Air Transport Case Study

THE IMPACT OF AVIATION REFORMS IN THE DOMINICAN REPUBLIC: A MODEL OF SOCIOECONOMIC GROWTH AND DEVELOPMENT

ICAO IDB

This study was carried-out by the International Civil Aviation Organization (ICAO), the Inter-American Development Bank (IDB) and Dominican Republic (Instituto Dominicano de Aviación Civil (IDAC) and Cuerpo Especializado en Seguridad Aeroportuaria y de la Aviación Civil (CESAC)).

Air Transport Case Study

THE IMPACT OF AVIATION REFORMS IN THE DOMINICAN REPUBLIC: A MODEL OF SOCIOECONOMIC GROWTH AND DEVELOPMENT

International Civil Aviation Organization
Inter-American Development Bank
Dominican Republic

ICAO

IDB

Foreword by ICAO

We are very thankful to the State of Dominican Republic, the Inter-American Development Bank (IDB) and to our ICAO professionals for their dedication and contribution towards delivering this Case Study: *The impact of aviation reforms in the Dominican Republic: A model of socioeconomic growth and development.*

The study, a first of its kind is part of ICAO's continuing efforts to assist Small Island Developing States (SIDs). It highlights the positive socio-economic impacts of air transport for the Dominican Republic, using data and analysis from the past two decades by demonstrating the benefits seen by national economies when States choose to make aviation a priority sector in their national development planning and policies.

The study will facilitate further investments and financing for the development of the air transport sector given the forecasted air traffic growth projected for Dominican Republic, a tourism intensive State. It will also serve as a template for other SIDs, as well as Land locked Developing Countries (LLDC) and Least Developed Countries (LDC) to consider and act upon in order to optimize their own air transport benefits.

Let us all continue to work together to further enhance this success and support similar strategies that will be needed to ensure the continued enhancement of the aviation sector.

Dr. Olumuyiwa Benard Aliu
President ICAO Council

Dr. Fang Liu
Secretary General

Foreword by IDB

The Latin America and Caribbean region has a very dynamic air transport sector, which recorded a doubling of traffic between 2010 and 2018. However, the region faces important challenges. Estimates indicate that countries need to invest about USD 53 billion between 2016-2040 in airport infrastructure to cope with the rising demand. At the same time, at least 13 countries in the region are below the global average in the effective implementation of the ICAO standards.*

The Inter-American Development Bank has been working closely with ICAO and our member countries towards closing these gaps and building safer and more reliable air transport services. The work of IDB includes support to national reforms, regional integration initiatives, promotion of quality airport infrastructure, and incentives for private sector participation. To date, IDB has approved around USD 640 million in loans in the air transport sector, in addition to various non-reimbursable technical assistances and knowledge products to support policy decisions. Furthermore, one of our objectives is also evaluate the effectiveness and impact of the interventions in the sector.

The Dominican Republic has been one of leading countries in the Region in the transformation of the air transport sector for various reasons: First, recognizing the importance of the sector for tourism and the development of the country, the government committed firmly to include the sector as one of the country's priorities. Second, important reforms towards the liberalization of the aviation market were approved, by signing open skies agreements and more liberalized ones with key States and by updating the civil aviation law in 2006. Third, institutional and regulatory changes to conform to ICAO safety and security standards have been implemented along the past 10 years. This case study aims to shed the light to these reforms and, mostly, evaluate the impact of the reforms in the civil aviation sector as main drivers of economic envelopment.

Miguel Coronado Hunter
Representative of IDB President in Dominican Republic

* The Inter-American Development Bank (2018). Developing a More Efficient, Affordable and Safe Aviation Sector in Latin America and the Caribbean: Conceptual Framework for Aviation.

