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Vulnerability and resilience of the tourism sector in India: Effects of natural disasters and internal conflict

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ABSTRACT

Tourism resilience studies often focus on a single shock event. In reality, the same destination may face different kinds of shocks. It is important to compare the relative effect and resilience to different shocks.

Using a panel dataset for 22 Indian states, we build random effect models to understand the impact of natural disasters and political conflict on domestic and foreign tourist arrivals. Severe conflict events affect domestic tourist arrivals negatively, while natural disasters do not. In contrast, natural disasters affect international tourist arrivals negatively but conflicts do not.

We study resilience by identifying breaks in tourist arrivals and noting corresponding recovery times. Breaks were observed in more states for the international segment compared to domestic segment. Recovery times was also greater for international rather than domestic tourists. Thus domestic tourists seem to be more resilient compared to international tourists. Our study provides useful insights that may have policy implications.

1. Introduction

Tourism plays an important role in the global politico-economic sphere. It is a key driver of economic growth and a provider of employment for tourist destinations (Pablo-Romero & Molina, 2013). The tourism industry worldwide has experienced sudden shocks in the form of natural disasters such as floods and earthquakes (Becken, 2013; Cochrane, 2010), or man-made disturbances such as wars and terrorist attacks (Richter & Waugh Jr, 1986; Sönmez, 1998). Such exogenous shocks change tourist perception about the attractiveness of a particular destination. This may lead to negative shifts in demand, with tourists preferring to visit destinations that are perceived to be safer. Changes in destination image may eventually lead to stagnation and decline of the tourist destination (Nguyen & Imamura, 2017; Shaw & Ichinosawa, 2006).

Resilience is one of the key factors that enable a socio-ecological system to be sustainable in the long run (Cheer & Lew, 2017; Clifton, 2010; Espiner, Orchiston, & Higham, 2017). In the sphere of tourism, Prayag (2018) argues that there is a need to shift from a crisis management perspective to a resilience perspective. Most empirical research in resilience of the tourism sector focusses on a specific exogenous shock affecting a particular destination (Pennington-Gray, 2018). Some studies focus exclusively on natural disasters (Biggs, Hall, & Stoeckl, 2012; Calgaro & Lloyd, 2008; Joerin, Shaw, Takeuchi, & Krishnamurthy, 2012), some concentrate on political conflict or terrorist attacks (Causevic & Lynch, 2013; Liu & Pratt, 2017; Sönmez, 1998; Yap & Saha, 2013) while others focus only on economic shocks (Perles-Ribes, Ramón-Rodríguez, Rubia-Serrano, & Moreno-Izquierdo, 2016).

In reality, a particular tourist destination may be subject to different kinds of shocks at different points of time (Neef & Grayman, 2018; van Strien, 2018). It is necessary to be able to compare the impact of different kinds of shocks on different kinds of tourists, in order to be able to formulate appropriate strategies for improving resilience. Few studies have compared the vulnerability and resilience of destinations that have experienced shocks that fall under different categories.[1] A few studies have tried to detect post-facto the incidence of a shock by identifying structural breaks in time-series data of tourist arrivals (Cró & Martins, 2017; Min, Kung, & Chang, 2019). However, they do not estimate the magnitude of the effect of these shocks on tourism. There is also paucity of research on the differential impact of such shocks on domestic versus foreign tourist segments. One notable exception is Cellini and Cuccia (2015) who considered the effect of the 2008 global economic recession on both domestic and international tourist arrivals

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[1] Page, Song, and Wu (2012) studied the effect of global economic crisis and swine flu in Great Britain, and Wang (2009) studied the effect of three independent shock events on tourism in Taiwan viz. (i) the 1997 financial crisis, (ii) the 1999 earthquake and (iii) 2001 terrorist attack on World Trade Centre. These studies examine specific events. In contrast we study a class of event such as natural disasters and political conflict.

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in different regions of Italy.

In the Indian context, Dhariwal (2005) and Yap and Saha (2013) look at time series data for international tourist arrivals to the country but not within the country. Parida, Bhardwaj, and Roy Chowdhury (2017) look at inter state tourist arrivals; they study the effect of political conflict but not natural disasters. None of the extant studies have tried to estimate and compare the impact of different kinds of shocks on tourism, at the level of intra-country granularity, for two different segments of tourists, viz. domestic and foreign tourists. This is the research gap that motivates this study.

The main contributions of the paper are as follows. In the first part we explore vulnerability of the tourism sector in different Indian states to different kinds of shocks. Using random effect panel models, we estimate the effect of the incidence as well as severity of natural disasters and terrorist attacks on tourist arrivals. We build separate models for two segments of the market – international and domestic tourists. The impact of different kinds of disturbances on different tourist segments, across a variety of geographical destinations has not been studied before, hence our findings are new and add to the extant literature.

In the second part of the study, we study the resilience of the domestic and foreign tourism sector in different Indian states. We propose a new method for studying the resilience of a particular destination, using variations from expected arrival trends.[2] Our results provide new insights into the vulnerability and resilience of international and domestic tourists and their variations across different states of India.

The rest of the paper is organized as follows. In Section 2, we provide a review of relevant literature. In Section 3, we formulate the research questions and state the hypotheses we will test. In Section 4, we describe the tourism statistics for each state as well as the incidences of natural disasters and political conflicts during the study period. In Section 5, we describe the results of the panel models to study the impact of exogenous shocks on foreign and domestic tourist arrivals. In Section 6, we discusses the resilience of the tourism sector. Section 7 concludes the paper.

2. Literature review

We first discuss the theoretical foundation underlying the concept of resilience in socio-ecological systems. Next, we review the literature on resilience in the specific context of tourism. Finally we describe the literature on effect of political conflict and natural disasters on tourism. A summary of the extant literature is provided in Table I.1 in Appendix I.

2.1. Resilience- conceptualization and theoretical models

Resilience is one of the key concepts used to understand the dynamic process of change in socio-ecological systems. Holling (1973) defined resilience as a measure of the ability of a system to absorb natural or economic shocks and continue to function at levels of pre-shock performance. Holling (1996) made a distinction between the two definitions, namely “engineering resilience” and “ecological resilience”. Engineering resilience refers to the time taken by a system to revert to a state of equilibrium when it faces small perturbations or shocks. This is the more traditional definition of resilience. Ecological resilience is based on the assumption that a system may have multiple stable equilibria. Ecological resilience refers to the magnitude of the shock that the system can absorb before it transforms to another stable equilibrium state. Gunderson and Holling (2002) introduced the idea of *panarchy*, a heuristic model of nested adaptive renewal cycles which were depicted using a series of asymmetric figure of 8's which represented changes at different time scales (slow to fast). Walker, Holling, Carpenter, and Kinzig (2004), p. 2) defined resilience as “the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks — in other words, stay in the same basin of attraction”.

In the socio-ecological context, Folke (2006) modelled resilience by linking the concepts of vulnerability, resilience and adaptive capacity. The development of a resilience perspective of dynamical systems includes an inherent ability to withstand disturbances, adapt to change, and transform to new states at different time scales. Nelson, Adger, and Brown (2007) pointed out that socio-ecological systems may have multiple stable states that are bounded by thresholds and the desirability of any given state is a normative decision. A system that is inherently inequitable or not socially desirable may also be resilient to changes. They also noted the trade-off between having a high adaptive capacity for the present vs. being resilient to future uncertainties. Hosseini, Barker, and Ramirez-Marquez (2016) provides a recent review of the different definitions of resilience. Academic interest in resilience has seen a significant rise in the last two decades. Xu and Marinova (2013) provide a comprehensive review in the area of resilience between the years 1973 and 2011.

