WORLD BANK GROUP   GFDRR
Global Facility for Disaster Reduction and Recovery

Resilience Firm Survey

The Caribbean

Antigua and Barbuda, Bahamas, Barbados, Dominica, Dominican Republic, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sint Maarten, Trinidad and Tobago, Turks and Caicos

1 Overview

Content of this document: This document provides information about The Resilience Firm Survey (RFS). It describes the RFS series: survey and sampling design, the questionnaire used, and discusses some data considerations, including outlier treatment and anonymization process.

Objective of the survey: The RFS is designed to collect information from private businesses focusing on i) dependence on and reliability of critical and non-critical infrastructure, ii) use of suppliers and impacts of supply chain disruptions, iii) impacts of recent disasters – coping capacity and long-term effects, iv) firm level preparedness and management of shocks and interruptions caused by natural hazards. The survey is customized depending on the context, industry sector and research questions. The data can be used to explore policy-relevant research topics related to climate change adaptation, infrastructure resilience, private sector recovery, and more.

Content of the data: RFS data contain information on firm characteristics, use of suppliers, infrastructure dependency, firm experience with disasters and risk management and coping capacity. Firm characteristics include sector engagement, number of employees, number of clients, costs and sales information. Use of supplier information include location of suppliers, use of inputs, frequency of restocking, storage capacity, etc. Infrastructure dependency focuses on use of infrastructure, such as water, electricity and transport, frequency of disruptions, impacts of disruptions on demand and sales, use of backup infrastructure, etc. Firm experience with disasters captures both direct (damages to property) and indirect (infrastructure and supply chain disruptions) impacts of recent disasters, as well as coping behaviors and recovery of sales after a shock. Risk management and coping capacity capture information on use of hazard risk information, access to insurance and preparedness measures. The RFS can be customized to collect information on different sectors and type of disasters. So far, it has focused on the impacts of urban flooding (TZ) and hurricanes/storms (CAR).

Caribbean application: The RFS in Caribbean was conducted in 13 countries between March and November 2020 and focused on the tourism industry and the restaurant, hotel and tour and transport companies. Due to the COVID-19 crisis, data collection was done both remotely and in-person depending on the restrictions in place and preference of respondent. The countries covered included Antigua and Barbuda, Bahamas, Barbados, Dominica, Dominican Republic, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sint Maarten, Trinidad and Tobago, Turks and Caicos. The survey in the

Caribbean focused on impacts of recent disasters to have affected the region, including Hurricane Irma, Hurricane Maria, Tropical Storm Dorian, etc. (see Table 2 for country and disaster list). The data collection was financed by the Global Facility for Disaster Reduction and Recovery (GFDRR) with the objective of better understanding how natural hazards – large and small, affect the tourism industry in the Caribbean. The data informed the 360° Resilience: A Guide to Prepare the Caribbean for a New Generation of Shocks (Rozenberg, et al. 2021) to make recommendations on how Caribbean countries can invest resources to strengthen resilience in the region.

This project was a collaborative effort between GFDRR and Urban, Disaster Risk Management, Resilience and Land Global Practice (GPURL).

Data files and other resources

- RFS_Caribbean_Data_2020: Data in STATA format (.dta)

- RFS_Caribbean_Questionnaire: Questionnaire in Common Application Programming Interface (CAPI) (.pdf)

Citation requirements:

- The World Bank. Resilience Firm Survey (RFS), The Caribbean, 2020. Dataset downloaded from microdata.worldbank.org on [date].

2   The survey

2.1   Description

Name of the study: Resilience Firm Survey (RFS) Caribbean

Geographical coverage: Antigua and Barbuda, Bahamas, Barbados, Dominica, Dominican Republic, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sint Maarten, Trinidad and Tobago, Turks and Caicos

Number of observations: 1413 firms in the tourism industry

Date of the survey: March to November 2020

Primary Investigators: Julie Rozenberg (World Bank), Alvina Erman (World Bank), Melanie Simone Kappes (World Bank)

Collaborators: GFDRR, GPURL and UDA consulting

Funding: GFDRR

Related reports: Erman, et al. (2021) and Rozenberg, et al., (2021)

2.2   Sampling design

The sample was drawn to achieve representativeness at the country level as well as the regional level. In the Dominican Republic, sampling was done in a way to also achieve representativeness in 4 provinces in the country. Since there was no comprehensive list of firms operating in the tourism industry readily available to sample from, the firm hired to collect data created a sampling frame from scratch by contacting relevant organizations and websites. To be able to say something about different sectors within the tourism industry, the sampling was stratified by three sectors, including hotels and accommodation, restaurants and bars, and a third sector including rental, taxi and tour companies, attractions and souvenir shops (referred to in this note as hotel, restaurant and tour/transport sectors). The sample selection was then completed in one stage in which firms were selected by using a systematic random sampling method from each stratum.