Table of Contents

Acronyms

ASAs	Air Services Agreements
ASCA	Superior Academy of Aeronautic Sciences
CESAC	The Airport and Civil Aviation Safety and Security Board
DR	Dominican Republic
EI	Effective Implementation
ESAC	School of Security and Safety in the Civil Aviation
FIR	Flight Information Region
FOD	Free On Board
GDP	Gross Domestic Product
ICAO	International Civil Aviation Organization
ICM	Interdisciplinary Centre for Mathematical and Computational Modelling at University of Warsaw
IDAC	Dominican Institute of Civil Aviation
JAC	Civil Aviation Board
NCLB	No Country Left Behind
SARPs	Standards and Recommended Practices
SDG	Sustainable Development Goals
SIDS	Small Island Developing States
USAP	Universal Civil Aviation Security Program
USOAP	Universal Oversight Audit Program

1. Introduction

The international air transport sector, directly and indirectly, supports the employment of 62.7 million people worldwide. The sector contributes 2.7 trillion dollars in global Gross Domestic Product (GDP), provides 4.1 billion people transport and moves more than a third of world freight by value on 37 million flights each year.

In September 2015, Heads of State and Government adopted the United Nations *Transforming our World: the 2030 Agenda for Sustainable Development*, including its 17 Sustainable Development Goals (SDGs) and 169 targets. The Agenda is a commitment to eradicate poverty and achieve sustainable development by 2030 worldwide. The adoption of the 2030 Agenda was a landmark achievement, providing a shared global vision toward sustainable development. The 2030 Agenda for Sustainable Development called special attention to Small Island Developing States (SIDS), as they face unique vulnerabilities in their sustainable development.

Achieving the 2030 Agenda's SDGs will depend on advances in mobility, including air transport that is safe, secure, efficient, economically sustainable and environmentally responsible. While sustainable transport and aviation do not have a specific SDG, it is widely recognized that both are essential enablers in the achievement of the 2030 Agenda for Sustainable Development. In 2017, the International Civil Aviation Organization (ICAO) completed a thorough analysis of how its 2017-2019 Business Plan supports the 2030 Agenda for Sustainable Development. Through this analysis, the Organization mapped linkages with 15 of the 17 SDGs.

In the interest of helping States to have access to the significant socio-economic benefits of safe and reliable air transport, ICAO has launched the No Country Left Behind (NCLB) initiative. This initiative focuses the efforts of the Organization to assist States in implementing ICAO Standards and Recommended Practices (SARPs), which the main goal is to help ensure that SARPs implementation is harmonized globally.

The Dominican Republic (DR), due to its outstanding aviation growth and dynamic interaction with the States and the region, serves as a model to the Small Island Developing States (SIDS). Other SIDS share many of the same characteristics as the DR, such as the reliance on tourism and air transport as the primary means of transportation. During the past 12 years, the island has emerged as one of the safest and most reliable countries to fly to, owing to a number of reforms in the aviation sector that brought the nation's air transport into compliance with the ICAO SARPs. These reforms, coupled with other policies to foster tourism on the island, increased the number of passengers who fly to the Dominican Republic, thus positively impacting island's economy.

The study describes these reforms from 2006 onwards and measures, through rigorous econometric models, the impact of these reforms on passengers flows to the State as well as the impact on the economy as a whole. The main reforms can be summarized as: modernization of the institutional framework, defining and separating functions between autonomous institutions for each group of activities; liberalization of the aviation market, fostering a free competitive market and signing air services agreements with more than 60 countries; capacity-building of public officers in order to deliver better services; modernization of the international airports and of the air navigation system; incorporation of ICAO SARPs in the internal legal framework; developing the Action Plan for the Mitigation of CO_2 emissions in the aviation sector with goals and measures; and others.

This case study provides a more relevant and accurate representation of the impact of such measures on Small Developing Island States (SIDS) as well as other small developing economies, including meaningful insight for civil aviation planners and relevant ministries (tourism, finance, transport) on the returns on investments generated by the civil aviation sector.

Finally, this case study is a specific side-by-side comparison of the aviation sector before and after the (2006) reforms were implemented. The studies also illustrate the difference between a State that does not have political will and commitment in establishing aviation as a national priority versus those that do.

