Research paper

Can domestic tourism relieve the COVID-19 tourist industry crisis? The case of Spain

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ARTICLE INFO	ABSTRACT
	This paper attempts to evaluate the capacity of Spanish domestic tourism to relieve the national travel industry crisis in the situation of a complete or significant loss of international demand, such as the one being produced by COVID-19. The results show that though Spanish domestic tourism is expected to fall by 42.64% compared to 2019 due to the loss of income and the fear of travelling, it can still generate 33% of the pre-crisis overnight stays, assuming that 50% of outbound tourism can be reoriented to the domestic market. On the regional level, the potential of domestic tourism varies significantly and may generate from 10% of the pre-crisis overnight stays in the Balearic Islands and Canary Islands to 70% in Castille-La Mancha. This figure depends on the traditional orientation of a region's portfolio on the domestic market, the volatility of its domestic demand and the capacity to attract new segments of domestic tourists. An important novel feature of this research is the use of the value-at-risk methodology to estimate the maximum expected loss of domestic travel as a component of the tourism demand portfolio.

1. Introduction

The COVID-19 health crisis originated in December 2019 in Wuhan, China. On January 20th, 2020, the WHO reported the first outbreak. Due to strong measures taken by the Chinese government, most of the rest of the world seemed to be convinced that the problem would stay concentrated in China. As noted in the Global Risk Report (WEF, 2020), pandemics were considered to be quite unlikely (Ramelli & Wagner, 2020). However, a lack of coordination of health measures resulted in the rapid spread of the disease globally. After infections in Japan, Korea and Hong Kong, the coronavirus spread to Europe. As of November 10th, 2020, over 50 million cases of COVID-19 were reported in over 200 countries (ECDC, 2020).

Health policies were implemented to prevent hospitals from being overwhelmed. In the tourism sector, especially in hospitality and transportation, the impact of such policies was dramatic and immediate. According to the August–September issue of the World Tourism Barometer (UNWTO, 2020a), international tourist arrivals saw a decline of 65% during the first half of 2020 over the same period the previous

year, with arrivals in June down 93%. Northeast Asia and southern Mediterranean Europe suffered the largest declines, reporting drops of 83% and 72%, respectively. According to this issue, the drop in international demand is expected to be close to 70% for the whole of 2020, especially as some destinations have reintroduced restrictions on travel due to a second wave of infections and expect that a return to 2019-level tourist arrivals would take up to 4 years. Similarly, the WTTC predicted a 73% reduction in international arrivals for 2020 in its worst-case scenario that considered a second wave of the contagion (WTTC, 2020b).

The academic literature has extensively studied the effects of natural and environmental disasters and even viruses (such as SARS and Ebola) on the tourism industry (Bassil et al., 2019; Cooper, 2005; Jayawardena et al., 2008; Karamelikli et al., 2019; Kuo et al., 2008; Moreno-González et al., 2020; Novelli et al., 2018; Ritchie & Jiang, 2019; Rosselló et al., 2020; Rosselló et al., 2017; Wen et al., 2005; Villamediana-Pedrosa et al., 2020; Zeng et al., 2005). However, the impact of the management of the COVID-19 health crisis on the tourism sector is unprecedented in terms of both the volume of people affected and the number of countries

involved (Yang et al., 2020). A review of the restrictive policy responses of governments worldwide suggests that most of the restrictions have a direct impact on tourism activities (Oxford University, 2020). Closed borders, bans on public gatherings, closed tourist attractions, and mobility restrictions across countries dramatically affect both domestic and international travel. In addition to economy-wide economic policies implemented to alleviate the crisis, governments have also introduced tourism-specific policies. Several of these policies are related to the promotion of domestic tourism, reflecting its crucial contribution to travel and tourism in major economies and a common industry expectation that domestic travel will recover before inbound travel. Domestic tourism accounts for 94% of tourism spending in Brazil, over 80% in India, Germany, China, Japan, Mexico, the UK and the US, and more than 70% in France and Italy (UNWTO, 2020b). In Spain, almost 70% of tourist arrivals and 45% of the tourism-related gross domestic product originate from domestic travellers (INE, 2020). Thus, understanding domestic travel is taking on special importance.

Unlike several recent studies on domestic tourism analysing its contribution to regional economic growth (Cortés-Jiménez, 2008; Goh et al., 2015; Haddat et al., 2013), with others investigating the determinants of domestic tourist arrivals and expenditures, as well as domestic tourists' habits (Ferrer-Rosell & Coenders, 2018; Guardia-Gálvez et al., 2014; Massidda & Etzo, 2012; Molinillo & Japutra, 2017; Tan & Wu, 2016; Thrane & Farstad, 2011), this paper attempts to evaluate the capacity of domestic tourism in Spain in relieving the country's national travel industry crisis in the situation of a complete or significant loss of international demand, such as the one being produced by COVID-19. The principal objective of this paper is to estimate the degree to which pre-crisis international and domestic tourism (measured in 2019 tourism numbers) can be covered by only domestic tourism once the internal mobility restrictions are lifted in Spain. This analysis will be done for a one-year period on the Spanish level and on the regional level to see in which regions domestic tourism can become a relief for local tourism firms.

Two specific objectives are defined to realise this analysis. First, we estimate the maximum potential losses in domestic overnight stays. In the case of domestic tourism, it is expected that a reduction in tourist flows will be generated due to (i) the crisis-related reduction in tourists' disposable income and negative expectations of future income and (ii) fear of contagion among tourists. To evaluate the loss in the flow related to the loss of income, we use value-at-risk analysis. Several scholars have argued that tourism demand is quite similar to stock markets, given that tourist markets have different levels of returns and risks (Jang & Chen, 2008). Even though returns and risks in tourism cannot be defined in the same way as in the finance field, it is possible to apply a finance-related idea to tourism research (Jang et al., 2002; Jang et al., 2004).

The uncertainties associated with the COVID-19 pandemic, which have been unprecedented in modern history, require the use of methodologies that consider the "worst-case scenarios". The value-at-risk (VaR) methodology has been widely used in finance to estimate the maximum expected loss in value of a given portfolio. The data on Spanish tourist arrivals are useful for the VaR since they reflect the income effect of the shock produced by the global financial crisis of 2008. However, since no important health crisis has happened in Spain, these data do not incorporate fear of infectious diseases. This effect on travel reduction is estimated based on existing literature for other tourism destinations.

The second specific objective is to evaluate the potential for the reorientation of the outbound tourist flow to domestic destinations. We considered that since the mobility restrictions were implemented due to COVID-19, some Spanish outbound tourists could replace their planned trips to international destinations with overnight stays in Spanish regions. Therefore, there could be a positive "substitution effect" on Spanish domestic tourism that would reduce the expected loss measured previously.

The remainder of this paper is organised as follows. The next section describes the medical and economic crises provoked by the spread of COVID-19 and how containment policies affected different sectors, particularly tourism. The third section explains the role of domestic tourism in the recovery of the tourism industry and for the wider economy, both in general and for the specific case of Spain. The fourth section presents the methodology used to evaluate the maximum expected loss of the domestic tourism flow. The fifth section discusses the results, while the final section summarises the findings and presents the conclusions.

