

AN APPROACH TO THE INFLUENCE OF CLIMATE CHANGE ON THE SEASONAL REAL ESTATE MARKET

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ABSTRACT

The effects of climate change are becoming more apparent day by day. This is reflected in an increasing global warming that produces changes in the climate in the short and medium term with potential and growing consequences in the behavioral patterns of society.

The climate crisis described above may have significant consequences on the vacation dynamics of national and foreign audiences. Effects such as the increase in temperatures, the desertification and erosion of large areas of the territory, or the scarcity of rainfall, reduce or alter the appeal of traditional holiday destinations. The loss of interest in typical tourist areas and the detour of their public to other areas that had never been touristic, cause alterations in the real estate market.

Despite the topicality and importance of this subject, the existing bibliography is scarce and scattered. This paper attempts to compile the existing scientific publications on the effect of climate change on real estate investment, as well as the main factors to be considered.

KEYWORDS

Climate change; tourism; real estate; investment; outcomes.

1. INTRODUCTION

The effects of climate change on the climatology and our environment are becoming more visible every day. So much so, that the European Parliament on November 28th 2019 declared the status of climate emergency and the aim of limiting global warming to 1.5°C during this century, in order to avoid the considerable reduction of the global biological diversity, in addition to other possible consequences.

Tourism is a sector that requires favourable weather conditions to attract consumers demand and therefore it can be affected by changes in climatology. Variations in climatology can reduce the attractiveness of traditional holiday destinations, or shift the demand away from traditional holiday destinations. Changes will manifest in a wide variety of ways, such as, the increase and intensity of extreme storms, or changes in the precipitation patterns. Furthermore, global warming will cause variations in the environment such as the sea level rise, the glaciers disappearance or the increase of desert areas.

In Spain, the tourism sector is one of the main boosters of the economy and the creation of employment. Proof of this are the record figures for the pre-pandemic situation in 2019, when the contribution to GDP was 12.4%, receiving 83.7 million tourists according to the National Institute of Statistics. In the coming

decades, our country faces uncertainty about how it will cope with the effects of global warming and whether tourism infrastructures will be able to adapt or whether it may already be too late to do so. The variation in demand for holiday destinations is directly related to trends in the real estate market in these areas. In the medium and long term, the value of the assets and the investments of families and companies may be reduced if the weather and natural environments of these destinations change considerably, since it may difficult to perform the activities for which they were chosen (winter sports, coastal tourism, etc.).

The existing literature about the impact of climate change on tourism and the holiday real estate market is very scarce and biased. Particularly, in the case of finding specific literature on south-western Europe or Spain. For this reason, the present study is primarily intended as a literature review of the published bibliography regarding the effects of climate change on the Spanish holiday real estate market. In this way, conclusions could be drawn on future trends in holiday real estate investments and how this will affect the value of the existing properties. However, after an initial screening, it is clear that the number of publications is very limited. Therefore, this literature review is finally approached as the basis for the analysis of the impact of climate change on the seasonal real estate market, as well as on the tourism sector. It also aims to answer the question of whether the tourism sector is adapted to cope with the effects of climate change, by asking to more specific future investigations, whether the main Spanish tourist destinations are adapted, or will be able to adapt to the effects of climate change before it would be too late.

This study is organised into three sections. The first section studies the effects of climate change on the real estate market, in particular, the variations produced in the assets valuation and the changing investment trends on the real estate sector. It also describes some of the strategies being taken by the real estate sector

to adapt its properties to the consequences of global warming. The second section analyses the impact of climate change on the tourism sector. Following several areas into which Scott and Stefan divide their research findings, this section distinguishes between three of the main tourism sub-sectors that are most likely to be affected by climate change in natural environments: winter sports tourism, coastal tourism and nature-based tourism. Therefore, some sub-sectors, such as urban, cultural and business tourism, have been excluded from this analysis, as they are considered to be more resilient to changes in climatology and will be more adaptable to the impact of climate change. Trips of these types of tourism are conceived on the basis of the specific destination, rather than the environment or activities to be undertaken. Finally, the third part seeks to answer the question of whether today's major tourist destinations are adapted to cope with the effects of climate change. In other words, whether they will be able to maintain their current attractiveness and demand for travellers, or whether demand will shift to other places that currently are less appealing for tourists. Finally, the conclusion describes the results obtained after relating the impact of climate change on the real estate market and the tourism sector.