Once the firm is selected for inclusion in the survey, every effort was made to interview the firm. The survey response rate was low due to the COVID pandemic, and replacements were done. Replacements were drawn from the same stratum. Due to restrictions in some countries, firms were not reachable, even after several attempts and replacements had been done. To compensate for low response rate in some countries, the sample size in other countries was increased. As a result, The Bahamas and Turks and Caicos have lower than expected sample size so caution should be applied when interpreting country level results from these two countries. Table 1 compares the sample, as drawn from the sample frame with the final sample, which was interviewed, by country and sector.

The final sample contains a total of 1413 firms across the 13 countries. Dominican Republic has the largest number of observations because the objective of sampling was also to achieve province level representativeness, in addition to country level representativeness, in 4 providences that rely heavily on tourism.

To make the survey estimates representative of the population, it is necessary to apply weights to selected firms during analysis. Regional weights (*weight*) are applied to statistics representing regional values while country weights (*weight_i*) are applied to all country level statistics.

Table 1. Sample comparison (actual and sampled)

Country	Hotels & Accommodation		Restaurants & Bars		Tours & Transport		Total	
	Sampled	Actual	Sampled	Actual	Sampled	Actual	Samples	Actual

Antiqua and Barbuda	36	*26*	33	*37*	11	*24*	143	*87*
The Bahamas	52	*20*	15	*12*	13	*17*	112	*49*
Barbados	42	*23*	20	*31*	18	*31*	134	*85*
Dominica	47	*44*	21	*22*	12	*15*	146	*81*
Dominican Republic	25	*103*	28	*150*	27	*202*	333	*455*
Grenada	29	*41*	29	*25*	22	*34*	146	*100*
Jamaica	45	*21*	21	*74*	14	*26*	175	*121*
St. Maarten	43	*48*	21	*25*	16	*22*	153	*95*
St. Kitts & Nevis	23	*32*	30	*16*	27	*31*	128	*79*
St. Lucia	34	*24*	20	*11*	26	*36*	115	*71*
St. Vincent	45	*44*	14	*17*	21	*32*	141	*93*
Trinidad & Tobago	34	*41*	32	*25*	14	*20*	146	*86*
Turks & Caicos	33	*3*	30	*3*	17	*5*	86	*11*
Total	**488**	**470**	**314**	**448**	**238**	**495**	**1958**	**1413**

3 Questionnaire modules

The survey modules are the following:

- Respondent characteristics

- Firm characteristics

- Clients

- Infrastructure dependence and disruptions

    o Water

    o Electricity

    o Communication (phone and internet)

    o Road and boat

- Suppliers

- Disaster preparedness

- Impacts of recent disasters (see Table 2)

- Impacts of disease outbreaks (Zika and COVID-19)

- Financial accounts

Table 1. Specific disasters covered in the questionnaire*

Country	Date	Type	Name
Antigua and Barbuda	6/9/2017	Storm	Hurricane 'Irma'
Bahamas	1/9/2019	Storm	Tropical cyclone 'Dorian'
Dominica	18/09/2017	Storm	Hurricane 'Maria'
Dominican Republic	20/09/2017	Storm	Hurricane 'Maria'
Jamaica	27/09/2016	Storm	Hurricane Matthew
Saint Kitts and Nevis	6/9/2017	Storm	Hurricane 'Irma'
Saint Lucia	28/09/2016	Storm	Hurricane Matthew
Saint Vincent and the Grenadines	29/11/2016	Flood	Flood
Sint Maarten	8/9/2017	Storm	Hurricane 'Irma'
Trinidad and Tobago	19/10/2018	Flood	Flood
Turks and Caicos	08/09/2017	Storm	Hurricane 'Irma'

*If a country is not listed here, firms located there were not asked about a recent disaster and the module was skipped.

4 Data considerations

4.1 Anonymization of the dataset

Protecting the privacy of survey respondents is of the outmost importance to the World Bank. To make sure the data cannot be used to identify individual firms in the dataset, a technique of statistical disclosure control (SDC), as described in Benschop, et al. (2021), was applied. It helped identify variables that included unique information about firms. After identifying the high-risk variables, necessary adjustments were made to make sure the SDC analysis provided satisfactory results, i.e., low risk of re-identification. Results can be shared upon request. The following data editing was done for anonymization purpose:

- Precise location data, such as GPS coordinates, and subnational administrative divisions (admin 1)[1] were dropped

- Identifying and contact information, such as firm name, respondent's name, supplier names, phone number and email contact, were dropped

- Number of fulltime workers above 100 was recoded to "above 100 fulltime workers" to mitigate re-identification of the largest firms.