2. Executive Summary

DOMINICAN REPUBLIC STATISTICS

- The air transport market in the Dominican Republic has consistently grown by an average of 5.52% annually over the last 20 years, making it one of the largest air transport markets among the Caribbean countries. The number of foreign passengers has increased at a faster pace compared to Dominican nationals, reaching 78% of total passengers in 2018, up from 70% in 1996.
- Regionally, in 2018, 63% of all passengers came from North America, while 19% came from Europe and 6% from South America. The Caribbean accounts for 4.96% of passengers in the air transport market in the Dominican Republic, third behind the United States and Canada.
- Only four countries make up more than 67% of passenger flows to the Dominican Republic: the United States, Canada, Spain and Germany. The Dominican air transport sector relies heavily on its ties to the United States. The U.S. accounted for 50% of the total flow of passengers to the island in 2018. Canada accounts for 12%, Spain 4% and Germany 3%.
- In 2018, 60 airline carriers provided regular flights to the Dominican Republic, with ten of them making up 64% of the market share. JetBlue alone transported an estimated 21% of the total passengers to the Dominican Republic in 2018. Low-cost airlines stood out in 2017, accounting for an estimated 45% of all passengers.
- The number of passengers transported by the Dominican Republic airlines has significantly grown between 2015 and 2018, contributing to a better connectivity between DR and Curazao, Cuba, Haiti, Puerto Rico, Saint Martin, British Virgin Islands, Aruba, Antigua and Barbuda and Jamaica. They also performed charter flights to Central and North America. The flight movements (entries and exits) reached 5,987 operations in 2016, representing a growth of 58.9%. In 2017, the number of flights was 9,865, a growth of 64.8%.
- The 2045 forecast shows an average growth of CAGR 4% in routes from Central America/Caribbean.
- In the year 2018, there was around 126.6 million Kg. of freight traffic by air, of which, 83.3 million was exports and 43.3 million imports. This cargo translated to a total FOB value of US$5.09 billion, which makes up 20% of the total imports and exports of the Dominican Republic. Las Americas airport represented almost 60% of the total imports and exports by air.
- Since 2015, there has been steady, yearly growth in exports, around about 8% annually, highlighted by 2016's 8.8% growth. The most exported product from the Dominican Republic, by weight, are vegetables (70% of the total); by value, stones and precious metals (70% of the total value). In 2018, 75% of exports from the Dominican Republic went to North America (EUA: 64% and Canada, 11%).
- There was a significant recovery on imports in 2018 after decreases in 2017. About 65% of the total imports came from United States (43%) and China (22%). Machinery and appliances are the most imported products, by air, to the Dominican Republic, both FOB-wise (US$806 million) and weight-wise (13.4 million kg.).
- The island, which accounts for 0.43% of the total passengers in the world, ranked 47th based on 2016 results at the Global Air Connectivity Index, a World Bank indicator that focuses on understanding the role of connectivity in economic growth and development. About 62% of total passengers used a direct flight to travel to DR, 36% made one stop and 2%, two stops, in 2016.
- DR has 36 airports, aerodromes and runways, both public (direct administration and concessions) and private. The international airports are administered by the private sector, either through concessions (five) or are privately-owned (three). By 2018, passengers flew via 242 direct routes from/into 38 countries/territories provided by 43 airlines through its 7 operational international airports.

- The traffic is concentrated in two main airports: Punta Cana (PUJ) and Santo Domingo (SDQ). Around 80% of passengers originating in the Dominican Republic departed from these two airports in 2017, through 50% of the total routes.