2.2. Resilience in tourism studies

Butler (1980) in his seminal paper introduced the ‘tourism area life cycle’ (TALC) model, in which he contended that tourist locations evolve over time and this dynamic nature might lead to degradation of environmental quality and a decline in the tourism experience. In the TALC model, rejuvenation and resilience are two important stages which take into account changes in environment and economics. Farrell and Twining-ward (2005) described tourism as an evolving complex system that includes the aspirations and values of local people in addition to the geographical specifics of the place.

Several dimensions of resilience have been discussed in the tourism literature including economic resilience (Cellini & Cuccia, 2015; Lew, 2014), social resilience (Cinner, Fuentes, & Randriamahazo, 2009; Keck & Sakdapolrak, 2013; Sharifi, 2016) and organizational (or enterprise) resilience (Orchiston, Prayag, & Brown, 2016; (Annarelli & Nonino, 2016)). Different indicators have been proposed for the measurement of resilience of destinations to disasters (Cutter, Burton, & Emrich, 2010). Cutter et al. (2010) included several variables to create a composite indicator for resilience – these included the social, economic, institutional, infrastructure, and community capacities of the tourist destinations to withstand sudden shocks. Lew (2014) made the distinction between fast changing variables and slow changing variables for measurement of resilience in the tourism context. After reviewing available resilience indicators, Sharifi (2016) concluded that resilience indicators should be multi-dimensional and should cover the temporal dynamism and risk management abilities of communities. Kristjánsdóttir, Ólafsdóttir, and Ragnarsdóttir (2018) provides a comprehensive review of indicators and find that researchers are focussing on the interconnectedness and dynamic nature of indicators. The commonality among all these definitions was the understanding that resilience refers to the ability of a system to stay within certain parameters after a disturbance, where the parameters may be operational, functional or performance related. Such resilience may be due to inbuilt characteristics of the system that exist even before the disturbance occurs.

2.3. Vulnerability and resilience of tourist destinations to natural disasters

The link between tourism and disaster risk reduction and management is important for places that both rely heavily on tourism and are prone to natural disasters (Becken & Hughey, 2013). Espiner and Becken (2014) made the distinction between *resilience* and *vulnerability*.

[2] Some researchers have identified structural breaks in the data (Cró & Martins, 2017; Perles-Ribes et al., 2016). However non-availability of time-series data over a long enough time periods before and after each event meant that this could not be done in the present study.

They contended that a highly resilient destination does not necessarily mean that it is not vulnerable, and vice versa. Some common mechanisms have been identified, which increase social and economic resilience. These are adaptive governance, capacity building, community participation, social and cultural factors, and perception management of the tourist destination. Calgaro and Lloyd (2008) analysed the effects of the 2004 tsunami on Khao Lak in Thailand. Khao Lak's vulnerability was shaped by 13 interlinked factors including social norms, dynamic governance processes and industry linkages. Calgaro and Lloyd (2008) and Djalante, Holley, and Thomalla (2011) pointed out the inter-linkages between adaptive governance, disaster risk reduction and resilience.

To make tourism more resilient, there need to be initiatives and adaptation from different sectors of the tourism supply chain and different scales of governance (Luthe & Wyss, 2014). Governments should use learning from disasters, both positive and negative, by documenting and evaluating responses of different stake-holders. Such documentation will guide and improve crisis management capacity and disaster risk reduction (Calgaro & Lloyd, 2008; Gurtner, 2016).

Some studies have noted variations across locations. Urban areas are more resilient than rural areas (Cutter et al., 2010). Cinner et al. (2009), Sharifi (2016) and Bastaminia, Rezaei, and Dastoorpoor (2017) and Saja, Teo, Goonetilleke, and Ziyath (2018) focussed on social resilience in the wake of disasters. Cinner et al. (2009) considered coastal regions in Madagascar, and identified assets, flexibility, the capacity to learn and the capacity to self-organise as critical for social resilience. Using panel data for 26 years, Kim and Marcouiller (2015) studied the vulnerability and resilience of US natural parks and coastal regions that had faced hurricanes. Bastaminia et al. (2017) considered resilience in the context of earthquakes in the Rudbar, Iran and identified awareness, knowledge, skill, attitude and social capital as the primary indicators of social resilience. Saja et al. (2018) proposed an inclusive and adaptable 5S framework consisting of social capital, social mechanisms, social structure, social equity and social belief.

It has been noted that informal tourism enterprises are most affected by disasters. Informal tourism enterprises fare better after crises when they are supported by the government, family and community (Biggs et al., 2012; Cinner et al., 2009; and Joerin et al., 2012. The hotel sector in the tourism industry has received relatively less attention from the resilience viewpoint. Brown, Rovins, Feldmann-Jensen, Orchiston, and Johnston (2017) provide a review of the literature specifically with reference to the hotel industry, and find that typically hotels tend to be under-prepared and lack adaptive capacity in the event of disasters.

2.4. Vulnerability and resilience of tourist destinations to political conflict and terrorism

We now turn to the effect of political conflicts on tourism. Wars, political instability and terrorism severely impact the tourism industry and create a negative image of the tourist destination (Sönmez, 1998). The literature in this area is vast with several authors studying the effect of local, regional and global conflict on tourist inflows in affected areas. In an early article on this topic, Richter and Waugh Jr (1986) point out the reason tourist attractions are particularly vulnerable to terrorist attacks and the tactical and strategic reasons why terrorists might target tourist destinations. Sönmez (1998) reviewed the extant literature and gave an overview of why terrorists may target tourist destinations and how this may affect destination image and further destabilize the local community. Using somewhat unstructured interviews with local government officials, Causevic and Lynch (2013) try to understand the role of tourism in promoting collaboration and economic rejuvenation in post-conflict Bosnia and Herzegovina.

Yap and Saha (2013) built fixed effect models using panel data for 139 countries in the period 1999–2009 to understand the effect of political instability and conflict on tourism demand. They found that political instability has a strong and statistically significant negative effect on tourist arrivals. Liu and Pratt (2017) conducted a longitudinal study to gauge the effect of terrorism on tourist demand in 139 countries. These 139 countries included 15 countries from East Asia and Pacific, 30 from Europe and Central Asia, 16 from Latin America and Carribean, 14 from Middle East and North Africa, 2 from North America, 4 from South Asia and 14 from Sub-Saharan Africa. They found that terrorism has a long run negative effect in 9 countries and a short run negative effect in 25 of the 95 countries they studied. The effect of political violence on tourism has also been studied in Sri Lanka (Fernando, Bandara, Liyanaarachch, Jayathilaka, & Smith, 2013), Greece (Samitas, Asteriou, Polyzos, & Kenourgios, 2018) and Indonesia (Gurtner, 2016). In all cases, political instability and terrorism is found to have a negative effect on the tourism industry. Cró and Martins (2017) studied structural breaks in time-series of tourist arrivals using Bai and Perron's structural break test and found that the breaks coincided with political crises and disasters.

In India, the effect of internal conflicts and political instability on tourism has been studied by Dhariwal (2005) and Parida et al. (2017). Dhariwal (2005) studied the arrival of foreign tourists in India over the period 1966–2000 and modelled it using dummy variables for three kinds of disturbance events viz. internal political instability (Maoist etc.), communal events and Indo-Pak conflict. They found that both tourist arrivals as well as tourism receipts were negatively affected by internal political conflict and Indo-Pak conflict. Parida et al. (2017) analysed the determinants of foreign and domestic tourist arrivals using a two stage least square fixed effect panel model. While the methodology used in both of these papers was similar to this study, it is important to note that they included only terrorist activities in their model and found no significant effect of this variable on tourist arrivals. They do not consider the effect of natural disasters. Neither do they consider the time to recovery (resilience) of the tourism sector in each state as we do.

