.7%
Toscana	11 311 222	2 750 598	8 560 624	1.9%
Aquitaine	10 362 384	7 402 057	2 960 327	1.7%
Languedoc-Roussillon	10 336 711	7 538 875	2 797 836	1.7%
Área Metropolitana de Lisboa	10 140 283	588 522	9 551 761	1.7%
Lazio	10 056 096	1 813 900	8 242 196	1.7%
Lombardia	10 018 565	2 056 481	7 962 084	1.7%
Illes Balears	9 483 086	1 556 517	7 926 569	1.6%
Algarve	9 136 418	1 464 793	7 671 625	1.5%
Bretagne	8 802 543	6 794 677	2 007 866	1.5%
Sicilia	8 338 218	2 951 679	5 386 539	1.4%
Veneto	7 944 549	1 432 789	6 511 760	1.3%
Comunidad de Madrid	7 570 801	2 365 154	5 205 647	1.3%

Source: Eurostat (tour_ce_omn12)

Conditional on firms having headquarters in the Adriatic Croatia, we use firms from the following NACE 4-digit sectors: 5510, 5520, 5530, 5590, 5610, 5621, 5629, and 5630. We define firms from these sectors as tourism firms. We have also experimented with adding sector 7911 Travel agency activities and 7912 Tour operator activities. However, our results remain very similar. Our final sample is composed of 9,681 tourism firms, which had 4,040,965 domestic transactions with 29,812 direct suppliers (of any sector and geographical location).

The share of firms across sectors in the sample is given below:

- 5510 - Hotels and similar accommodation (share of unique firms: 0.087),
- 5520 - Holiday and other short-stay accommodation (share of unique firms: 0.110),
- 5530 - Camping grounds, recreational vehicle parks and trailer parks (share of unique firms: 0.015),
- 5590 - Other accommodation (share of unique firms: 0.137),
- 5610 - Restaurants and mobile food service activities (share of unique firms: 0.320),
- 5621 - Event catering activities (share of unique firms: 0.007),
- 5629 - Other food service activities (share of unique firms: 0.003),
- 5630 – Beverage serving activities (share of unique firms: 0.321).

Table A2. Tourism firm size distribution

Tourism firms' total costs	Percentage	Cumulative Percentage
A. Up to 30,000 €	33%	33%
B. 30,000 to 75,000 €	23%	56%
C. 75,000 to 150,000 €	18%	74%
D. 150,000 to 300,000 €	14%	88%
E. 300,000 to 1,000,000 €	9%	97%
F. 1,000,000 € and more	3%	100%

Note: The total sample is composed of 9681 tourism firms.

Detailed variable descriptions are provided in Table A3.

Table A3. Variable description

Variable (source)	Description
Total costs (GFI)	Total firm costs in 2019. Accounting variable from profit and loss statement.
Labour costs (GFI)	Total firm gross labour costs in 2019. Accounting variable from profit and loss statement.
Sector (GFI)	Firms' NACE 4-digit.
Domestic supplier costs (URA)	The sum of firms' costs towards suppliers located in Croatia in 2019.
Sector (URA)	Firms' NACE 4-digit.
Municipality (URA)	Firms' headquarters' geographic location. Each firm is located in one of the 556 municipalities in Croatia.
County (URA)	Based on the municipality variable, the authors sort municipalities into 21 counties (NUTS-3).
Region (URA)	Based on the municipality variable, the authors sort municipalities into four regions (NUTS-2).
EU supplier costs (PDVS)	The sum of firms' costs towards suppliers located in the EU in 2019.
Total EU imports	Includes the direct and indirect imports of firms. The indirect imports are explained in Section 3.

Figure A2 provides a simple explanation of the firm j – *Tour Ltd* and its supplier (S1), S1's supplier (S2), and S2's supplier (S3). In this example, each firm has a single domestic supplier. Firms S1, S2, and S3 have direct imports, while *Tour Ltd*. does not import directly. Each firm has costs to other domestic firms *(SC)*, as well as labour costs *(e(LC)).* Also, the *S1*, *S2*, and *S3* all have their import share equal to 0.1 (10%). It is obvious from this example that although *Tour Ltd*. does not directly import, it imports indirectly €16 (€8 + €5 + €3). A key assumption of the indirect imports calculation is that a firm's composition of inputs in production does not vary across its buyers (i.e. tourism firms; Dhyne et al., 2021).