2. THE IMPACT OF CLIMATE CHANGE ON REAL ESTATE INVESTMENT

Facing the climate crisis in which the planet is immersed is one of the main challenges that our society deals today. The effects of climate change are becoming more severe day by day. In order to mitigate these consequences, governments and corporations have focused on ESG (*Environmental Social Governance*) policies. As part of the measures they are beginning to implement, these initiatives seek to bring benefits to the environment and to the society. Some of these measures are targeted to reduce energy consumption and greenhouse gas emissions

produced by buildings. Buildings are the origin of approximately 36% of global greenhouse gas emissions. Periodic refurbishments of the existing buildings, based on energy efficiency and the reduction of greenhouse gas emissions, reduces the risk of loss of the property value and the disinvestment liquidity of the assets. Proof of this is the current trend in certificate buildings with internationally recognised environmental seals, such as LEED, WELL or BREEAM at different levels, with the aim of improving their interest for potential users and investors. These certificates also ensure that certain international environmental requirements are fulfilled, promoting the recycling of waste, the production of renewable energy, the use of public transport, electric vehicles and bicycles, the improvement of insulation in building shells and the quality of air inside the buildings, as well as other improvements.

All these actions at particular level are not enough to tackle global warming from an urban and territorial perspective. Neither do they prevent the devaluation of real estate assets or the reduction of investors' interest in certain areas or sectors. To address this, joint action by governments is needed to establish international environmental policies; these should regulate, through legislation, limitations on buildings energy demand and greenhouse gas emissions. They must also promote, through investment assistance and tax exemptions, that private entities and households undertake the appropriate measures to achieve the reduction of greenhouse gas emission targets and to limit global warming during this century. An example of such policies is the Directive 2018/844/EC promoted by the European Union to support EU constituent governments to foster energy efficiency and sustainability improvements in the existing buildings.

Nowadays, although they are increasingly taken into consideration, ecological variables such as the energy savings produced by the installation of renewable energies or the reduction of emissions during the life cycle of a building, whether for the approval by an investment

committee of any real estate operation or in the decision of an individual to purchase a home, are not as decisive as more conventional factors, such as short/medium-term profitability, location and services in the surroundings. As Ristimäki et al. determine, the preliminary combined analysis of economic and ecological variables during the life cycle of buildings helps to economically justify the sustainable design of new urban developments.

On the other hand, there is also an emotional factor in the variation of real estate prices, as demonstrated by the study of Baldauf, Garlappi and Yannelis, in which the results obtained confirm the hypothesis that differences in beliefs about climate change are reflected in the price of housing in different neighbourhoods in the US. Specifically, their main finding was that, considering all other parameters being equal, homes located in "denier" neighbourhoods sold for 7% more than homes in "believer" neighbourhoods in the same city. They concluded that heterogeneity in beliefs about long-term climate change risks significantly affected the housing market in their country. As investments in commercial real estate assets, they also are influenced by emotional drivers, such as the interest on the buildings for potential users or the destinations chosen by tourists for their next holidays. Consequently, any variation in tourism demand for a destination will lead to changes in its economic activities and companies' performance, correcting the value of real estate assets from the point of view of profitability investment.

3. EFFECTS OF CLIMATE CHANGE ON THE TOURISM SECTOR

Climate change will undoubtedly affect the development of the international tourism sector, but as Scott and Stefan describe, climate change is only one of several macro-economic parameters (e.g., among others, the cost of travel, political stability, currency exchange or natural disasters) that combined will affect the

prospects for international tourism. According to their study, climate change will affect tourism in four different ways:

- Direct impact on climatology, varying the length and quality of climate-dependent tourism seasons, operating costs, location decisions, attractiveness and tourism demand of destinations, etc.
- Environmental changes caused indirectly by climate; affecting natural assets that define the image of destinations and are key attractions for tourists.
- Socio-economic disruptions caused indirectly by climate; such as reduced economic growth and available wealth, increasing political instability, etc.
- Policy responses from other sectors, such as mitigation policies, which could alter transport costs and the selection of destinations, adjustment policies related to reduced water consumption, etc.

Depending on the geographical location and type of tourism, the climate crisis will affect tourism destinations differently. Places that are more focused on urban activities, such as business or cultural tourism, will be less affected by the effects of climate change. This is due to the fact that activities are mainly carried out inside buildings and have a greater number of infrastructures, making it easier to adapt to weather inclemencies and changes in the environment. Therefore, based on the division of several areas into which Scott and Stefan divide the findings of their study, this section analyses the main tourism sub-sectors that will be most severely affected by the impact of climate change, excluding cultural and business tourism for the reasons above mentioned.

3.1. Winter sports tourism

Due to its dependence on climatology fluctuations, winter sports tourism is the tourism market with the greatest impact and the most immediate impact of the global

warming. The ski industry has been the first and most studied industry to analyse the effects of climate change on tourism. Similarly, today, there is a growing interest from ski industry professionals (such as investors, ski area owners and snow management companies) in climate risk information and expert advice on the implications of climate change. Industry stakeholders need to know in advance the effects of climate change to enable a more climatology-resilient and sustainable adaptation of the tourism sector in mountain regions of the world (Steiger et al., 2017).