2. Medical and economic crisis

2.1. Slowing the spread of the disease

As shown in Fig. 1, there are two possible broad strategies for managing the health crisis. One strategy considers that containment policies will produce an economic disaster with dramatic social consequences. Accordingly, it is assumed that the number of deaths will be higher due to the forced rationing of healthcare facilities that have exceeded their capacity. Additionally, as more people are infected, the number of immune people increases, reducing the risks of the infection's future rebound. The other strategy develops different measures to contain the spread of the virus, trying to ensure a situation in which the number of severely infected people who require hospitalisation does not exceed the number of hospital beds available for severe cases (Baldwin & Weder di Mauro, 2020).

First, the priority objective was focused on health policies to help contain the spread of the virus (Gourinchas, 2020). Moreover, containment measures varied among countries in terms of both timing and type (IC, 2020). These differences will have very different consequences both for containing the health crisis and for the economic crisis.

2.2. Economic crisis

Based on Fig. 2, we analyze the effects of COVID-19 on aggregate supply and aggregate demand.

Shortly after the dramatic health consequences emerged, the economic implications began to be analysed (Baldwin & Weder di Mauro, 2020; Bofinger et al., 2020). Initially, most analyses focused on the supply consequences of the lack of intermediate inputs produced by China for world manufacturers. This condition has produced a contraction in world trade (Gopinath, 2020). Shortly after, as a result of the illness of many workers and of the policies to mitigate the spread of the virus (e.g., school closings, quarantines, border closures), the number of workers drastically decreased, thus causing another supply shock. We must also consider the demand shock caused by the drop in consumption as a result of the drop in income and lower export demand. This drop in demand will lead to job losses that will lead to another drop in consumption. Furthermore, companies and self-employed people have reduced their investment demand and face liquidity and solvency problems. Finally, this situation will have negative effects on the financial system (Bofinger et al., 2020).

2.2.1. Containment policies

The corollary of the severe economic crisis associated with COVID-19 in the words of Baldwin & Weder di Mauro (2020) and with a consensus of many of the world's leading economists is "*act fast and do whatever it takes*". As seen at the bottom of Fig. 1, the economic and social consequences of not carrying out policies that help contain the economic crisis associated with the health crisis would be dramatic. As Baldwin & Weder di Mauro (2020) note, the epidemiological shock is transitory, but economic and social damage could be persistent.

The range of economic policies that have been proposed in different countries is extensive. However, these policies can be grouped into demand policies (fiscal and monetary), supply policies (labour market and industry policies) and policies that support the financial sector.
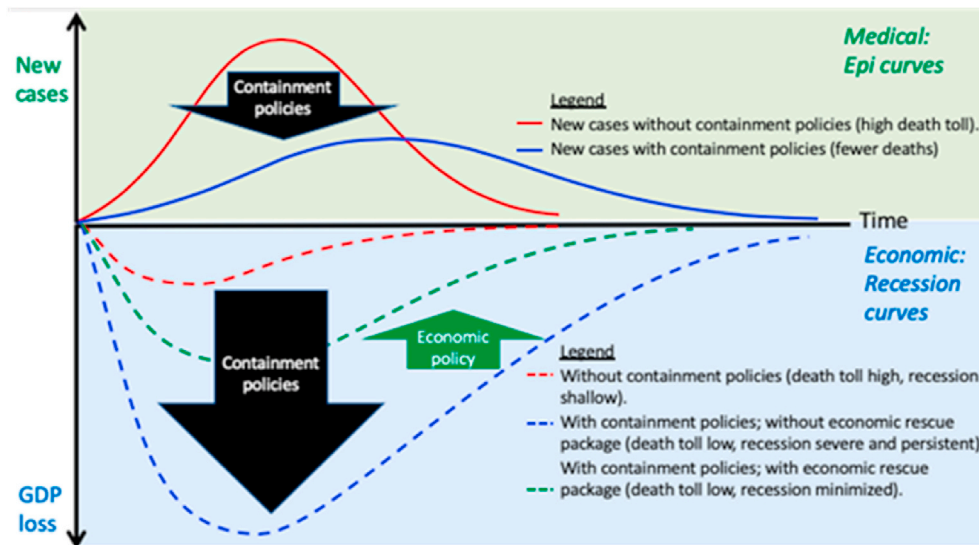
Fig. 1. The recession, made worse by containment policy, can be mitigated by economic policy.
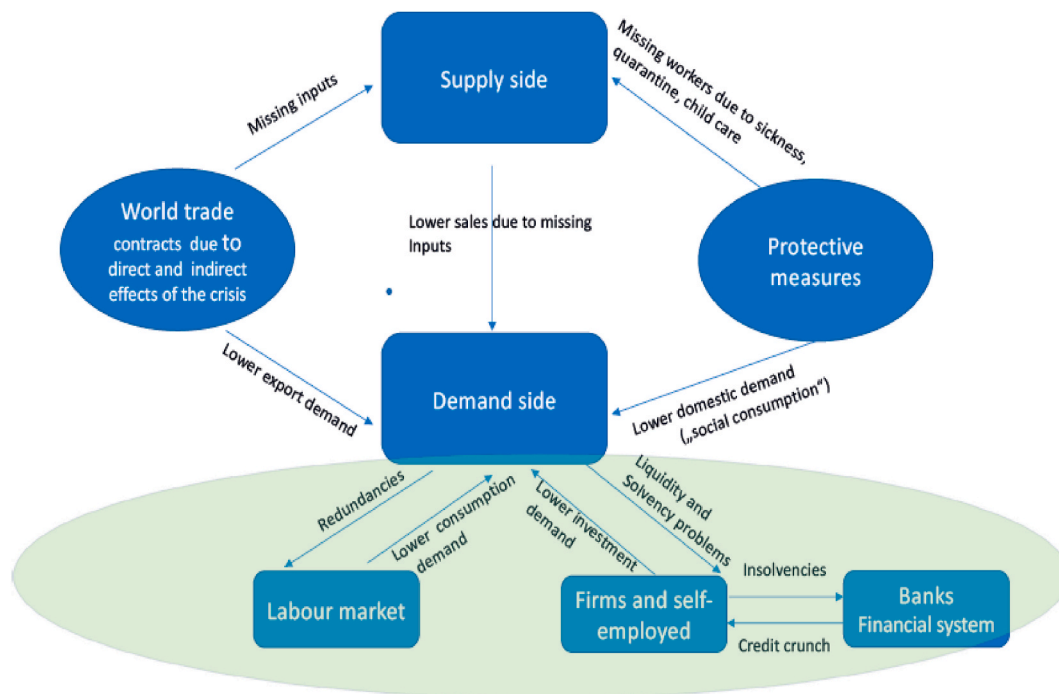Source: (Baldwin, 2020)based on (Gourinchas, 2020).

Fig. 2. Effects of COVID-19 on aggregate supply and demand
Source: (Bofinger et al., 2020)

Moreover, this crisis asymmetrically affected different industrial sectors. There is a high degree of consensus that the tourism industry (transportation and hospitality) will be the most affected by the crisis (see Fig. 3).

Therefore, it is necessary to consider the need for the intensification of measures or the development of specific measures for the tourism industry.