2.5. Comparison of domestic and foreign tourist segments

International tourism has garnered far greater attention in the extant literature than domestic tourism. This may be due to the greater economic implications of international tourism due to foreign exchange earning potential; as well as the availability of consistent data from the UNWTO. The number of domestic tourists far exceeds the number of international tourists visiting the country. According to a recent estimate by WTTC, 73% of the global tourism spend is contributed by domestic tourists (WTTC, 2018a). Eijgelaar, Peeters, and Piket (2008) provided one of the first comparative analysis of domestic vs, international tourism globally. Yang and Wong (2012) used a spatial econometric model to study the spillover effects of domestic and international tourism flows in 341 cities in China. Tiwari, Dash, and Narayanan (2018) demarcated the foreign tourist flows to India based on the source countries and analysed the extent to which shocks were permanent or temporary based on where the tourists were coming from. Dahles and Susilowati (2015) found that domestic tourism segment in Yogyakarta, Indonesia was more resilient than the international tourism segment.

3. Research gap and research questions

As can be seen from the review of literature presented above, there have been several studies that have considered the impact of different

Table 1
Geographical features, socio-economic conditions, tourist attractions, domestic and foreign tourist arrivals across states.

	State/Union territory	Area (sq.km)[a]	Beaches[b]	Hill stations[c]	Monuments of national importance[d]	Population (Crores)[a,g]	Avg. GSDP (2004–14) Rs. Crores[e]	GSDP per Capita	Annual DTA (2008–14) (Crores)[f]	Annual FTA (2008–14)[f]	%FTA/ Total Tourist
1	Andhra Pradesh	275,045	16	9	137	8.47	603,348	71,262	14.89	477,255	0.32%
2	Assam	78,438	0	5	55	3.12	100,932	32,382	0.38	14,984	0.39%
3	Bihar	94,163	0	2	70	10.38	219,110	21,108	1.62	530,566	3.16%
4	Chhattisgarh	135,191	0	4	47	2.55	124,762	48,849	0.84	3349	0.04%
5	Delhi	1483	0	0	174	1.68	266,556	159,107	1.17	1,946,842	14.18%
6	Gujarat	196,024	9	4	203	6.04	538,338	89,153	2.02	147,015	0.72%
7	Haryana	44,212	0	1	91	2.54	263,750	104,031	0.69	174,797	2.46%
8	Himachal Pradesh	55,673	0	40	40	0.69	57,485	83,839	1.17	362,827	3.00%
9	Jammu & Kashmir	222,236	0	20	69	1.25	60,540	48,243	0.90	56,037	0.62%
10	Jharkhand	79,714	0	4	13	3.30	121,576	36,879	1.30	49,979	0.38%
11	Karnataka	191,791	16	18	506	6.11	428,269	70,058	6.22	479,521	0.77%
12	Kerala	38,863	19	134	26	3.34	277,861	83,223	0.87	647,288	6.90%
13	Madhya Pradesh	308,245	0	3	581	7.26	292,379	40,274	4.16	246,343	0.59%
14	Maharashtra	307,713	38	18	285	11.24	1,051,003	93,528	4.95	3,172,976	6.02%
15	Odisha	155,707	22	9	78	4.19	189,656	45,213	0.76	51,080	0.66%
16	Punjab	50,362	0	1	33	2.77	226,084	81,606	1.18	151,889	1.27%
17	Rajasthan	342,239	0	1	163	6.86	352,025	51,300	2.66	1,281,243	4.60%
18	Sikkim	7096	0	16	3	0.06	7587	124,848	0.05	26,554	5.28%
19	Tamil Nadu	130,058	16	32	1152	7.21	583,182	80,842	15.36	2,743,214	1.75%
20	Uttar Pradesh	240,928	0	0	742	19.96	609,067	30,517	12.32	1,551,049	1.24%
21	Uttarakhand	53,483	0	61	44	1.01	81,131	80,194	4.40	390,520	0.88%
22	West Bengal	88,752	8	17	134	9.13	428,395	46,897	2.83	1,150,565	3.90%

[a] Source: State Census, 2011 (https://www.census2011.co.in/states.php).
[b] Common knowledge, see also List of Beaches in India, Wikipedia (https://en.wikipedia.org/wiki/List_of_beaches_in_India).
[c] Common knowledge, see also List of hill stations in India, Wikipedia (https://en.wikipedia.org/wiki/List_of_hill_stations_in_India).
[d] Source: Alphabetical List of Monuments, Archeological Society of India (http://asi.nic.in/alphabetical-list-of-monuments/).
[e] Source: State wise statistics, NITI Ayog (http://niti.gov.in/state-statistics).
[f] Source: Market research and statistics, Ministry of Tourism, Govt. of India (http://tourism.gov.in/market-research-and-statistics).
[g] One Crore is ten million.

kinds of shocks on tourism. These include studies that have looked at short term shocks such as terrorist attacks, natural disasters (earthquakes, floods) and epidemics such as SARS etc., or long term impacts of climate change, economic recessions and political unrest. These studies consider different the impact on a specific destination of different kinds of shocks independent of each other.

However, many destinations are subject to different kinds of shocks at time. Simultaneously, they may be subject to natural disasters as well as terrorist attacks. Building stronger and a more resilient tourism sector within the constraints of limited economic and physical resources indicates that one needs to understand and be able to compare the effects of different kinds of shocks for the same destination which will allow policy makers to build appropriate disaster management plans.

While a few studies have looked at the effect of specific events such as a disease outbreak and economic recession (Page, Song, and Wu, 2012; Wang, 2009), there are no studies have compared the differential impact of multiple categories of shocks, on domestic and international tourists for the same destination over a period of years. This is the research gap that we aim to address in this study. Thus we formulate the following research questions:

1. What is the impact of the occurrence, severity and recency of natural disasters and internal conflict on domestic and foreign tourist arrivals across different states in India?
2. How long does it take to recover from a decline in international or national tourism activity across states of India?

3.1. Hypotheses to be tested

Based on the research questions stated in Section 3, we formulate the following hypotheses that will be tested in this study. In each case, we are stating the null hypothesis:

H1. The incidence of natural disaster events does not affect domestic tourist arrivals.

H2. The incidence of internal conflict events does not affect domestic tourist arrivals.

H3. The severity of natural disasters does not affect domestic tourist arrivals.

H4. The severity of internal conflict events does not affect domestic tourist arrivals.

H5. The recency of the last disaster (whether it be natural disaster or internal conflict) does not affect domestic tourist arrivals.

H6. The incidence of natural disaster events does not affect foreign tourist arrivals.

H7. The incidence of internal conflict events does not affect foreign tourist arrivals.

H8. The severity of natural disasters (measured by number of fatalities) does not affect foreign tourist arrivals.

H9. The severity of internal conflict events (measured by number of

fatalities) does not affect foreign tourist arrivals.

H10. The recency of the last disaster (whether it be natural disaster or internal conflict) does not affect foreign tourist arrivals.

4. Tourism, natural disasters, and political unrest across the states of India

Tourism is an important driver of the Indian economy. It contributed about Rs. 16.91 trillion (or US $247.3 billion), which was about 9.2% of the GDP of 2018. India was ranked 7th among 184 countries by the World Travel and Tourism Council, 2018 (WTTC, 2018b), in terms of contribution of tourism to the overall economy. This sector also generated about 42.67 million jobs which accounted for about 8% of the total employment in India. The economic contribution of tourism is expected to grow by about 6.7% annually to about US $492 billion by the year 2028 as per the WTTC. In comparison tourism in the Asia-Pacific region is expected to grow at about 6.4%.