Most part of the literature studies the effect of climate change from the demand or supply side. However, as Scott and Stefan state, most of these studies suffer from important limitations that reduce the validity and restrict its relevance for decision-making. The use of inappropriate indicators and the omission of snow-making in regions where it has been an integral adaptation to climate variability are the main limitations of the studies. However, studies that consider artificial snow production, such as the two developed by Steiger (2010 and 2011), conclude that the impact of climate change is substantially lower than those that have omitted it. According to Scott and Stefan, the most likely effect of change will be a contraction in the number of ski operators in the more regional markets, although the variation in demand of different areas should be found out by future researchs.

3.2. Coastal tourism

There is a wide variety of publications that study the impact of sea level rise on the economy (Bosello et al., 2013), even the disappearance of large geographical areas at sea level or the main consequences such as the scarcity of drinking water (Kwadijk et al., 2010). In contrast, the effects of sea level rise on coastal tourism have been less well documented in academic research. As Scott and Stefan suggest, this may be due to the shortage of geospatial information sets available on coastal tourism assets (resorts, beaches, transport infrastructure,

etc.). Several publications have highlighted the loss of high-value beaches, destruction of tourism infrastructure, alteration of biodiversity, increasing need for beach protection and changes in coastal aesthetics as the main effects of sea level rise on coastal tourism. The majority of the literature studying the consequences of sea level rise in coastal areas is based on engineering and geospatial models. However, they do not adequately assess adaptation strategies, such as structural coastal protection, which could be an economic response to land loss and infrastructure damage. By contrast, coastal protection may not be economically viable in some coastal areas, and it will vary according to the density of accommodation and infrastructure for each location. In addition, coastal protection may not be compatible with most of hotels and resorts, as they should preserve sea views, easy access to the beach and the aesthetics of the beaches in order to maintain their attractiveness for tourists.

On top of this, according to Arabadzhyan et al., with regard to tourist behaviour, studies differ considerably in the variables selected (willingness to return to the destination, alternative destinations, reduction in the number of visitors, etc.), as well as in the regions under study in order to share the same conclusions. Likewise, as these are non-linear processes, it is difficult to draw general conclusions; on the one hand, climatology is variable and can affect neighbouring territories in very different ways; on the other hand, tourist behaviour is complex, since, for example, individual heat stress does not increase proportionally with temperature, it appears when a certain temperature threshold is reached.

Tourists seek to escape from the heat of cities by choosing coastal destinations for their holidays despite similar temperatures. So high summer temperatures may have less impact on tourist demand for coastal destinations. Therefore, in order to assess the socio-economic effects of climate change on tourism, it is essential to use non-linear methodologies, or methodologies

that complement linear models to draw more relevant conclusions.

3.3. Nature-based tourism

The effects of climate change on natural resources and the environment are becoming more tangible, although this varies heterogeneously depending on the location and type of environment (glaciers, coral reefs, mountains, beaches and fjords, etc.). The impact of global warming on nature-based tourism has been studied in many different regions of the world. One of the natural environments mainly affected by climate change with great attractiveness for tourists are glaciers which, as Wang and Zhou state, are losing their visual attractiveness in some of their environments or even tend to disappear due to ice melting and sliding. This will increase the loss of tourism demand and economic development in certain mountain areas. As the Unesco stated, glaciers in one-third of World Heritage sites will disappear by 2050 regardless of the applied climate scenario and glaciers in around half of all sites could almost entirely disappear by 2100 in a business-as-usual emissions scenario⁵. Local adaptation measures in these areas will not be able to remedy or slow down the problem; global measures must be put in place to reduce greenhouse gas emissions and global warming. According to Scott and Stefan, after the episodes of coral bleaching on the Great Barrier Reefs during the 1990s and 2000s, surveys were conducted asking divers whether they would return to the destinations if the reefs were degraded. For example, in a survey conducted in Zanzibar (Tanzania) and Mombasa (Kenya), only a small proportion (28 and 45%) were aware of coral bleaching, and a considerable proportion (40 and 33%) indicated that they would return to dive on a degraded reef, showing that there would be some market for degraded reefs. Furthermore, when tourists in the Great Barrier Reef area were surveyed about coral bleaching, only a small proportion (13%) would not revisit the region, but a large group (41%) were hesitant

about their intentions. However, desert areas such as the Middle East, North East Africa or large deserts such as the Atacama Desert will be more resilient to the effects of change as they comprise large areas of arid land with low rainfall and flora and fauna diversity. Another decisive factor for nature-based tourism is the loss of biodiversity and the reduction of the existing fauna, as this may significantly reduce the interest of visitors seeking to see certain animal species that are currently protected or endangered. As Scott and Stefan state, the findings of the different studies suggest that the effects of climate change on the environment will differ between different tourism markets. There is also evidence that discounted fares may compensate, in some part, for the degradation of certain destinations.

