# Tourism in Iceland: Persistence and seasonality

CrossMark

Luis A. Gil-Alana[a],[*],[1], Edward H. Huijbens[b]

[a] University of Navarra, Pamplona, Spain
[b] University of Akureyri, Iceland

## ARTICLE INFO

## ABSTRACT

This paper analyses tourism in Iceland using fractional integration and taking into account the seasonality and the degree of persistence in the data. Using annual data, the unit root hypothesis cannot be rejected, implying permanency of shocks. However using, monthly data, a break is found at 2009m7 and the orders of integration are in the interval (0, 0,5) suggesting mean reversion. The conclusion is that exogenous shocks impacting inbound tourism do not persist and tend to disappear relatively fast. The key policy implications thereof are reported at the end of the paper, critiquing the classical response to perceived slumps in inbound tourism that include marketing and promotion instead of developing infrastructure in anticipation of resumed growth in inbound tourism.

## Introduction

This paper analyses the development of the Icelandic tourism sector through inbound tourism statistics as compiled by the Icelandic Tourist Board. The data is analysed using time series techniques based on the concept of fractional integration or I(d) behaviour, which allows for an investigation into the degree of persistence in the data. By persistence we mean the level of association between the observations. The higher the level of association between observed points in the time series the higher is the dependence between them in the data. Understanding data persistency contributes to the formation of tourism policy as the severity and persistence of a downturn in inbound tourism numbers can be forecasted. Being able to foresee if trends persist and to what degree will inform tourism policy. Slumps in inbound tourism can thus be tackled with appropriate policy measures, such as boosting transport link development or planning and funding a marketing strategy if the slump is likely to persist, or boosting domestic product development and infrastructure investment if it will not and growth resumes relatively quickly.

The fractional integration approach is chosen specifically as it seems to be more flexible than other more classical methods that are based either on stationary models or nonstationary ones, or more specifically on I(0) and I(1) models respectively.[2] By using fractional integration, the order of integration of the series is permitted a fractional value, which may be constrained between 0 and 1 or even above 1 depending on the degree of persistence of the data. This is important because in the event of an exogenous shock, such as natural catastrophes, terrorism, pandemics or economic downturns, the fractional value can give information about the duration or how shock induced setbacks will impact the projected future development of the series. Thus, if a series is I(d) with d < 1, shocks will have a transitory nature, with their effects disappearing in the long run, and at a faster rate the lower the value of

---

d is, requiring inward facing policy measures of e.g. preparing for the trend resumption. On the other hand, if a series is I(d ≥ 1) shocks will have a permanent nature, requiring outward, i.e. marketing and access oriented policy measures to recover the original long term projections.

We focus on Iceland because as other Nordic countries it has experienced a continuous increase in the number of visitors for the last three decades (Hall, Müller, & Saarinen, 2009). However, unlike Northern European and other Nordic destinations, the island nation of 340,000 has witnessed an almost exponential growth in inbound tourism since 2010. In 2017 up to 2.5 million guest are expected, up from around 490,000 in 2009 and 2010. This rapid growth has sparked concerns about which particular exogenous shocks could impact the growth of inbound tourism and how these could persist. The paper's research question is: what is the degree of persistence of exogenous shocks in the existing data on inbound tourism to Iceland? In other words, if in the event of a negative exogenous shock to the tourism sector in Iceland, to what extent will the inbound tourism trend recover by itself in the long run with no need of outward oriented policy actions. Analysing two sets of time series from 1949 till 2016, the impact of former exogenous shocks and their persistence can be established. Using fractional integration it can be shown that shocks can be long-lived persisting forever (if d ≥ 1) or disappearing though very slowly (if d is large though smaller than 1). As stated, the lower the value of this integration, the faster the recovery process will be. In the empirical application carried out in Section '*Empirical results*' different hypotheses concerning the order of integration of the Icelandic inbound tourism series are tested, including the classical ones based on integer differentiation such as I(1) and I(2) behaviour but also others based on fractional values such as those based on long memory (d > 0), stationarity (d < 0.5) or mean reverting (d < 1) behaviour.