India has 35 states and union territories which vary in terms of their climatic and geographical conditions, and also in socio-economic, political and cultural aspects. In this study we included 22 states that saw the highest demand in domestic and foreign tourism. State wise data for geographical area, number of beaches and hill stations, monuments of national interest, population, average Gross State Domestic Product (GSDP), and average number of domestic tourist arrivals (DTA) and foreign tourist arrivals (FTA) are summarized in Table 1. Uttar Pradesh is the most populous state having about 16.5% of the country's population followed by Maharashtra (9.28%), Bihar (8.57%) and West Bengal (7.54%). In terms of socio-economic indicators, Delhi has the highest GSDP per capita followed by Sikkim, Haryana, Maharashtra and Gujarat.

As can be seen from Table 1, in terms of geographical area, Rajasthan, Madhya Pradesh and Maharashtra are the largest. The natural (beaches and hill stations) and man-made attractions (monuments) also vary from state to state. Kerala has the largest number of natural attractions with 134 hill stations and 19 beaches. Uttarakhand, Himachal Pradesh, Tamil Nadu and Maharashtra rank high in terms of natural attractions. In terms of monuments of national importance, Tamil Nadu leads followed by Uttar Pradesh, Karnataka, Madhya Pradesh, Maharashtra and Gujarat.

Tamil Nadu has the highest number of domestic tourist arrivals followed by Andhra Pradesh, Uttar Pradesh, Karnataka and Maharashtra. In terms of foreign tourist arrivals, Maharashtra leads followed by Tamil Nadu, Delhi, Uttar Pradesh, Rajasthan, West Bengal and Kerala. Foreign tourists accounted for a relatively higher percentage of total tourist arrivals in Delhi, Kerala, Maharashtra, Sikkim and Rajasthan. Parida et al. (2017) found that in addition to economic development in each state, the presence of world heritage monuments acted as pull factors for both domestic and international tourists. Suresh, Bid, and Gunasekar (2015) studied state wise tourist arrivals and found that literacy rates, consumer price index, number of tour operators and the presence of a domestic, international or metro airport increased tourist arrivals in a particular state.

4.1. Natural disasters

Several tourist destinations in India have witnessed natural disasters such as floods, cyclones, earthquakes and a tsunami in addition to deaths due to heat and cold waves. India ranked fourth in the world in terms of the total number of natural disasters (147) and third in terms of the economic losses ($167 billion dollars) caused by disasters in the period 2005–2014 (Hall, Prayag, & Amore, 2017). Recent instances include the cyclone in Orissa in 1999 (Kumar, Mahendra, Nayak, Radhakrishnan, & Sahu, 2010); earthquake in Gujarat in 2001 (Lahiri, Sen, Rao, & Jena, 2001); the tsunami in 2004 that affected Andhra Pradesh, Tamil Nadu and Kerala (Joerin et al., 2012; Mishra et al., 2018), earthquakes and landslides in Sikkim (Chakraborty, Ghosh, Bhattacharya, & Bora, 2011); flash floods in Uttarakhand in 2013 (Kotal, Roy, & Bhowmik, 2014) and floods in Kerala in 2018 (Mishra et al., 2018). A state-wise summary of such events during 2008–2014 is given in Table 2. In terms of severity, the 2004 Tsunami and the flash floods of 2013 had the highest death toll. In terms of number of occurrences, Uttar Pradesh and Bihar had the highest frequency of events.

A map of India with the geographical spread of these events is given in Fig. II.a in Appendix II, where areas have been shaded based on the number of natural disaster events. The eastern coastal states and the northern states at the foothills of Himalayas are most prone to disasters.

4.2. Political unrest and terrorist attacks

India has been plagued by ongoing political conflict and terrorist attacks concentrated in certain parts of the country. Two regions in particular have been subjected to severe ongoing conflict. One is the northern state of Jammu and Kashmir – which has had been in the middle of an ongoing conflict with militants as well cross border terrorism (Bose, 2009). The other source of long term unrest has been Maoist violence in the four states of Chhatisgarh, Jharkhand, Bihar and Odisha (Bahree, 2010; Gomes, 2015). State-wise summary of total number of conflict events and total deaths in the period 2008–2014 is given in Table 3. Only 11 states out of the total 22 states in this study experienced some kind of political conflict. These are the only states that have been included in this table.

A map of India with the geographical spread of internal conflict is given in Fig. II.b in Appendix II. The areas in this map have been shaded based on the percentile of frequency of occurrences of internal conflict events. As can be seen the states of Jammu and Kashmir, Chhattisgarh and Jharkhand had the highest frequency of political conflict events.

5. Vulnerability of tourism sector in each state to natural disasters and political conflict

Our primary objective in this study was to understand whether natural disasters and political unrest affected tourist arrivals of foreign and domestic tourists across different states of India. We also wanted to compare the magnitudes of the effects on domestic and foreign tourism.

5.1. Data

Our data consisted of panel data for domestic tourist arrivals (DTA) and foreign tourist arrivals (FTA) in 22 states over 7 years from 2008 to 2014. This data was obtained from the Market Research and Statistics division of the Ministry of Tourism, Government of India.[3] Data for natural disasters in the Indian subcontinent over this same period was obtained from the EM_DAT database from the Centre for Research on the Epidemiology of Disasters (CRED) (Guha-Sapir, Below, & Hoyois, 2015). Data for political unrest and internal conflict events was obtained from South Asian Terrorism Portal (SATP)[4] (Schmid & Bowie, 2011). State wise economic indicators such as Gross State Domestic Product and contribution to GSDP from different sectors was taken from NITI Aayog, Govt. of India.[5] The state of Telangana was formed in 2014, after dividing the former Andhra Pradesh into a northern and southern states. Given that our data spans a period pre and post 2014, and since there are large similarities in culture, geographical features as well as vulnerability to natural disasters etc., we treat Telangana and Andhra Pradesh as one single entity.

[3] http://tourism.gov.in/market-research-and-statistics
[4] https://www.satp.org/
[5] http://niti.gov.in/state-statistics

Table 2
State wise occurence, kind and severity of natural disasters (2008–2014).

State/UT	Number of incidents	Kind of disaster	Total deaths	Total affected[a]
Andhra Pradesh	16	Cyclone/tsunami	5831	15,088,468
Assam	3	Earthquake/storm	88	1,080,200
Bihar	15	Storm/Extreme Temperature	377	14,455,874
Chhattisgarh	2	Cyclone	25	14,150,000
Delhi	8	Extreme Temperatures	154	642
Gujarat	3	Storm	56	143
Haryana	5	Extreme Temperatures	162	813
Himachal Pradesh	6	Extreme Temperatures	147	771
Jammu & Kashmir	12	Extreme Temperatures/earthquake	1538	226,366
Jharkhand	5	Storm	86	13,230,100
Karnataka	1	Storm	17	17
Kerala	1	Tsunami	4000	654,512
Madhya Pradesh	2	Extreme Temperatures	57	270
Maharashtra	2	Extreme Temperatures	62	350
Odisha	8	Storm/Extreme Temperature	194	14,220,702
Punjab	6	Extreme Temperatures	144	682
Rajasthan	4	Extreme Temperatures	127	683
Sikkim	1	Earthquake	23	575,200
Tamil Nadu	4	Tsunami/Cyclone	5076	974,528
Uttar Pradesh	25	Extreme Temperatures/storm	702	4093
Uttarakhand	4	Floods/Extreme temperature	4053	2,000,234
West Bengal	10	Storm/Extreme Temperature	311	19,563,451

[a] The total affected numbers indicate the total number of people affected by these disasters.