POLICY REFORMS

- DR enacted Law No. 491-06 in December 2006, modernizing legislation to cope with the new aviation landscape, followed by two amendments: Law 67-13 and Law 29-18.
- The relevant reforms in the aviation sector are: (i) a set of strong institutions to define the air transport policies and to establish the technical and economic regulations of civil aviation, air traffic control, investigation of accidents and sector oversight. The objective is to separate functions among autonomous institutions to avoid conflict of interests; (ii) institutions to define the air transport policies and to establish the technical and economic regulations of civil aviation, air traffic control, investigation of accidents and sector oversight; (iii) More flexibility for foreign operators and relaxation of ownership requirements for national operators.
- Until 2007, the Dominican Republic had signed bilateral agreements with 19 countries, most of them traditional (limited frequencies and routes). However, Law 491-06 established the liberalization of air services in the State. By giving the Civil Aviation Board (JAC, in the Spanish abbreviation) the mandate to sign Air Services Agreements (ASAs) on behalf of the State and a technical staff to carry out the activities, the new law boosted the number of agreements and moved towards more liberal agreements signed between the Dominican Republic and other countries, reaching agreements with a total of 66 countries.
- JAC also accepted more code share agreements after the reforms, as a way to bring about more routes to the State. Currently, there are 15 active code share agreements, which provide 25 routes from Panamá, Spain, the United States, Guadeloupe, Guyana, and the United Kingdom, involving 15 airlines.
- The Dominican Republic joined the ICAO-UE capacity building program for CO_2 mitigation from international aviation. The State defined an Action Plan with goals and mitigation measures. Between 2012-2018, the Dominican stakeholders invested around USD 13 million in measures to mitigate CO_2 emissions, including solar power plants, equipment to improve energy efficiency in the airports, LED lights, more efficient refrigeration systems, implementation of Preconditioned Air (PCA) units and electronic Ground Power Units (GPU) to reduce the use of auxiliary power units (APU) and the partial implementation of the Air Traffic Flow Management (ATFM) concept in the main building of Air Navigation Services Norge Botello. ICAO-UE measured 16.800 CO_2 fewer tons of emissions from international flights and airports compared to the 2018 baseline (without project scenario).

SECURITY AND SAFETY OVERSIGHT: POLICIES AND CAPACITY BUILDING

- Similarly, Law 188-11 changed the civil aviation safety and security oversight in the Dominican Republic. These changes included the development of a modern system of sanctions for violations and acts of disobedience.
- The Airport and Civil Aviation Safety and Security (CESAC) board has released the National Plan for Security and Safety in the Civil Aviation, which led to a group of reforms, such as the implementation of a data center, new technologies for inspections, and a video system for airport oversight and simulation.
- In 2014, the Dominican Republic established its primary law and regulations to certify airplanes ground handling services companies. By now, 28 companies have been identified, and five were certified. 18 more are currently going through the certification process under RAD 24 (Dominican Aviation Regulation, in the Spanish abbreviation) and 10 have expressed interest but have not started the process.
- Along the same lines, through the Superior Academy of Aeronautic Sciences (ASCA), the Dominican Republic has trained 9,265 students under more than 100 academic courses from 2008-2018. The academy also trained 291 students on Air Traffic in Aerodromes and Aeronautic Administration, since 2013. Furthermore, ASCA provided courses for students in many other countries in Latin America and the Caribbean.

- Through the School of Security and Safety in the Civil Aviation (ESAC), the Dominican Republic trained 6,500 professionals on security and safety in civil aviation, and 4525 professionals through 252 courses, from 2009-2018. Among these students, 196 are foreigners from 17 different countries.
- Under this new reform framework, and due to the commitment of the Dominican Republic toward security issues, major progress was made in the Universal Civil Aviation Security Program (USAP) from 76.46% to 96.98% in 2017, an increase of 20.52 percentage points, reaching high marks in terms of airport security and civil aviation.

AIR NAVIGATION SYSTEMS

- The FIR Santo Domingo (MDCS) has a dimension of 172,578 km^2, surrounded by the FIRs of Miami (KZMA), San Juan (TJZS), Curazao (TNCF) and Port-au-Prince (MTEG).
- The Air Traffic Flow Management Unit was created under the Santo Domingo Area Control Center, with a staff of 13 specialists, to monitor and evaluate the traffic situation in the airports and the Santo Domingo Flight Information Region (FIR), generating deliverables designed for the optimal execution of air flows.
- The Air Navigation System is staffed by more than 600 air navigation service provider personnel, 266 aviation technical operators and 334 air traffic controllers. The ANS personnel, spread throughout the different air navigation facilities, supported air navigation services for 215,770 air operations during 2018.
- The Dominican Republic created the Department of Safety Management, which is a specialized technical body responsible for the implementation of an SMS for air navigation services as well as the subsequent continuous operation of said system.
- The Dominican Republic is upgrading its Aviation System Block, starting from Block 0, which has the capacities ready to be implemented with supporting documents such as standards, procedures, specifications and training materials. The State expects to start upgrading Block 1 in 2019, Block 2 in 2025 and Block 3 in 2031, with ICAO's support.