3. Domestic tourism to relieve the tourist industry crisis in Spain

3.1. The importance of tourism in Spain

Spain has been ranked as the world's second most popular destination, according to the United Nations World Tourism Organisation (UNWTO, 2019). It is also the most competitive country according to the Travel and Tourism Competitiveness Index. (WEF, 2019). The tourism sector plays an important role in the country's economy, contributing 12,2% to Spanish GDP (including 6,4% directly and 5,8% indirectly) and employing 12,8% of the total workforce. Although tourism-related activities were significantly affected by the financial crisis of 2008, they started to grow again in 2013, with an average annual growth rate of approximately 5% (Fig. 4).

During the last ten years, international arrivals to Spain, which make up 33% of tourist arrivals and 55% of tourism-related GDP (INE, 2020), have been growing continuously at an average of 2,6% per annum. In 2019, 83'509,153 tourists arrived in Spain from abroad. Fig. 5 shows the
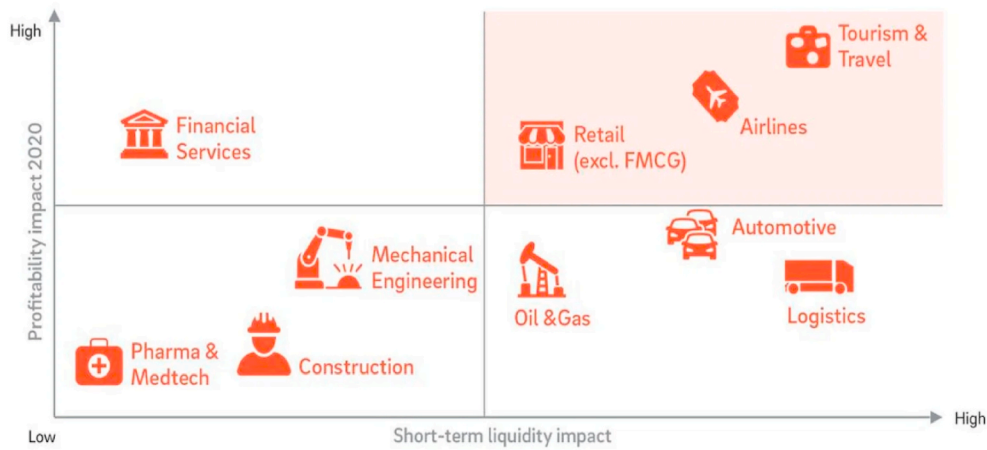
Fig. 3. COVID-19 impact matrix
Source (Roland Berger, 2020)
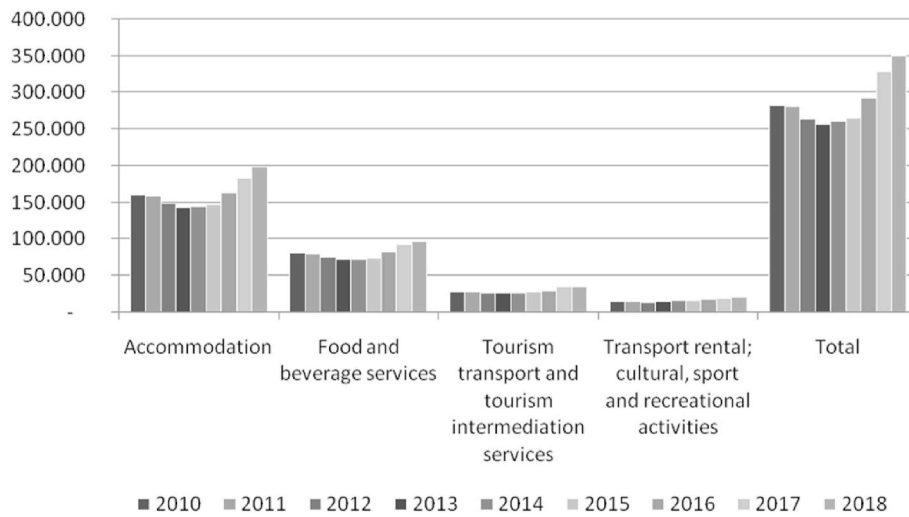
Fig. 4. Production by main tourism characteristic activities (in millions of Euros)
(Source: Tourism Satellite Accounts of Spain, INE 2020).

Region	International arrivals	Average annual growth rate (2006-2019)	Share
Catalonia	19.375.152	1,8%	23,2%
Balearic I.	13.679.781	2,3%	16,4%
Canary I.	13.146.863	2,3%	15,7%
Andalusia	12.023.153	3,0%	14,4%
Valencian C.	9.535.496	3,9%	11,4%
C. of Madrid	7.640.980	4,7%	9,1%
Galicia	1.624.711	2,5%	1,9%
Basque C.	1.611.280	3,1%	1,9%
Castille LaMancha	1.286.198	0,0%	1,5%
R. of Murcia	1.037.818	3,7%	1,2%
Aragon	544.761	1,5%	0,7%
Extremadura	469.398	5,5%	0,6%
Navarre	415.054	7,3%	0,5%
Cantabria	392.516	0,8%	0,5%
Asturias	317.860	2,9%	0,4%
Castille Leon	262.044	0,6%	0,3%
La Rioja	139.497	7,0%	0,2%
Total Spain	83.509.153	2,6%	100%

Fig. 5. International arrivals in Spanish regions, 2019

distribution of international arrivals among Spanish regions and average growth since 2010. The six regions with the highest international demand are coloured dark grey and jointly account for 90% of international tourist arrivals. They are traditional sun-and-beach coastal destinations (Catalonia, the Balearic Islands, Valencian Community, Andalusia and the Canary Islands) and the Community of Madrid, a traditional destination for cultural and business trips. During the last ten years, all regions showed positive growth in international arrivals, with some regions growing at an average of 7% per year during this time.

Since the beginning of the COVID-19 crisis, several specific measures have been promulgated to support the tourism sector. They include mortgage moratoriums for properties related to tourist activity, financial aid for projects promoting the digitalisation of tourism and sustainability of tourism destinations, and exemptions from social security taxes for some categories of workers (Government of Spain, 2020). There are no data yet to evaluate whether these measures are supportive. There are also some economy-wide stimulus measures, such as liquidity injections and fiscal relief, available for tourism businesses as well. Among these measures, the most welcomed by the sector has been the possibility of temporary layoffs and short-timework schemes (ERTEs, by their Spanish abbreviation). According to the Spanish Ministry of Labor and Social Economy, the hospitality and commerce sectors account for 44% of the total workforce affected by ERTEs (Government of Spain, 2020b). This temporary measure was adopted in the early stages of the pandemic but has been recently extended until January 31st, 2021.The tourism sector has actively demanded a further extension given the context of widespread economic weakness and uncertainty as to how the health situation will ultimately unfold.

3.2. The importance of domestic tourism

Buhalis (2020), in his communication on April 1st, warned that no considerable international tourism activity could be expected in the summer of 2020, and domestic tourism and staycations would prevail. In its optimistic scenario for Spain, the international consulting firm Deloitte expected that there would only be domestic tourism in August, while international tourism would not start to rebound before December 2020–January 2021 (Deloitte, 2020). The OECD believes that domestic tourism will play an important role during the recovery phase (OECD, 2020a).