Table 3
State wise occurence, kind and severity of internal conflicts (2008–2014).

SN	State/UT	Total number of incidents	Total deaths	Main kind of conflict
1	Andhra Pradesh	433	130	Maoist
2	Assam	977	811	Insurgency
3	Bihar	1525	450	Maoist
4	Chhattisgarh	3291	1411	Maoist
5	Jammu & Kashmir	1411	410	Terrorism
6	Jharkhand	3494	1172	Maoist
7	Madhya Pradesh	38	1	Maoist
8	Maharashtra	700	302	Maoist
9	Odisha	1154	406	Maoist
10	Uttar Pradesh	20	3	Maoist
11	West Bengal	739	487	Maoist

5.2. Model specification

The large variations in geographical and socio-economic conditions across different states of India, as well as the different climatic and political conditions in each state lead to heterogeneity in the tourism attractiveness of each state. The pull factors (tourist attractions) and push factors (natural disasters and political instability) vary from state to state. Each state also differs from others in terms of its institutional infrastructure, its economic conditions, its social and cultural factors and the effectiveness of its governance (given that the state government legislative members are elected independently of each other). These differences also affect the resilience of the states to natural disasters and political conflict. This is why, it makes sense to study the commonalities and differences in the factors that affect the resilience of the tourism industry across states. This motivates our pan-India study with state-wise panel data over 7 years from 2008 to 2014 (after the global recession in 2008).

We use panel regression methods to understand the effect of natural disasters and internal conflict on the arrivals of domestic and foreign tourists to different states of India. The primary variables of interest are indicator variables for whether there was a natural disaster or internal conflict in a given state in a given year, and the associated fatalities for these events. We include several control variables in our model to ensure that there is no omitted variable bias. These include the Gross State Domestic Product (GSDP), share of the GSDP contributed by the travel and infrastructure sector (Railways and Roads), tourism industry (trade, hotels and restaurants) and government expenditure (Public Administration). We use GSDP instead of GSDP/capita because we are interested in the overall resources available to the state to deal with sudden economic shocks. GSDP/capita would give an idea of the average economic condition of the residents of a state – which is not our primary concern here. We also include a variable that indicates the number of years that have elapsed since the last disaster. This variable was included to see whether a particular state was more prone to disasters.

The panel regression models for domestic and foreign tourist arrivals are specified below.

$$DTA_{it} = \beta_0 + \beta_1 GSDP_{it} + \beta_2 ND_{it} + \beta_3 FAT\_ND_{it} + \beta_4 IC_{it} + \beta_5 FAT\_IC_{it} + \beta_6 RW_{it} + \beta_7 TR_{it} + \beta_7 THR_{it} + \beta_8 PA_{it} + \beta_9 BF_{it} + \beta_{10} HS_i + \beta_4 CS_i$$

$$FTA_{it} = \beta_0 + \beta_1 GSDP_{it} + \beta_2 ND_{it} + \beta_3 FAT\_ND_{it} + \beta_4 IC_{it} + \beta_5 FAT\_IC_{it} + \beta_6 RW_{it} + \beta_7 TR_{it} + \beta_7 THR_{it} + \beta_8 PA_{it} + \beta_9 BF_{it} + \beta_{10} HS_i + \beta_4 CS_i$$

where:

Dependent variable: Domestic Tourist Arrivals (DTA) or Foreign tourist arrivals (FTA)

Independent variables:

i. ND - Natural Disaster Dummy
ii. FAT_ND - Fatalities due to natural disaster
iii. IC - Internal Conflict dummy
iv. FAT_IC - Fatalities due to internal conflict
v. GSDP – Gross State Domestic Product
vi. RW – % contribution to overall GSDP from railways sector

Table 4
Results of F test and Hausman test.

Dependent variable	F test (fixed vs. pooled OLS)	Hausman test (fixed vs. random)
Foreign Tourist Arrival	H_0: OLS better than fixed entity effects F = 54.052, df1 = 19, df2 = 121, *p*-value < 2.2e-16	H_0: u_i uncorrelated with regressors, Random effect better than fixed effect chisq = 32.122, df = 11, *p*-value = .000729
Conclusion	Reject null hypothesis Fixed Effects model better than pooled OLS model	Cannot reject null hypothesis Random effect model better than Fixed Entity effect model
Domestic Tourist Arrival	F = 12.712, df1 = 19, df2 = 121, *p*-value < 2.2e-16	chisq = 20.814, df = 11, *p*-value = .03535
Conclusion	Reject null hypothesis Fixed Effects model better than pooled OLS model	Cannot reject null hypothesis Random effect model better than Fixed Entity effect model

Table 5
Results of panel regression with random effects for domestic tourist arrivals.

Dependent variable: Log (domestic tourist arrivals)					
	Estimate	Std. Error	z-value	Pr(> |z|)	
(Intercept)	0.659	2.101	0.314	0.754	
log(GSDP)	1.236	0.154	8.039	0.000	***
factor(ND)1	−0.032	0.120	−0.265	0.791	
FAT_ND	0.000	0.000	−1.240	0.215	
YALD	−0.014	0.037	−0.377	0.706	
RW	0.269	0.243	1.110	0.267	
TR	0.057	0.081	0.712	0.477	
THR	−0.025	0.028	−0.912	0.362	
PA	0.068	0.035	1.946	0.052	.
factor(IC)1	0.300	0.191	1.574	0.116	
FAT_IC	−0.004	0.001	−3.299	0.001	***
factor(BF)1	0.170	0.212	0.801	0.423	
factor(HS)1	1.176	0.545	2.158	0.031	*
factor(CS)1	0.099	0.404	0.245	0.807	
Signif. codes: 0	'***' 0.001	'**' 0.01	'*' 0.05	'.' 0.1	' ' 1
Total sum of squares	66.767				
Residual sum of squares	32.58				
R-Squared	0.51204				
Adj. R-Squared	0.46673				
Chisq	146.908 on 13 DF		*p*-value < 2.22e-16		

Table 6
Results of panel regression with random effects for foreign tourist arrivals.

Dependent variable: Log (foreign tourist arrivals)					
	Estimate	Std. Error	z-value	Pr(> |z|)	
(Intercept)	1.091	2.419	0.451	0.652	
log(GSDP)	0.902	0.172	5.242	0.000	***
factor(ND)1	−0.202	0.101	−1.987	0.047	*
FAT_ND	0.000	0.000	−0.744	0.457	
YALD	−0.025	0.032	−0.757	0.449	
RW	−0.479	0.263	−1.825	0.068	.
TR	−0.103	0.079	−1.308	0.191	
THR	0.034	0.028	1.180	0.238	
PA	0.059	0.034	1.711	0.087	.
factor(IC)1	0.162	0.175	0.929	0.353	
FAT_IC	−0.001	0.001	−1.205	0.228	
factor(BF)1	0.011	0.176	0.061	0.951	
factor(HS)1	0.552	0.862	0.640	0.522	
factor(CS)1	0.597	0.693	0.862	0.389	
Signif. codes: 0	'***' 0.001	'**' 0.01	'*' 0.05	'.' 0.1	' ' 1
Total Sum of Squares	36.936				
Residual Sum of Squares	22.317				
R-Squared	0.3958				
Adj. R-Squared	0.33969				
Chisq	91.7109 on 13 DF		p-value	6.57E-14	

vii. TR – % contribution to overall GSDP from transport sector (other than railways)
viii. THR – % contribution to overall GSDP from trade, hotels and restaurants
ix. PA – % contribution to overall GSDP from public administration
x. YALD - Years after last disaster
xi. BF – Big Festival Dummy
xii. HS – Hill State Dummy
xiii. CS – Coastal State Dummy

We use the F test and Hausman test to choose between fixed effect, random effect or OLS regression (Baltagi, 2008). Based on results given in Table 4, we choose the random effect model.