4. IS THE TOURISM SECTOR ADAPTED TO CLIMATE CHANGE?

As discussed formerly, it is crucial to have a comprehensive research framework on the effects of global warming in the different tourism sub-markets, well in advance, so that the tourism stakeholders can implement the correct measures to minimize the impact of climate change on tourist demand. Governments and, in particular, international organisations should take the immediate initiative to establish international mitigation policies that promote greenhouse gas emission neutrality in transport and energy consumption. The measures to be put in place should be backed by substantial financial support and long-term tax exemptions. As there is a large time bias between the viability of companies' business plans (less time-bound) and the benefit/cost assessment of investment in sustainable solutions. Similarly, major airlines, shipping and energy companies should focus their research on developing new greenhouse gas neutral fuels in order to develop sustainable travel methods. If the main effects of the current climate crisis (such as global warming,

changes in climatology, sea level rise and loss of biodiversity) are to be reduced or even reversed, mitigation policies must be taken globally, otherwise the result will not be sufficient or will be accomplished too late.

As well as the tourism sector must adapt on the supply side, there is a growing consciousness among tourists to travel more sustainably (i.e. choosing closer destinations, using more efficient transport methods, selecting accommodation with certifications based on energy efficiency and sustainability, etc.). However, as Scott and Stefan indicate, although a considerable proportion say they are willing to pay some additional charge or fee to offset environmental costs, only less than 5% say they have paid, or always pay, charges for offsetting environmental effects.

All measures put in place to mitigate the effects of climate change and its consequences on the tourism sector will bring results in the medium and long term. In the short term, the tourism sector and public administrations will have to invest collectively to remedy the effects of climate change, such as damage on infrastructures, nourishment of environmental resources such as beaches after severe storms or forests after wildfires, artificial snow-making, etc. Thereupon, developing countries and small archipelagos, which have fewer resources and are more dependent on international tourism, may be more affected by the effects of climate change and the slowdown in economic development that tourism entails for them.

5. CONCLUSIONS

This study analyses the impact of climate change on the seasonal real estate market by examining its effects on the tourism sector. Any variation in tourism demand of a region will lead to changes in its tourism activity and in the operational profitability of sector companies, these will produce a correction on the value of the properties from the point of view of profitability as an investment.

Despite the topicality of the issue, the effects of climate change and its impact on the seasonal real estate market, it has been observed that there is a scarce number of academic publications about it. This may be due to the relevance of the subject, the recent concern of the society on the effects of global warming or the complexity of undertaking a research that encompasses geospatial, climatic, economic and non-linear parameters regarding human behaviour. Likewise, the impact of the climate crisis will vary depending on the destination under study and the type of tourism it performs. That is, areas that develop their tourism on natural environments and focus their activities on the environment as the main resources for attracting tourist demand will be more affected. On the other hand, urban regions that mainly promote cultural or business tourism will be more resilient to the impact of climate change, since their activities are mainly carried out in indoor areas and they have a greater number of infrastructures, easing the adaptation to weather inclemencies and variations on the environment. Furthermore, regions located in developing countries or small archipelagos, that are more dependent on international tourism to improve their economic prosperity, as well as, destinations that promote tourism based on nature or dependent on good climatology will be the most affected. Accordingly, there may be regions or types of tourism that won't have enough resources to adapt in time to the impact of climate change. Depending on the results of mitigation and sustainability policies, as well as the economic resources that companies and governments are willing to disburse, destinations traditionally known for their high demand for winter sports, coastal or nature-based tourism may cease to be so.

The severity of climate change stills uncertain in the medium to long term, and the consequences can be unpredictable. Mitigating climate crisis through far-reaching action to reduct and eliminate the greenhouse gas emissions is one of the most important initiatives that society must undertake to deplete the increasing global

warming. Moreover, it is necessary to encourage further research on the impact of global warming on the real estate market, in order to, not only inform investors and households of the resulting corrections in the value of their real estate properties, but also to expose, well in advance, the changes in trends and variations in demand of real estate investments that will take place between certain regions. This study can therefore serve as a basis for any investor, private or institutional, when analysing any investment opportunity in the seasonal real market in order to ponder it about beyond a standard feasibility study. Any investment feasibility study should also integrate a longer-term analysis, beyond the temporality of the business plan. The inaccuracy regarding the celerity and severity that climate impact may cause to any new acquisition loss of interest as an investment, that it held thus far.

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