Domestic tourism is the key driver of the tourism sector globally, accounting for 73% of total travel and tourism spending in 2017 (WTTC, 2018). However, governments and destination managers often prefer international visitors who are associated with higher spending capacities and foreign exchange (Archer, 1978; Jafari, 1986; Sheldon & Dwyer, 2010).

It is primarily during times of crisis when international travel is negatively affected that domestic tourism regains its importance for researchers and governments (Garau-Vadell et al., 2018; Kozak & Kim, 2019). Thus, a number of studies provide evidence of how the promotion of domestic tourism helped to counteract the decreases in international arrivals due to economic crises (De Sausmarez, 2007; Mikulić et al., 2018; Scheyvens, 2002; Song et al., 2019), to maintain jobs and sustain livelihoods after the fall of international tourism that resulted from a series of natural and man-made catastrophes (UNWTO, 2013),as well as the loss of international tourism resulting from the negative image that Arab and Muslim countries suffered as a result of the September 11th attacks (Al-Hamarneh & Steiner, 2004). Recently, during the global financial crisis, researchers have again devoted attention to domestic tourism as a means of reducing the economic impacts generated by the reduction of international tourist arrivals (Sheldon & Dwyer, 2010).

Domestic tourism has several benefits compared to international tourism regarding its role in economic development. For example, domestic tourism may result in a higher contribution to local development due to its capacity to decrease external leakages (Sheldon & Dwyer, 2010). Several studies on developing countries demonstrate that

domestic tourists are more likely to purchase more locally produced goods and services than other categories of tourists. These domestic tourists support small-scale enterprises and are more willing to participate in community development initiatives (Bowden, 2005; Liu & Wall, 2005; Scheyvens, 2007). Domestic travel, which includes visiting friends and relatives and other social occasions, disperses tourists to areas not frequented by international tourists and promotes more balanced regional development (Goh et al., 2015; Haddad et al., 2013; Li et al., 2016; Seckelmann, 2002). Moreover, domestic tourism is associated with more intensive pro-poor backward economic linkages than inbound tourism (Llorca-Rodríguez et al., 2020; Sindiga, 1996). Finally, domestic tourism helps address seasonality within regions (WTTC, 2018).

The importance of Spanish domestic tourism in relieving the tourism industry crisis due to COVID-19 cannot be overestimated. Even when mobility between countries begins to return to its previous levels, the fear of travelling, especially by air, will take time to disappear. This is an important limiting factor since the main origin markets are located at considerable distances from Spain, and the most used means of transportation is air travel. The option to arrive by private cars seems to be a viable option only for certain French and Portuguese tourists. Moreover, domestic tourism plays a pivotal role in the most important countries that contribute to Spanish tourism, such as Germany and the UK. This fact suggests that even when international mobility starts to rebound, domestic tourism in these countries will be a strong (and reinforced) competitor for Spain.

Spanish domestic tourism can be considered a solid basis for the revival of the tourism industry since Spaniards account for almost 70% of tourist arrivals in Spain (see Table 1) and account for 45% of the country's tourism-related GDP (INE, 2020). Moreover, there is the potential to reorient some Spanish outbound tourism to the domestic market. This segment currently accounts for approximately 10% of trips (Table 1) and 30% of tourism-related consumption of Spaniards (INE, 2020). Depending on the destination of outbound tourism, this shift could occur as a result of the limitations to travelling outside of Spain, the income effect, the fear of using air transport and the preference for close-to-home tourism by private car.

Finally, Spanish domestic tourism is also an important regional development factor. The study of Cortés-Jiménez (2008) shows that

Table 1
Inbound, domestic and outbound tourism in Spain (arrivals).

	2016	2017	2018	2019
Inbound tourism (I)	75,315,008	81,868,522	82,808,413	83,509,153
Domestic tourism (D)	166,218,791	176,399,801	176,772,352	173,754,971
Outbound tourism (O)	15,732,052	17,289,487	19,307,118	20,119,745
Internal tourism (D + I)	**241,533,799**	**258,268,323**	**259,580,765**	**257,264,124**
Share of domestic tourism in total internal tourism, %	68.82%	68.30%	68.10%	67.54%
National tourism (D + O)	**181,950,843**	**193,689,288**	**196,079,470**	**193,874,716**
Share of outbound tourism in total national tourism, %	8.65%	8.93%	9.85%	10.38%

Source: Elaborated by the authors from data from the Spanish Statistical Office (INE, 2020)

while both domestic and international tourism has positive influences on economic growth in Spanish coastal regions, for the internal regions of Spain, only domestic tourism has a significant, positive effect.

Domestic tourism is more equally distributed among Spanish regions (Fig. 6) than international tourism. The most attractive domestic destinations (coloured in dark grey and attracting more than 5% of domestic tourists) include Mediterranean sun-and-beach destinations (excluding the Balearic Islands) and some interior regions, such as Castille and León, Castille-La Mancha and Galicia. The least attractive regions are Navarra, La Rioja, and the Balearic Islands, each accounting for less than 2% of nights spent domestically. The financial crisis of 2008 resulted in negative growth of countries' GDP over five years (2009–2013) and affected domestic tourism more than international tourism. This is why, in most of the Spanish regions, domestic tourism shows minimal positive or even negative growth rates from 2007 to 2019. The fall in tourism activities explained before in Fig. 4 is thus mostly related to the fall in domestic demand.

Fig. 7 shows that the role of domestic tourism varies significantly among Spanish regions. For example, in Castille-La Mancha and Castille-and-Leon, the domestic market comprises more than 90% of the tourism portfolio. However, in the Balearic Islands and the Canary Islands, the role of Spanish tourists is less than 20%.

4. Materials and methods

The uncertainties associated with COVID-19 require the use of methodologies that consider the "worst-case scenarios". The value-at-risk (VaR) methodology has been widely used in finance to estimate the maximum expected loss of value of a given portfolio. It is important to mention that VaR studies use simulations on market risks based on price shocks, considering the difficulty for financial institutions in rapidly adjusting assets to counter changing market conditions (McNeil & Frey, 2000).However, in service and commodity markets, prices vary less than quantities both at seasonal and business cycle frequencies (Barsky & Miron, 1989). Specifically, in tourism, McAleer et al. (2005) state that "*the volatility in tourist arrivals and in their growth rates are conceptually equivalent to the volatility in financial returns, which is more commonly known as financial risk*". Lozano et al. (2020) demonstrate that short-term tourism demand changes result in volatility in quantities four times higher than volatility in prices. Specifically, they find that in the case of Spain, the rigidity of labour costs per worker seems to have been an important obstacle in short-term price flexibility. Finally, we can expect that the dependence of many tourist businesses, especially hotels, on tour operators may limit the possibility of rapidly adjusting prices

due to the annual nature of the agreements. For all these reasons, we consider that the most immediate risk of the pandemic is the reduction in quantities.