5.3. Domestic tourist arrivals

We first built the panel model for domestic tourist demand. The dependent variable was the log of domestic tourist arrivals (DTA). The coefficients of the independent variables, and their statistical significance, are given in Table 5. As can be seen from the results, whether there was a natural disaster that year, or the fatalities due to such disasters, do not have a statistically significant effect on domestic tourist arrivals. Though the dummy variable for internal conflict is not statistically significant, the number of fatalities due to internal conflict is highly statistically significant and is negative in sign. Given these results, we were able to reject only Hypotheses 4 among the stated hypotheses. We were not able to reject Hypotheses 1, 2 3 and 5.

Among the control variables, log(GSDP) is positive – i.e. states which are doing better economically attract more domestic tourists. The dummy variable HS (i.e. the state is a hill state) is also statistically significant and positive indicating that there is a higher demand among domestic tourists to go to hill stations. It is interesting to note that the share of GSDP from the railways or road transport sector, or the trade, hotel and restaurant sectors was not statistically significant. The variable PA which is the ratio of the GSDP contribution from the Public Administration to state GDP is statistically significant and positive, indicating that states that spend more on public administration attract more domestic tourists. The adjusted R-square of the model was 0.47 indicating a reasonably good fit of the data.

5.4. Foreign tourist arrivals

In, the second model developed in this paper, the dependent variable was the log of foreign tourist arrivals (FTA). The coefficients of the independent variables, and their statistical significance, are given in Table 6. As can be seen from the results, the dummy variable for the occurrence of a natural disaster was statistically significant and had a negative effect on foreign tourist arrivals. However, the severity of the natural disaster did not have a significant effect. Interestingly, neither the occurrence nor the severity of political conflicts had a statistically

Table 7
Regression coefficients for tourist arrival trend lines for each state.

	FTA Intercept (in thousands)	FTA Slope – trend (in thousands)	DTA Intercept (in thousands)	DTA Slope – trend (in thousands)
Andhra Pradesh	682.49	−27.36	65,777.32	11,085.87
Assam	6.15	1.18	1909.05	256.43
Bihar	−136.05	88.88	2900.71	1781.29
Chhattisgarh	−0.72	0.54	−5941.46	1909.20
Delhi	1101.89	112.66	−5436.29	2296.22
Gujarat	−14.37	21.52	1419.98	2504.00
Haryana	−27.35	26.95	4944.93	263.74
Himachal Pradesh	203.44	21.25	4085.07	1019.86
Jammu & Kashmir	33.55	3.00	6498.33	339.90
Jharkhand	−47.76	13.03	−8263.91	2835.66
Karnataka	371.61	14.39	−8436.15	9416.66
Kerala	206.82	58.73	4229.05	601.17
Madhya Pradesh	99.24	19.61	−20,909.52	8334.79
Maharashtra	643.81	337.22	−14,690.21	8560.22
Odisha	21.54	3.94	2495.13	686.65
Punjab	−88.51	32.05	−9264.81	2804.00
Rajasthan	915.40	48.78	13,830.35	1699.17
Sikkim	3.22	3.11	160.51	42.12
Tamil Nadu	220.02	336.43	−39,122.23	25,699.04
Uttar Pradesh	−369.67	256.10	−10,398.81	17,821.82
Uttarakhand	1008.36	−82.38	85,118.72	−5476.97
West Bengal	735.51	55.34	−2557.18	4119.72

significant effect on foreign tourist arrivals. Given these results, we were able to reject Hypothesis 6 but could not reject Hypotheses 7, 8, 9 or 10.

Log of GSDP was highly statistically significant and had large positive effect on tourist arrivals. A higher ratio of GSDP contribution from Public Administration seemed to increase tourist arrivals. Foreign tourist arrivals were not affected by big festivals or it being a hill state or coastal state. The adjusted R square of the models for FTA was 0.34 which was lower than for the previous model, for DTA.

6. Resilience in tourism – identifying breaks and years to recovery

In the first part, we explored the vulnerability of tourism sector to natural disasters or political conflict. In the second part, we address the issue of resilience. We have used the "engineering resilience" definition; that is we identify the number of years it takes for the tourism industry in a particular state to bounce back after a shock. Several studies have looked at the impact of specific exogenous shocks such as an earthquake (Huang & Min, 2002), a cyclone (Vu & Im, 2016) or political unrest events (Liu & Pratt, 2017) by identifying structural breaks in time-series data. Since we did not have time-series data at a level of granularity to conduct such event studies, we adopted a different methodology for identifying breaks. Based on data for 14 years (2003–2016)[6] we regressed foreign tourist arrivals (FTA) and domestic tourist arrival (DTA) with time to obtain the trends in each state. The estimated coefficients for trend lines are given in Table 7.

There are some interesting things to note from these results. We can see that domestic tourist arrivals are increasing at a much higher rate than foreign tourist arrivals. In particular we see that for some of the southern states (Tamil Nadu and Andhra Pradesh) and one northern state (Uttar Pradesh), the year over year increase in DTA are significantly higher than other states.

Using these estimated regression parameters, we computed the predicted numbers of tourist arrivals in each state for each year. We are interested to identify variations that can be identified as a negative shock, and the number of years that it took for the tourism sector of the state to recover from such negative shocks. The residuals (actual minus predicted) for each state-year point were computed. If the negative residuals (drop in tourist arrivals) from 1 year to the next was greater than one standard deviation of the time-series for that state, it was considered to be a break year. The number of years that the residuals continued to be negative was the taken to be the years to recovery.

We explain our methodology of identifying break years through the example of two states viz. Tamil Nadu and Uttarakhand. Fig. 1 indicates the variation from mean in number of foreign tourist arrivals for each of the above 5 states. As can be seen from the figure, FTA in Uttarakhand experience a break year in 2006. The standard deviation from the average, in terms of the number of foreign tourist arrivals in different states during the 14 years of study has been given in Fig. 1. While

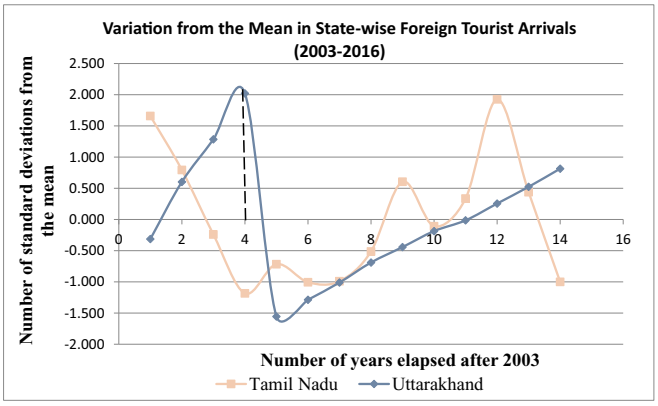


Fig. 1. Variance of residuals (actual minus forecasted values) of FTA during study period.