SAFETY AUDIT RESULTS AND LACK OF EFFECTIVE IMPLEMENTATION

- In 1993, the United States Federal Aviation Administration (FAA) downgraded the Dominican Republic to Category II. Under the new aviation law approved in the Dominican Republic (2006), and the different improvements obtained from the new reform framework, the FAA upgraded the Dominican Republic aviation safety rating to Category I in 2007.
- The first audit under the Universal Safety Oversight Audit Program (USOAP) in the Dominican Republic was carried out in January 2009, with missions to validate the corrective measures in 2016 and 2017. The State has achieved great results in the ICAO's USOAP, improving the Effective Implementation (EI) from 85.98% (2009) to 90.52% (world average is 66.32%). With these results, the Dominican Republic ranks in the top 5 States in the North America, Central America and Caribbean Region (NACC) in the safety oversight arena (top 4 of 22 in NACC region).

THE IMPACT OF AIR TRANSPORT REFORMS IN THE DOMINICAN REPUBLIC ECONOMY

- Our macroeconomic model estimated a 15.5% increase in GDP per capita between 2006-2012, which can be translated in USD 607 per capita of income increase.
- The microeconomic model estimated an increase between 23% and 27% in the participation of passengers going to Dominican Republic from the U.S. over passengers going to other destinations. Moreover, due to the policy improvements, the increase of U.S. tourists to the DR increased tourism spending by USD 836 million to 1.016 billion between 2006-2012. The results show a causal relationship between the reforms and the increase of passengers, thus impacting positively the economy.

- Using a conservative estimate, the total net benefit to Dominican Republic in the period of 2006-2012 attributable to the policy is USD 837 million through American tourist spending, and USD 78 million in taxes charged by the State to non-residents, reaching a total of USD 915 million. The contribution of taxation to the economy (GDP) of Dominican Republic is significant. Estimates indicate that for the year 2017, taxation contributed around USD [non-residents 80 unit tax] 490 million to the DR economy.

3. State Profile

DOMINICAN REPUBLIC

Socioeconomic Indicators

Population: 10.88 million

Surface area: 48,671 square kilometers

Population Density: 224 people per sq km

Category: Small Island Developing State

GDP: 75.93 billion USD (2017)

GDP per capita: US$ 7,052.26 USD (2017)
Upper middle-income developing State (Word Bank)

Average growth (2000-2016): 4.9%

Doing Business Ranking (2018): 99th (World Bank)

Global Competitiveness Index (2017-2018): 3.9 out of 7 (104th out of 137) (World Economic Forum)

Travel & Tourism Competitiveness Index (2017): 76th (World Economic Forum)

Logistics Performance Index (2018): 2.66 (87th).

Aviation Indicators

Number of passengers: 13,751,481 (2017)

Average growth total pax (1996-2017): 5.28%

Global Air Connectivity Index (2106): 0.41 (rank 47th - World Bank).

Air Liberalization Index (2011): 23 out of 50 (WTO).

Global Competitiveness Index - Quality of Airport Infrastructure (2017-2018): 4.8 out of 7 **(50th) (World Economic Forum)**

Airport Infrastructure:

- 36 airports, aerodromes and runways;
- 8 international airports (7 operative)
- 4 public airports (managed by private firms through concessions)
- 3 private airports (Punta Cana, La Romana y El Cibao)
- 1 national domestic airports;
- 1 military airport;
- 7 domestic aerodromes;
- 20 aerodromes for aerial work (agriculture aerial spraying)