In our VaR analysis, we use the number of overnight stays as the tourism market risk variable. The data used were taken from the "*Residents Travel Survey*" (ETR/FAMILITUR). This survey provides information on the number of overnight stays carried out each month by Spaniards within the different regions of Spain and abroad (domestic and outbound tourism). The data from 2005 to 2014 are supplied by the Spanish Tourist Office while the data starting on January 1st, 2015are provided by the Spanish National Statistical Office (INE). Since the data series used different methodologies, we had to apply a statistical link for 2015/2014 provided by the INE (2020b) to form a continuous dataset. Based on this 2015/2014 link, it is possible to extend the series backwards with the interannual rates for 2014/2013, 2013/2012 and subsequent months available in Familitur.

4.1. Value at risk

The concept of value-at-risk has become the standard measure to quantify market risk(Linsmeier & Pearson, 2000; Sun & Hong, 2010). The VaR is defined as the maximum potential loss with a given probability "π" over a given time horizon "t" (Duffie & Pan, 1997; Glasserman et al., 2002). The formal definition of the VaR is as follows:

$$Pr[\Delta V \leq VaR] = \pi \tag{Eq 1}$$

where "ΔV" is the change in the value of the function "V" over a set time horizon with probability π (Danielsson & De Vries, 2000, pp. 239–270). Conversely, VaR can be written as a function of the probability π. Let F (•) be the cumulative distribution function (c.d.f.) of ΔV. Then, we get the following:

$$F^{-1}(\pi) = VaR \tag{Eq 2}$$

The VaR estimation entails the estimation of a quantile of the distribution of returns; therefore, the VaR could be defined as the alpha-quantile of a portfolio value, where losses greater than the VaR are suffered only with a small probability.

One of the main objectives of market risk analysis is measuring the extent of exposure to various aggregates according to changes in trade variables (Caporin, 2008; Duffie & Pan, 1997; McNeil & Frey, 2000). Currently, the negative shock to the tourism sector generated by COVID-19 has drastically reduced visits to tourist destinations. Therefore, it is important to estimate the potential impact that this pandemic

Region	Domestic arrivals	Average annual growth rate (2007-2019)	Share
Andalusia	32.717.537	-0,3%	18,8%
Catalonia	25.259.744	0,8%	14,5%
Valencian C.	19.779.616	2,7%	11,4%
Castille Leon	17.555.243	0,1%	10,1%
C. of Madrid	13.684.541	-0,5%	7,9%
Castille LaMancha	10.998.239	-0,4%	6,3%
Galicia	10.001.037	-1,5%	5,8%
Aragon	7.425.910	3,0%	4,3%
Canary I.	6.510.876	3,4%	3,7%
Basque C.	4.927.379	1,5%	2,8%
Asturias	4.844.535	0,7%	2,8%
Extremadura	4.469.918	-0,2%	2,6%
Cantabria	4.037.654	0,1%	2,3%
R. of Murcia	3.543.695	0,0%	2,0%
Balearic I.	3.275.923	-0,7%	1,9%
Navarre	2.913.496	4,2%	1,7%
La Rioja	1.633.103	1,3%	0,9%
Total Spain	**173.754.971**	**0,5%**	**100,0%**

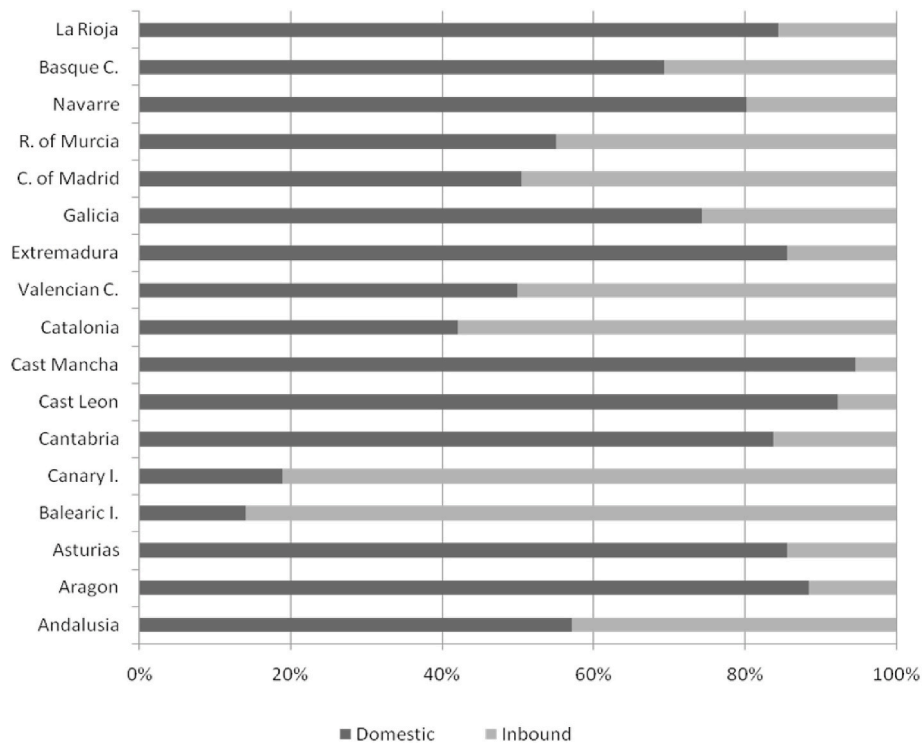**Fig. 6.** Number of domestic trips received by Spanish regions in 2019.

Fig. 7. Shares of domestic and inbound tourism by community (2019)

could generate on domestic tourism. For this research, we use VaR to assess the expected loss of overnight stays in Spain. Under this framework, we consider that each Spanish region represents a component of its domestic tourism portfolio.

One major challenge in VaR analysis is the specification of the probability distribution of returns (Danielsson & De Vries, 2000, pp. 239–270; Duffie & Pan, 1997; Glasserman et al., 2002). Moreover, extreme return distributions are not constant over time and thus pose exceptional challenges in their estimation (Engle & Manganelli, 2001). Therefore, VaR estimations are highly dependent on accurate predictions of uncommon events, or catastrophic risk, since the VaR is calculated using the lowest portfolio returns. Any statistical method used for VaR estimation must have the prediction of tail events as its primary goal (Danielsson & De Vries, 2000, pp. 239–270; Caporin, 2008).

Academic studies regarding VaR analysis propose several methods of calculating the VaR, such as the delta-normal approach or Monte Carlo simulation (Linsmeier & Pearson, 2000; Danielsson & De Vries, 2000, pp. 239–270). Among these, the Monte Carlo simulation approach is frequently used because it can be applied to a wide range of risk models (Pritsker, 1997; Sun & Hong, 2010). For this research, we will use both estimations to obtain a wider range of expectations for the loss of overnight stays for Spanish tourists.

Let $R^{(i)}_t$ denote the annual rate of change in overnight stays of the i_{th} region at time "t". The arithmetic rate of change of the Spanish tourist sector at time "t" (R_t) is:

$$R_t = \sum_{i=1}^{k} w_i R_t^{(i)} \qquad \text{(Eq 3)}$$

where w_i represents the weight of each region at time "t" in the total (overnight stays) of the country. Therefore, the expected annual rate of change of the Spanish tourist sector at time "t" is as follows:

$$E[R_t] = E\left[\sum_{i=1}^{k} w_i R_t^{(i)}\right] = \sum_{i=1}^{k} w_i E\left[R_t^{(i)}\right] \qquad \text{(Eq 4)}$$

The variance of the annual rate of change in overnight stays at time "t" is given by:

$$Var(R_t) = \sigma_{R_t}^2 = w^T \sum w \qquad \text{(Eq 5)}$$

where Σ is the variance-covariance matrix. In this approach, the standard deviations and correlations are computed from the time series of annual rates of change in the domestic tourist market following the suggestions of Linsmeier and Pearson (2000).