## Contextual setting

Exogenous shocks that can impact the tourism industry are divided by Henderson (2007) into eight categories. Macroeconomic fluctuations impacting demand, political turmoil at a destination level, global terrorism threat levels, socio-cultural conflicts, environmental issues, pandemics, technological failure, and commercial setbacks. All eight can in one way or another have ramifications for inbound tourism development globally or at a given destination. The paper's focus on Iceland relies on the fact that the development of tourism in Iceland has experiences sustained growth throughout the post-war years. However, in the last decade this development has been extremely rapid, driven by nigh on exponential growth in inbound tourism, mainly from Europe and North America, even though three exogenous shocks can be identified that typically thwart tourism growth. Chief amongst these is the extreme strength of the króna in the year leading up the financial collapse of the island in 2008. This placed Icelandic tourism at a distinct disadvantage as a prohibitively pricey destination in comparison to neighbouring destinations. The second is the global economic downturn that precipitated the krónas collapse but at the same time sent inbound tourism worldwide in a downward spiral. Thirdly is the natural catastrophe of the Eyjafjallajökull eruption which upset aviation globally and smothered large tracks of land under ash. Despite this tourism has grown as Table 1 shows, citing some of the key indicators of inbound tourism growth.

The year 2009 is selected as a reference as the take-off in inbound tourism can be tagged to the year 2010. Still prior to that, ever since 1990 Iceland had seen a healthy growth in inbound tourism numbers exceeding that of most competing destinations in the region. Secondly, what is intriguing is the fact that this growth has continued more or less unabated since the 1970s, with few very minor setbacks.

The take-off in 2010 can be attributed to several well-documented factors, mostly substantiated in outbound tourism surveys performed by the Icelandic Tourist Board. The primary one is the growth of awareness concerning Iceland, although this is of-course hard to measure and tally. The absolute collapse of the island's financial sector, with huge socio-economic ramifications made it to the world's headlines. Iceland was the first victim of the global credit crunch, which sparked a pronounced tourism slump all over the world, especially in long-haul destinations. Iceland, however held on in terms of inbound tourism, not least due to the spring 2010 eruption of Eyjafjallajökull even though it created a temporary setback in inbound tourism for the month the eruption lasted (Jóhannesson & Huijbens, 2010). The May eruption sent clouds of ash over key hubs in West Europe effectively grounding air traffic for up to a week with global ramifications (Budd, Griggs, Howarth, & Ison, 2011). People across the planet were stuck in airports from Dubai to Singapore, Buenos Aires to Los Angeles. When the global media explained what was going on, the limelight was squarely cast on the sparsely populated, volcanic, sub-Arctic island in the North Atlantic recently having been claimed by the global credit crunch. The image of the North, and Iceland in particular, has been traditionally associated with harsh climate, hardy people and as a place where one can come up close and personal to the elements (Ísleifsson & Chartier, 2011). The global media lime-light most certainly perpetuated these tropes in its coverage of the collapse of the financial sector and the volcanic outburst. Marauding financial Vikings from a desolate wilderness island at the edge of the habitable world, underlined in the minds of those wanting to come into

**Table 1**
Key indicators of tourism growth in Iceland.

| Source | Indicator | 2009 | 2016 | Growth % |
|---|---|---|---|---|
| Iceland Tourist Board | Departing foreign nationals counted at KEF international | 464.536 | 1767.726 | 281% |
| Statistics Iceland | Foreigners' bednights in all accommodation establishments | 2134.245 | 6764.615 | 217% |
| Statistics Iceland | TSA inbound tourism expenditure calculations | 92,3 bISK | 357 bISK | 287% |
| Keflavík International Airport | Total number of pax at KEF international airport | 1832.944 | 6821.358 | 272% |
| Icelandair | Total number of passengers carried by the airline | 1319.207 | 3674.592 | 179% |