Figure A2. From direct to indirect imports

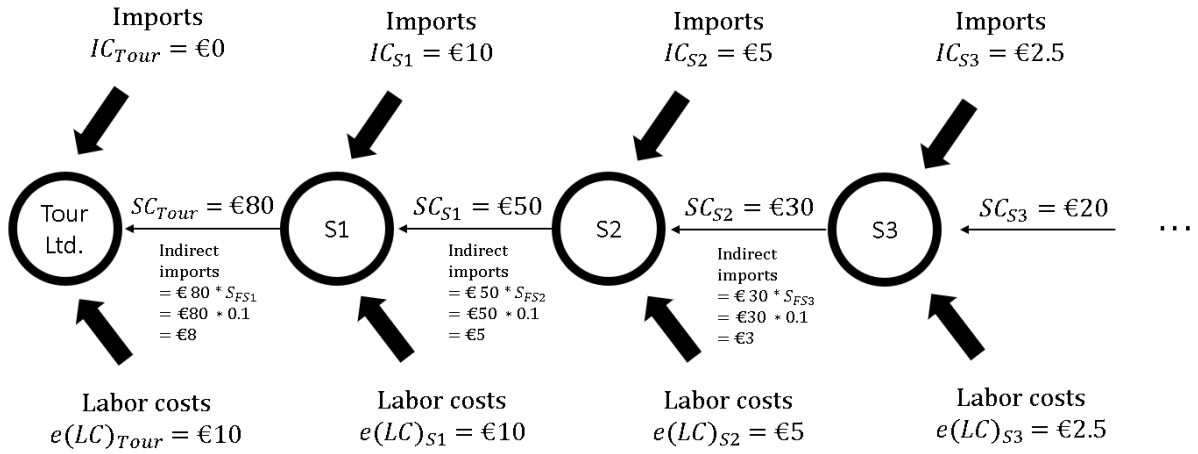


Table A4 provides the structure of inputs purchased by tourism firms covered in this study. Top 10 supplier sectors of the tourism firms take up 67.87 % of their total purchases in the year 2019. As expected, wholesale trade dominates (29.04%). When combined with related sectors, i.e., manufacture of food products and retail trade, these inputs total to almost half of all purchases of analyzed tourism firms (47.65%).

Table A4. Tourism firms input purchase

Supplier sector	Rank	Share of purchase (in %)
46 - Wholesale trade, except of motor vehicles and motorcycles	1	29.04
10 - Manufacture of food products	2	9.32
47 - Retail trade, except of motor vehicles and motorcycles	3	9.29
35 - Electricity, gas, steam and air conditioning supply	4	5.44
55 - Accommodation	5	5.24
64 - Financial service activities, except insurance and pension funding	6	2.19
68 - Real estate activities	7	1.92
41 - Construction of buildings	8	1.91
43 - Specialised construction activities	9	1.85
36 - Water collection, treatment and supply	10	1.67
Other	-	32.13
Total	-	100.00

Table A5 displays the ranking of origin markets from which the tourism firms covered in this study import directly the most. Top 10 EU countries (including Great Britain) of which tourism firms directly import take up 95.52% of their total direct foreign input purchases in the year 2019. The Netherlands dominate the share of purchases with 40.00%, followed by two neighboring countries, i.e., Slovenia (21.14%) and Italy (11.55%).

Table A5. Tourism firms direct foreign input purchase by origin

Foreign input location	Rank	Share of purchase (in %)
Netherlands	1	40.00
Slovenia	2	21.14
Italy	3	11.55
Germany	4	6.08
Austria	5	5.86
Great Britain	6	3.91
Ireland	7	2.37
Spain	8	1.81
Belgium	9	1.46
France	10	1.34
Other	-	4.48
Total	-	100.00