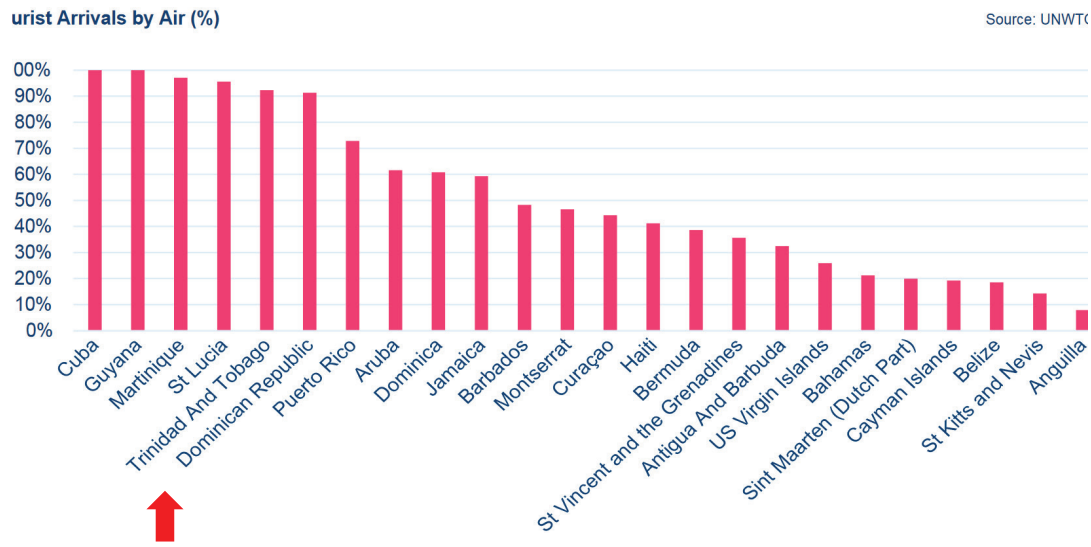
Effective Implementation (EI) of ICAO USOAP: 90.52% (4th in the region, 2018).

4. State of Air Transport and Connectivity

4.1. STATE OF AIR TRANSPORTATION: GENERAL STATISTICS, MAIN DESTINATIONS AND AIRLINES

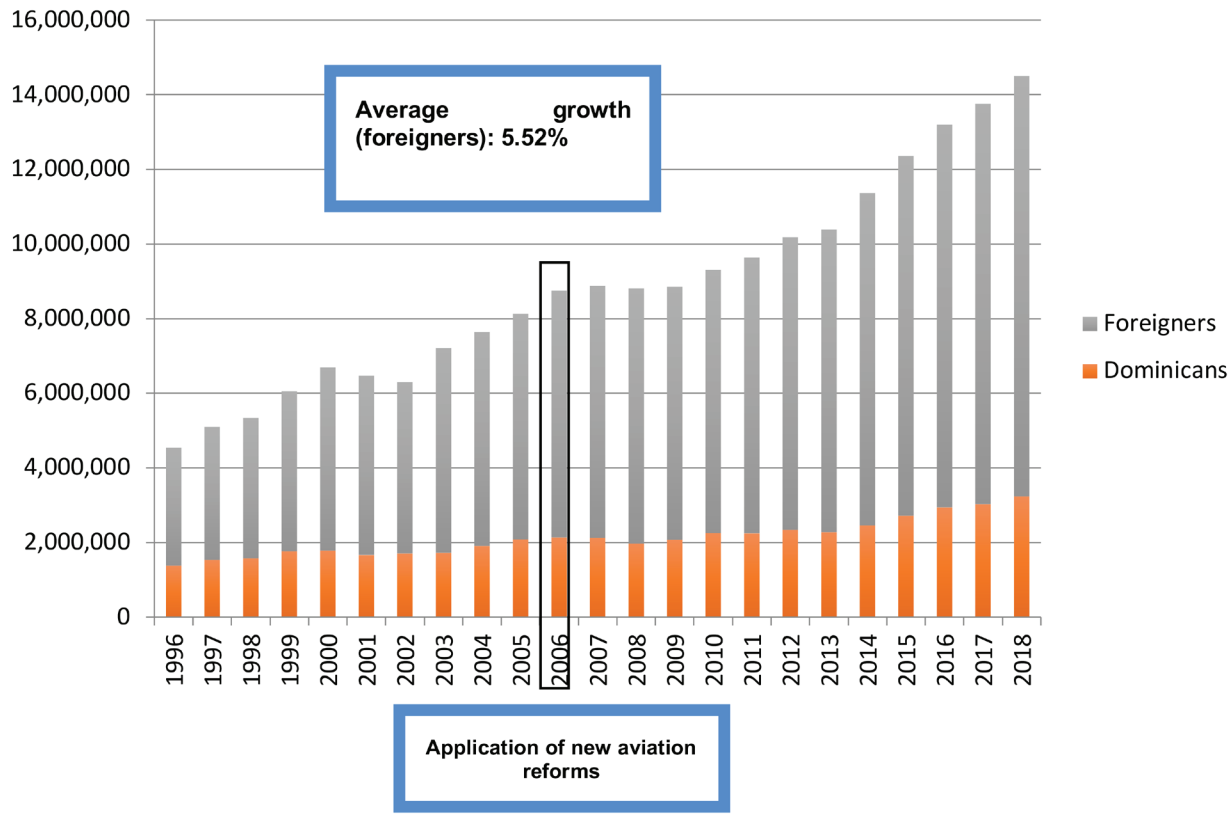
The air transport market in the Dominican Republic has consistently grown by an average of 5.52% annually over the last 20 years, making it one of the largest air transport markets among the Caribbean countries. The number of foreign passengers has increased at a faster pace compared to Dominican nationals, reaching 78% of total passengers in 2018 up from 70% in 1996. Moreover, 90% of tourists arrive by air, indicating the importance of aviation for tourism on the island, as shown in the chart 1.