The delta-normal method is a parametric technique in which the returns of the market variables are considered to be normally distributed; therefore, practitioners can use the mathematical properties of the normal probability density function to estimate the VaR (Engelbrecht, 2003; Linsmeier & Pearson, 2000). The advantages of this method include its simplicity and the fact that the distribution of returns does not need to be assumed to be stationary over time since volatility updating is incorporated into the estimation (Engelbrecht, 2003).

A Monte Carlo simulation is considered to be more flexible and accurate than the delta-normal approach since it can take into account the non-linearities of the portfolio with respect to its underlying risk factors (Engelbrecht, 2003). A Monte Carlo simulation is a computerised mathematical technique that allows one to account for variability in the analysis. The primary advantage of a Monte Carlo simulation is that it is an extremely powerful tool for quantifying the potential effects of uncertainty. This is completely relevant in a context of high uncertainty such as with COVID-19.

A Monte Carlo simulation generates "N" hypothetical annual rates of change and uses these simulations to estimate the impact on the current situation. The outcome is a probability distribution of the overall value of the outcome variable calculated through iterations. For this research, we consider the number of overnight stays in the year 2019 as the current situation. Finally, the VaR is determined from this distribution, and it estimates the loss greater than a given probability π (Engelbrecht, 2003; Glasserman et al., 2002; Linsmeier & Pearson, 2000).

The first step to set a basic Monte Carlo approach for estimating loss probabilities requires the generation of N scenarios by sampling changes in risk factors $\Delta S^{(1)} \ldots, \Delta S^{(N)}$ over a given time horizon (Δt). For this

research, we will follow the proposal of Pritsker (1997) in which the changes in risk factor "i" ($\Delta S^{(i)}$) are simulated from historical realisations of the changes in risk factors (ΔS) over past periods (Pritsker, 1997). This approach implicitly assumes that future changes in the risk factors will resemble samples from past changes.

The second step requires revaluing the Spanish domestic tourism portfolio in scenarios $S + \Delta S^{(1)} \ldots, S + \Delta S^{(N)}$ and determining the annual rates of change in overnight stays in proportion to the current situation $R^{(1)} \ldots, R^{(N)}$.

Finally, the last step involves estimating the fraction of scenarios in which the expected losses exceed the probability π (the left tail of the distribution).

The empirical cumulative density function of the annual rates of change in overnight stays generated by the Monte Carlo simulation, $\widetilde{F}(\pi)$, is then used as a proxy for $F(\pi)$; therefore, $\widetilde{F}^{-1}(\pi)$ is the corresponding estimate of the VaR at confidence level π (Pritsker, 1997). Furthermore, note that $\widetilde{F}^{-1}(\pi)$ is an unbiased and consistent estimator of $F^{-1}(\pi)$ and that the estimated VaR ($\widehat{VaR}$) of this distribution is a consistent estimator of the real VaR, as $N \to +\infty$ (Serfing, 1980; Sun & Hong, 2010; Tridade et al., 2007).

Since the global financial crisis of 2008, which was considered the worst recession after the Great Depression, several scholars have become interested in extreme event analysis and the reliability of VaR methodology during unusual market conditions (Kourouma et al., 2010). Some authors investigated the performance of VaR models and argued that the results provided good predictions of market risk with a 95% confidence interval in stable market conditions; additionally, in the case of volatile market conditions, the tested models gave good estimates of market risk with a 99% confidence interval (Andjelic et al., 2010; Miletic & Miletic, 2015).

The VaR estimation allows us to mainly estimate the effect of the reduction in the income from overnight stays generated by COVID-19. However, there is a second effect that must be considered, which is linked to passengers' fear of travelling. To incorporate this effect, the authors reviewed the literature regarding the impact of different infectious diseases on tourism demand. According to the data provided by the WTTC (2019), it seems that fear may be related to disease mortality rates. While Zika provoked a 1% decrease in tourism arrivals, it was 41%–70% in the case of Ebola. We consider SARS to be the closest benchmark to COVID-19 since it is less lethal than Ebola (Lefebvre et al., 2014; Petrosillo et al., 2020). According to the WTTC survey, the maximum impact of SARS on tourism demand was a decrease of 28% (WTTC, 2020a). For this research, we use the same reduction rate as a proxy for the fear effect on each region. We admit that this could be a conservative estimate. COVID-19 is considered to be slightly less lethal but more contagious than SARS (Petrosillo et al., 2020); the real fear effect could be higher and last longer.

5. Results

The annual growth rate series statistics show uneven behaviour in domestic tourism among Spain's regions. The annual growth rates in Andalusia, Catalonia and the Community of Madrid show the lowest standard deviations, while those for the Region of Murcia and La Rioja
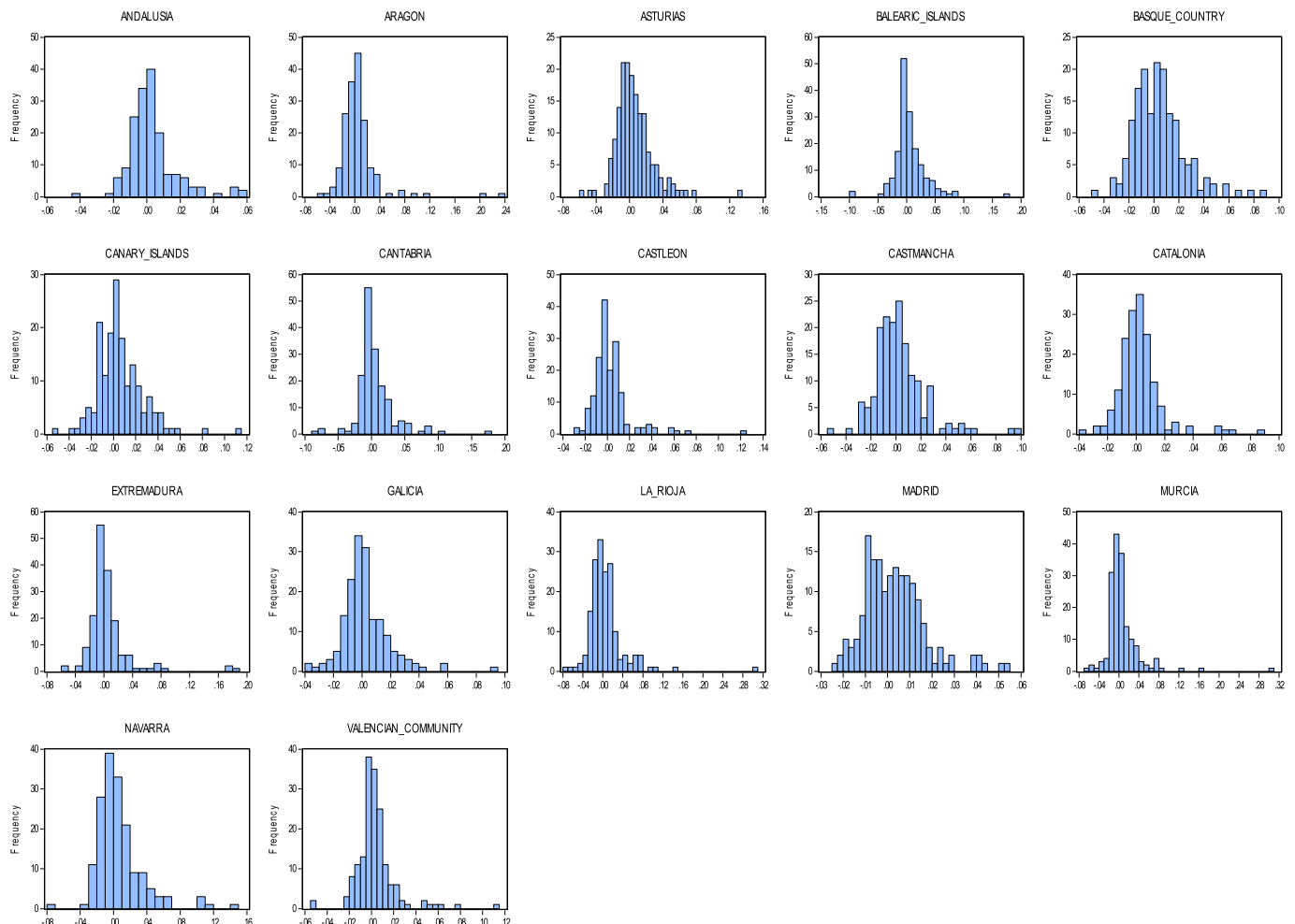