Table 8
Trend line parameters, breaks and years to recovery for each state.[a]

State/UT	FTA		DTA	
	Year of break	Years to recovery	Year of break	Years to recovery
Andhra Pradesh	2010	5	2013	2
Assam	No Break		2016	1+
Bihar	2013	4+	No Break	
Chhattisgarh	2005	4	2015	2+
Delhi	2009	2	No Break	
Gujarat	No Break		No Break	
Haryana	2011, 2015	3, 2+	2015	2+
Himachal Pradesh	2014	3+	2013	4+
Jammu & Kashmir	2015	2+	2013	4+
Jharkhand	2012	2	No Break	
Karnataka	2008	3	2008	3
Kerala	2009	4	No Break	
Madhya Pradesh	2009	6	No Break	
Maharashtra	2013	4+	No Break	
Odisha	2015	1	No Break	
Punjab	2007	9	No Break	
Rajasthan	2009	3	2009	7
Sikkim	2015	1	2011	6+
Tamil Nadu	No Break		No Break	
Uttar Pradesh	No Break		2014	3+
Uttarakhand	2007	7	2007	7
West Bengal	No Break		2011	3

[a] In cases where the residuals in tourism demand continue to be negative till the last year in our sample (2016), we have marked such cases with a '+' to indicate that this is censored data.

[6] For panel regression, we used data for seven years (2008–2014) and not 14 years, due to unavailability of data for internal conflict. In this part of the analysis, we use a larger data set for domestic and foreign tourist arrivals across all states since the data was readily available.

tourist arrivals fall by about 3.5 standard deviations in 2006, it takes several years for the tourist arrivals to catch up with the forecasted values. Tamil Nadu does not suffer a drop in tourism of > 1 standard deviation in the entire study period.

A summary of breaks and recovery times given in Table 8. As can be seen from Table 8, the slope for the trend lines for foreign tourist arrivals in Maharashtra, Tamil Nadu, Uttar Pradesh and Delhi had the largest positive slopes for FTA's. In case of domestic tourist arrivals, the slopes for Tamil Nadu, Uttar Pradesh, Andhra Pradesh, Karnataka and Maharashtra were the highest. Foreign tourist arrivals had a positive slope in all states except Andhra Pradesh and Uttarakhand; and the slope for domestic tourist arrival trends was positive for all states except Uttarakhand.

The break years for both FTA and DTA were identical in the case of Uttarakhand (2007), Rajasthan (2009), Karnataka (2008), Himachal Pradesh (2014/2013) and Haryana (2015). Even though our data cannot explain the reason for these breaks, we speculate that the breaks in Uttarakhand and Himachal Pradesh may be related to floods in 2007 and 2013. The break in Karnataka may be related to the global recession in 2008.

Other than this, Andhra Pradesh suffered a break in FTA in 2010 and DTA in 2013. Chhattisgarh suffered a break in FTA in 2005 and DTA in 2015. Jammu and Kashmir suffered a break in FTA in 2015 and DTA in 2013. Some states suffered a break in FTAs but not in DTAs – these were Bihar, Delhi, Jharkhand and Kerala, Madhya Pradesh, Maharashtra, Odisha and Punjab. Assam, Uttar Pradesh and West Bengal had no breaks in DTAs but had breaks in FTAs.

The years to recovery ranged from 1 year (Odisha, FTA) to 9 years (Punjab, FTA). FTAs had more numerous breaks than DTAs (18 and 12 respectively). The median number of years taken to recover were more for FTA compared to DTA. We find that there has been greater volatility in foreign tourist arrivals compared to domestic tourist arrivals across the 22 states. 17 of the 22 states witnessed a break in foreign tourist arrival trends and only 12 of the 22 states experienced a break in domestic tourist arrival trends. The years to recovery were typically greater for foreign tourist arrivals than domestic tourist arrivals.

7. Conclusions

In this study, we were interested in understanding the comparative effect of natural disasters and political conflict on domestic and foreign tourist arrivals across different states in India. Using panel data for 22 states over 7 years from 2008 to 2014, we built random effect models, after incorporating several control variables. Our results indicate that natural disasters do not affect domestic tourism demand but do have a negative effect on foreign tourism demand. Conversely, political unrest, has a negative effect on domestic tourism but not on foreign tourist arrivals.

The reasons for this apparent anomaly in tourism demand among international and domestic tourists may be due to the differences in motives and psychology of these two segments. Domestic tourists are motivated by social or religious reasons and have fewer resource constraints in terms of time and money while traveling within the country. Their perceived risk may be lower. Hence they may be willing to take chances in visiting places that have faced natural disasters. Political conflict, however, may increase their concerns for their physical safety.

International tourists planning to travel to India may stay away from states affected by natural disasters, to minimize possible disruptions and to get the greatest value for their time and money. Our result that terrorism or political conflict does not affect international tourist arrivals is similar to those of Liu and Pratt (2017) and Parida et al. (2017). Cró and Martins (2017) had identified structural breaks in tourist demand to be coinciding with crises or disasters. We find similar trends, further we are able to find direct statistical support for causal relationships or lack thereof. Analysing breaks in trends, we find that domestic tourists are more resilient to shocks compared to the foreign tourists, which is similar to the finding of Dahles and Susilowati (2015).

7.1. Limitations and scope for future research

We conclude with an assessment of the limitations of the study. We have used pan-India data across 22 states and 7 years. We did not have access to monthly tourist arrivals, and this has constrained our analysis to some extent. Further, we have not been able to capture destination specific traits affecting resilience. However, as pointed out by Pennington-Gray (2018), while there are many case studies on resilience for individual destinations, there are not too many studies across destinations, and there is a need for appropriate research to fill this gap. This study meets that broader research objective with a robust empirical model of pan Indian data across 22 states and 7 years. We did not have access to data at a granularity for each event in each state to be able to conduct an event study methodology. Hence, even though we identified the breaks in tourism trends, we could not assign the causes for the breaks, or the reasons for different periods of recovery in each state. These constitute interesting questions for future work.

Appendix I. Appendix

Table I.1
Theme – wise summary of literature review.

Theoretical, conceptual and literature reviews	
Holling (1973); Sönmez (1998); Gunderson and Holling (2002); Folke (2006); Nelson et al. (2007); Clifton (2010); Cochrane (2010); Hosseini et al. (2016); Sharifi (2016); Brown et al. (2017); Saja et al. (2018)	
Empirical studies on vulnerability and resilience	
Qualitative (Case studies based on primary data)	Natural disasters: Calgaro and Lloyd (2008); Cinner et al. (2009); Djalante et al. (2011); Biggs et al. (2012); Orchiston et al. (2016); Bastaminia et al. (2017); Basurto-Cedeño and Pennington-Gray (2016); Shaw and Ichinosawa (2006); Gurtner (2016) Political conflict/Terrorist attacks: Richter and Waugh Jr (1986); Causevic and Lynch (2013); Gurtner (2016)
Quantitaive (Econometric models based on secondary data)	Natural disasters: Huang and Min (2002); Cutter et al. (2010); Page et al. (2012); Cellini and Cuccia (2015); Kim and Marcouiller (2015); Vu and Im (2016); Min et al. (2019); Joerin et al. (2012) Political conflict/Terrorist attacks: Yap and Saha (2013); Liu and Pratt (2017); Fernando et al. (2013); Samitas et al. (2018); Cró and Martins (2017); Dhariwal (2005); Parida et al. (2017)