Chart 1: Tourist Arrivals by Air in 2018 (%)



The chart 2 shows the evolution of the air transport market in the State. There are only two points where the market showed slight drops in the rate of growth, both related to major global events: 2001-2002, due to the terrorist attacks on 09/11, and 2008-2009, due to the global economic crisis. However, the Dominican Republic quickly adapted to these short-term setbacks by redirecting destination-marketing efforts to alternative source markets with similar spending and travel habits, such as Canada, mitigating the effects of the crisis (WEF, 2011).

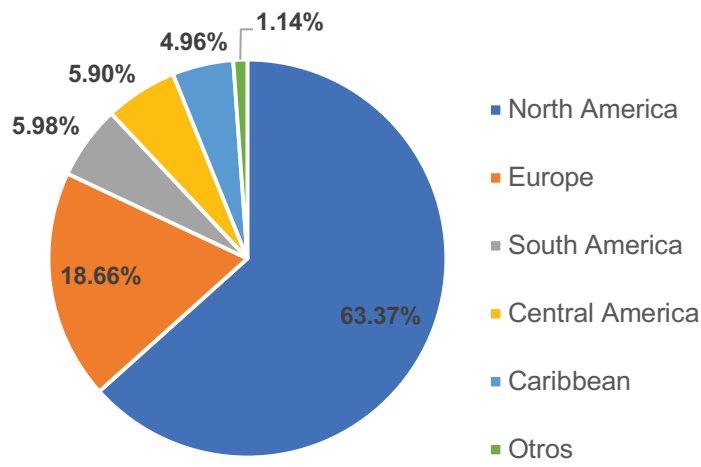
Chart 2: The evolution of the air transport market in the Dominican Republic, 1996-2018



Source: JAC

Regionally, in 2018, 63% of all passengers came from North America, while 19% came from Europe and 6% from South America, as described in the chart 3. While the numbers are skewed towards the United States — which captures most of the passengers of North America — in South America, the passengers are divided nearly equally between Brazil, Argentina, Chile and Colombia. In Europe, the largest number of passengers come from Germany, Spain, Italy and France. The Caribbean accounts for 4.96% of passengers in the air transport market in the Dominican Republic.