Fig. 8. Histogram of the annual rate of change of overnight stays by region

have the highest (Fig. 8). After we obtain the distribution of the annual rates of change in overnight stays, we use the mathematical properties of the normal distribution to calculate the loss of overnight stays that will be equal to or exceed a given percentage of the distribution.

The results of 100,000 Monte Carlo simulations show that in Spain, the reduction in domestic overnight stays generated by COVID-19 is expected to be 42.64% at the 99% confidence level; however, this loss can be considerably compensated by the reorientation of outbound tourism back into the national market. Fig. 9 shows the estimations of how much the fall in domestic demand can be reduced depending on the share of the outbound tourism that is reoriented. The estimations are made for all possibilities ranging from 0% to 100% with a step of 5%.

By analysing the maximum expected loss of overnight stays among the Spanish regions, we can see that the loss is not homogeneous (see Table 2 and Fig. 10). The smallest losses in overnight stays are predicted for the Community of Madrid (35,29%), Andalusia and Aragon (35,14% in each community). The Canary Islands and Castille-and-Leon are the regions with the highest expected losses (59.40% and 58.77%, respectively). The differences in the losses are due to the historical volatility of tourism demand in these regions, where the most important effect is income.

Fig. 10shows that there is no clear spatial effect in the distribution of the losses in domestic tourism. It should also be noted that in island tourist destinations (such as the Canary Islands and the Balearic Islands), the great dependence on air and sea transportation could generate expected losses even greater than those estimated by the VaR analysis if mobility restrictions are applied to these.

Next, we evaluated the potential of domestic tourism to relieve the local tourism industry in the absence of inbound tourism for all of Spain and each community. First, we calculated the expected volume of overnight stays by domestic tourists in the simulated period considering the expected losses at 99% confidence levels. Furthermore, for the same period, we calculated the potential additions to domestic tourism from outbound tourism, considering pessimistic, moderate and optimistic situations in which 0%, 50% or 100% of such tourists are reoriented. In this case, the outbound overnight stays were allocated according to each community's share of domestic tourism. Finally, the share of expected domestic and reoriented outbound overnight stays in July 2020–June 2021 over the sum of domestic and inbound overnight stays in 2019 was calculated (see Fig. 11).

As shown, domestic tourism can have more or less potential to provide relief for the tourism industry. Assuming a moderate situation where Spain manages to reorient 50% of its outbound tourism to the internal market, domestic tourism has the potential to generate 35,6% of the total pre-crisis overnight stays in Spain. However, this figure varies significantly among Spanish regions. For example, if the communities manage to attract 50% of their potential share in outbound tourism, domestic travel may generate up to 67% of the pre-crisis overnight stays in Aragon and up to 70% in Castille-La Mancha. In the rest of the communities, this rate will vary from 30% to 60%. The Canary Islands

Table 2
Ranking of communities by their loss of domestic tourism.

Region	Maximum expected loss of domestic tourism
Canary I.	59.40%
Castille and Leon	58.77%
La Rioja	49.78%
R. of Murcia	48.98%
Valencian C.	45.53%
Extremadura	44.85%
Balearic I.	43.72%
Asturias	43.67%
Cantabria	43.29%
Navarre	41.95%
Galicia	41.48%
Catalonia	40.23%
Basque C.	40.01%
Castille-La Mancha	37.95%
C. of Madrid	35.29%
Andalusia	35.14%
Aragon	35.14%

and the Balearic Islands are notable exceptions because domestic tourism will potentially generate only 9.6% of the pre-crisis overnight stays in these communities.

The present analysis shows the joint effect of the historical volatility of domestic tourism in a region, its relative importance compared to international travel, and the region's potential share in reoriented outbound tourism in terms of the viability of the recovery strategy based on domestic travel. For example, the reliance on domestic tourism seems to be viable in Castille-La Mancha and Aragon due to the traditionally high shares of domestic tourists in their portfolios and the relatively low maximum expected losses in domestic overnight stays. In contrast, in the Canary Islands, domestic tourism plays a residual role in the regional's portfolio. Moreover, the maximum expected loss of domestic overnight stays is the highest among the regions. These factors reduce the chances of domestic tourism to offset the fall in international demand. In the Balearic Islands, the maximum expected loss of domestic tourism is expected to be average among the regions. However, its low relative share in the regional and Spanish domestic tourism market are the factors that potentially limit the possibility of filling the void of international visitors with domestic travellers. The Balearic and Canary Islands will need to make special efforts to attract new segments of domestic tourists. Other tourism destinations can make a similar analysis to evaluate the viability of the recovery strategy based on domestic travel.

Consequently, a deep understanding of the characteristics of domestic travellers and the volatility of their demand could be valuable tools for a destination to evaluate the potential of a strategy of reliance on domestic tourism. For example, we used a rough estimate of 28% to simulate the fear effect of disease outbreaks on tourism arrivals. However, further research on the fear of contagion and risk perception of COVID-19 would be useful due to the specific characteristics of this disease. The fear effect may be different among age groups since COVID-19 more severely affects older adults. Hence, the fear effect on arrivals can potentially be longer and more pronounced in the regions where such tourists represent an important segment. For example, in Spain, this may happen in regions with a conspicuous share of travellers using the Spanish social tourism programme for older adults (IMSERSO). In this respect, the management of the health image is of particular importance (Moreno-Gonzales et al., 2020). Further research is also necessary for increasing the chances of reorienting pre-crisis outbound tourists to national markets. For example, the characteristics of outbound tourists and the factors affecting the choice between domestic and outbound travel have not been a focus of research so far. For instance, little is known about the outbound travels of Spaniards.