Appendix II. Appendix

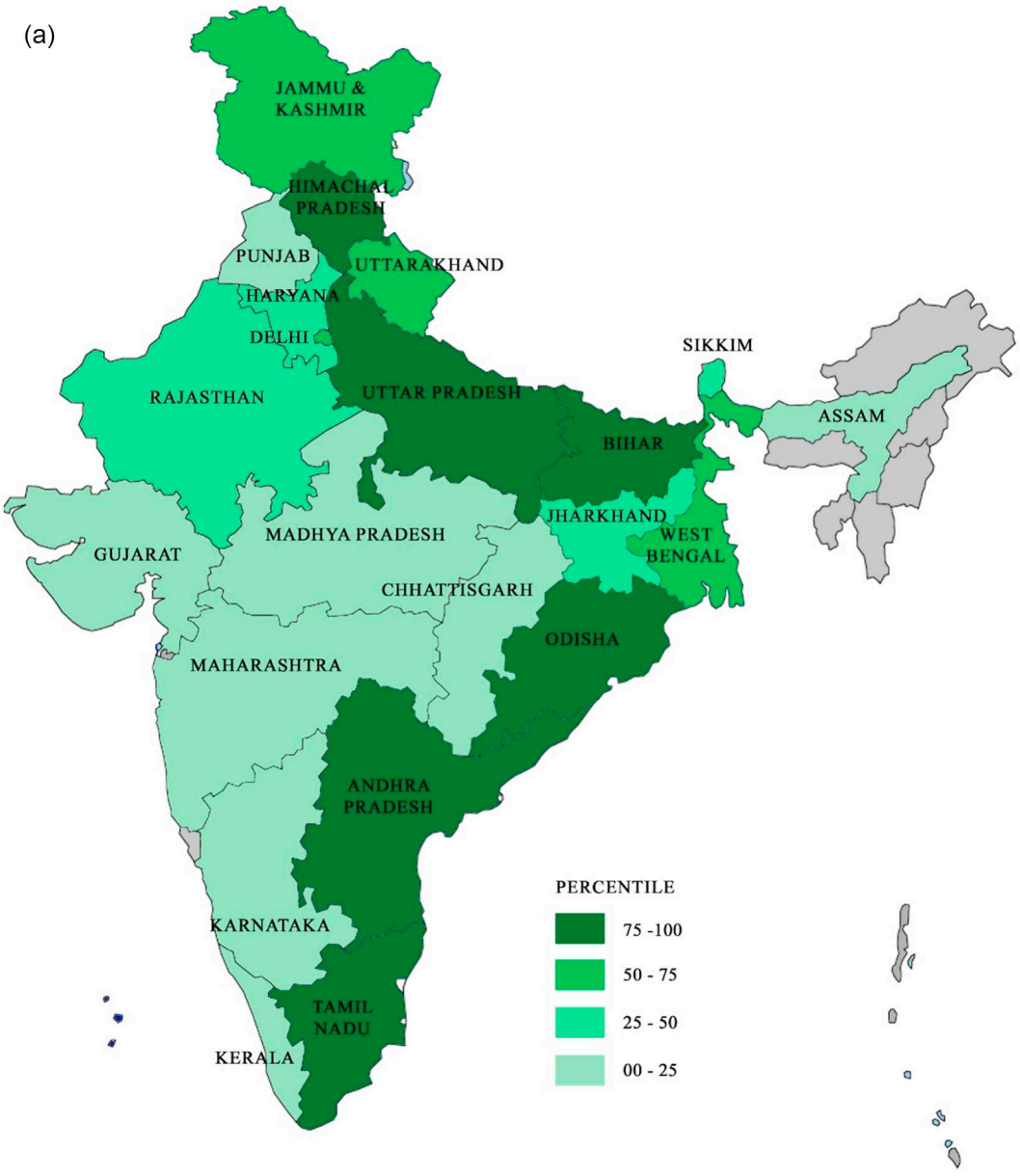
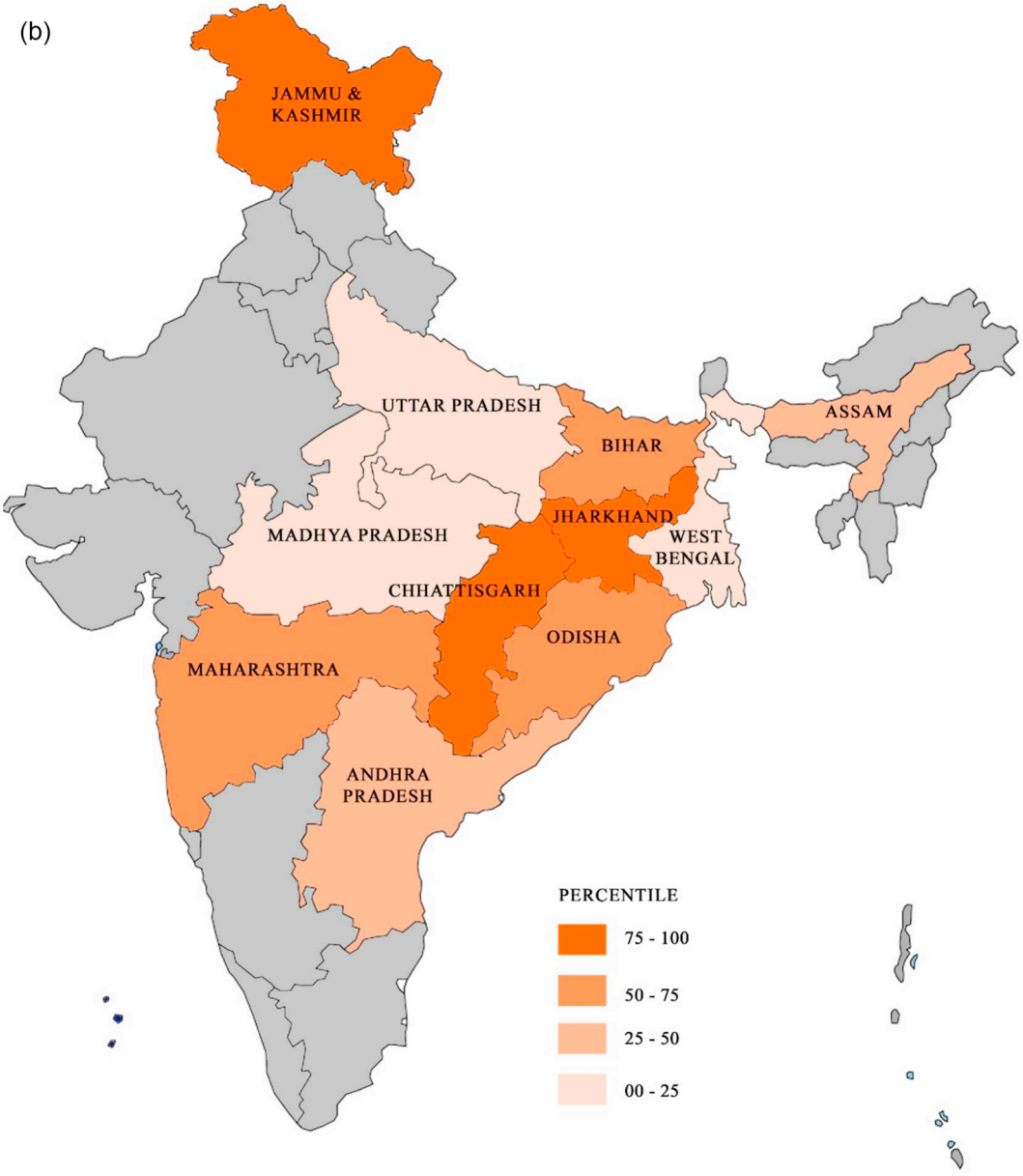


Fig. II. Geographical distribution of natural disasters in India. (b) Geographical distribution of internal conflict in India.



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