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[1] However, these were kept for Dominican Republic since the sample size is larger and to allow for analysis at the subnational level
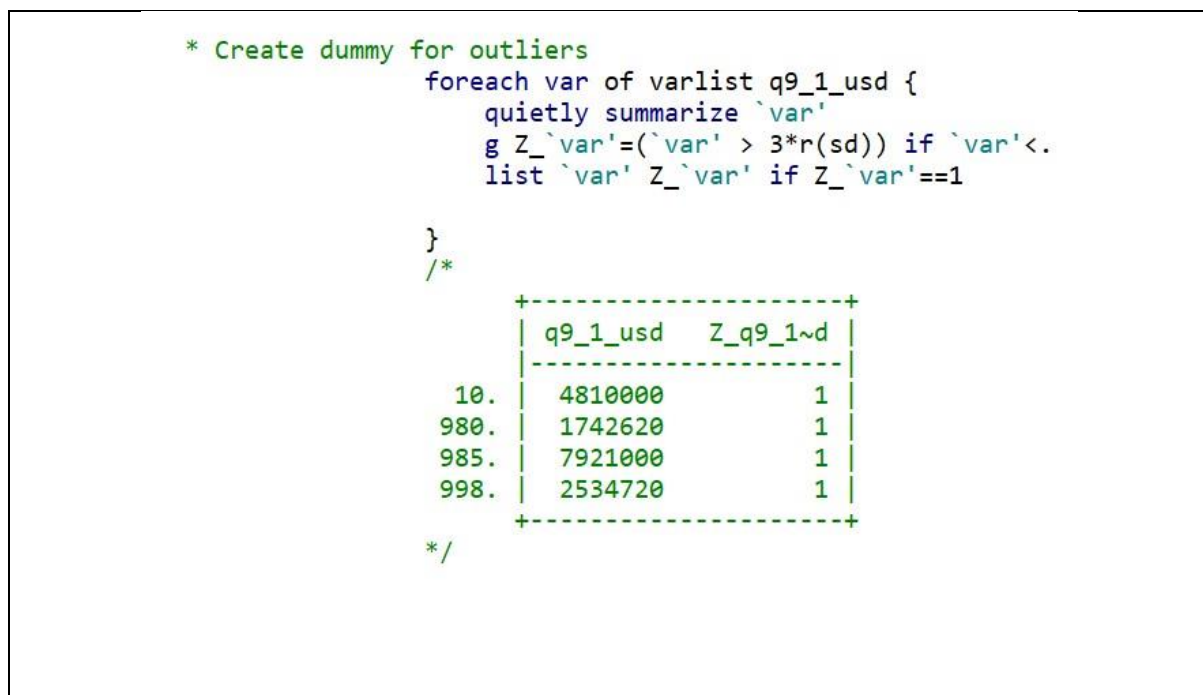
4.2   Outlier treatment

Continuous variables may present some measurement errors. A technique of outlier treatment is recommended. Some of these variables are:

- *q9_1_usd*: What is your average operational cost during the peak season (in *USD*)

- *q3_19*: What is the cost of electricity from your main supply source during the peak? (in *LCU*)

An established method to identify outliers is to tag the observations that deviate from the mean by a set number of standard deviations. Three standard deviations are commonly used. Figure 1 includes STATA code that can be used to tag outliers[2].

Figure 1: Codes for the identification of outliers for the variable *q9_1_usd*

```
* Create dummy for outliers
            foreach var of varlist q9_1_usd {
                quietly summarize `var'
                g Z_`var'=(`var' > 3*r(sd)) if `var'<.
                list `var' Z_`var' if Z_`var'==1

            }
            /*
                +--------------------+
                | q9_1_usd    Z_q9_1~d |
                |--------------------|
            10. |   4810000            1 |
           980. |   1742620            1 |
           985. |   7921000            1 |
           998. |   2534720            1 |
                +--------------------+
            */
```

These outliers can then be either dropped or replaced. For instance, for the variable q9_1_usd, outliers could be replaced by a predicted value based on characteristics associated with operational costs in the sample (excl, outliers), such as number of clients, sector, number of employees, etc. This technique is linked to high uncertainty and careful consideration should be taken before using predicted data.

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[2] Additional checks may be conducted to analyze the presence of outliers. The technique in Figure 1 assumes that the distribution of the variable is normal. This may not be the case, even after using a logarithmic transformation. Other transformations and for which kinds of variables to use them are explained in Ravallion (2017). Outliers may influence the mean and the median of the distribution. More robust methods of outlier treatment may be necessary, for instance, the median absolute deviations (MAD) method (Belotti et al., 2021, Rousseeuwand Croux, 1993).

References

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