All this information would be essential for creating efficient initiatives to promote domestic travel, such as marketing campaigns and
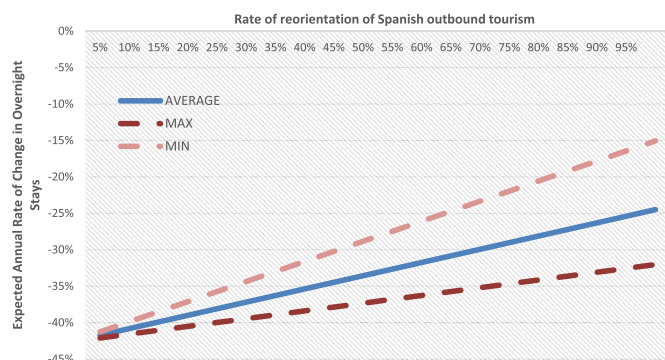

Fig. 9. Simulation of the effect of the reorientation of outbound tourists on VaR

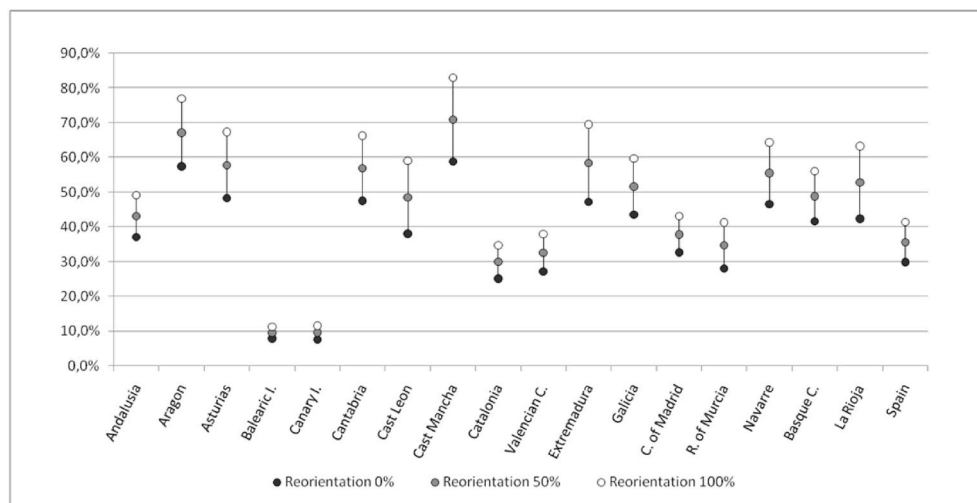**Fig. 10.** Maximum expected loss of domestic tourism by region

Fig. 11. Expected domestic overnight stays in July 2020–June 2021 as a share of the pre-crisis domestic and inbound overnight stays.

financial incentives (UNWTO, 2020b). The latter type of initiative is especially important in countries where citizens have a low spending capacity, and there is a high dependence on international visitors. This group includes many so-called SIDS (small island developing states). The majority of these are highly dependent on tourism and have hardly been hit by the actual COVID-19 pandemic (UNWTO, 2020c). In Spain, no specific measures have been taken at the country level to promote this segment of tourism demand so far. However, during the summer of 2020, many Spanish communities held promotional campaigns to attract domestic tourists. This contrasts with the considerably more active actions undertaken by other countries that have designated special budgets for marketing campaigns to promote inbound travel (Australia and Philippines), offering discounts for visiting local destinations (Indonesia), vouchers to spend domestically (Iceland), and for purchasing domestic air routes when commercial operations are not feasible due to the crisis (Norway) (OECD, 2020a; WTTC, 2020a).The

absence of domestic tourism makes a destination more vulnerable to drops in international tourism. Hence, the measures to promote domestic tourism should be given greater weight and considered within the broader context of destination resilience.

6. Conclusions

Efforts to contain the spread of COVID-19 are producing dramatic negative impacts on the global economy, resulting in a worldwide recession. There is a high degree of consensus that the tourism and travel industry, especially the airlines and retail segments, will be the most strongly affected sector with very substantial reductions in income and liquidity. While governments must improve the coordination of containment measures to restore international mobility, domestic tourism can provide relief for national tourism industries.

Our results show that the negative impact of COVID-19 on Spanish

domestic tourism is considerably high. The reduction in overnight stays is expected to be approximately 42.64% at the 99% confidence level. This reduction can be partly compensated for by the reorientation of outbound tourism to the domestic travel market, suggesting the use of policies encouraging Spaniards to visit national tourism attractions instead of travelling abroad. Furthermore, the negative impact of the crisis is not expected to be homogeneous among Spanish regions; it will produce decreases in domestic overnight stays from 35 to 60%, depending on the historical volatility of a region's tourism demand.

The simulations of the tourism flow suggest that the reliance on domestic tourism and the reorientation of outbound tourism can be a fruitful strategy to help the tourism sector survive the crisis when inbound tourism falls to zero. These two types of travel can potentially generate approximately 35,6% of the pre-crisis overnight stays for the entire Spanish tourism sector. On the regional level, domestic and reoriented outbound tourism may generate from 10% (in the Balearic Islands and the Canary Islands) to 70% (in Castille-La Mancha). This figure will vary depending on the traditional orientation of a region's portfolio towards the domestic market, the volatility of its domestic demand and the region's potential share in reoriented outbound tourism.

An important novelty of this research is the use of VaR to estimate the maximum expected loss in Spanish domestic tourism. To the best of the authors' knowledge, there are no previous studies in the field of tourism economics that use this tool to assess the potential losses in tourism flows generated by external worldwide shocks. From a practical perspective, this analysis can contribute to better-informed decisions on the role of domestic tourism as a part of a destination tourism portfolio. The use of the VaR methodology helps us to better understand the market risk in countries with several tourist destinations, especially in the context of large negative international shocks. This analysis is useful for identifying destinations with more or less resilience to these shocks and fostering tourism policies to minimise them. This methodology can be readily replicable for any other destination, subject to the availability of data. Notably, the VaR models based on new tourist data reflecting both fear and income effects of the COVID-19 crisis will be able to give more exact predictions of the effects of future pandemics.

To improve the precision of the model, further research should focus on the characteristics of domestic travellers and the volatility of their demand. Similarly, the characteristics of outbound tourists and the possibility of reorientation of outbound tourism to domestic market in the case of a pandemic should be studied. To the authors knowledge these aspects have not been a focus of research so far. The results are likely to vary among the countries, so country specific studies would be necessary.

Another important issue for further research is the understanding of the fear of contagion and risk perception of COVID-19. The fear effect may be different among age groups since COVID-19 more severely affects older adults. Consequently, it is essential to understand the impact of the fear effect and its duration, which can also vary for different tourism origin markets. As a specific application it would be interesting to analyze if there are differences between island and mainland tourism destinations. All this information would be essential for creating efficient campaigns to recover destination's safety perception and to manage the fear of contagion.

Authorship statement

Italo Arbulú; Resources, Supervision. Maria Razumova: Methodology, Software, Supervision. Javier Rey-Maquieira: Methodology, Software, Resources. Francesc Sastre: Software, Writing – review & editing, Supervision

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