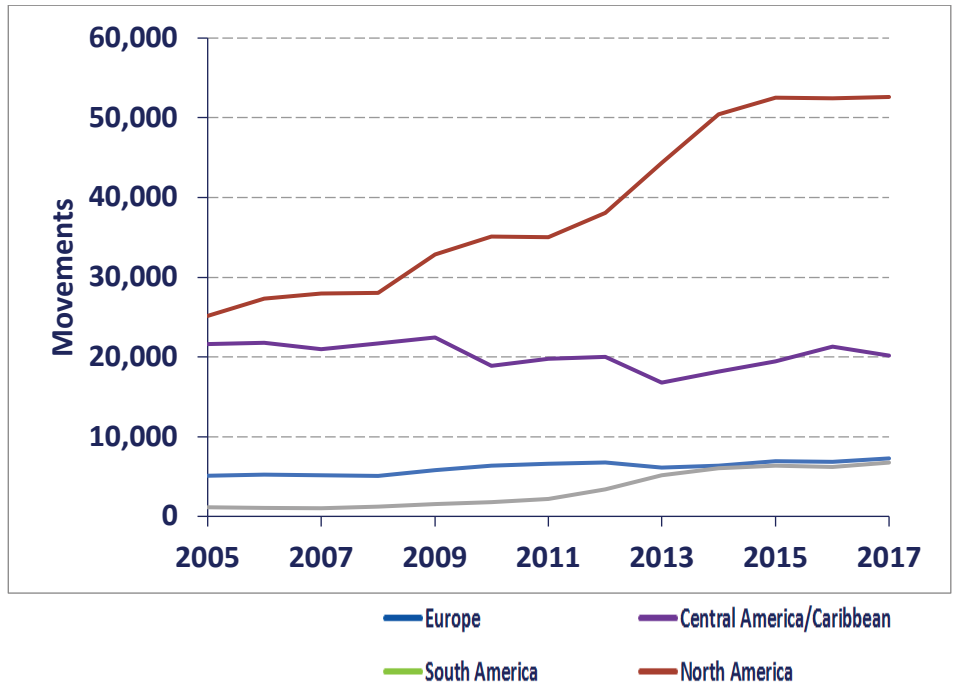
Chart 3: Air Transport Market by Region in Dominican Republic, 2018 (total pax)



Source: *JAC, OAG*

The number of scheduled flights (movements) has also grown from 2005 to 2017, especially from North America, as shown in chart 4:

Chart 4: Number of scheduled flights in the Dominican Republic, 2005-2017

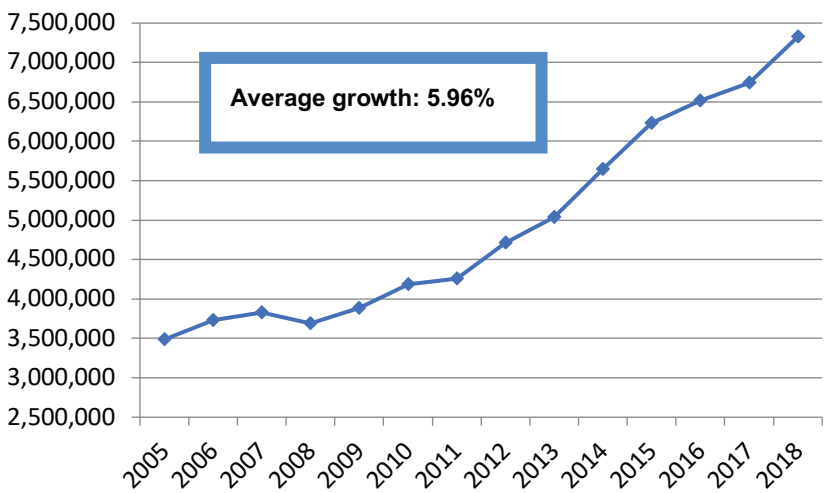


Source: JAC, OAG

Only four countries make up more than 67% of passenger flows to the Dominican Republic: the United States, Canada, Spain and Germany. The Dominican air transport sector relies heavily on its ties to the United States. The U.S. accounted for 50% of the total flow of passengers to the island in 2018. The average growth between 2005-2017 was 5.96% annually. The only drop occurred between 2007 and 2008, due to the 2008 financial crisis in the U.S. Chart 5 shows the growth trend between the two countries.

The main inbound flights left and returned to the cities of New York (about 39% of total U.S. passengers), Miami (11%), Fort Lauderdale (7%) and Atlanta (6%), arriving at the airports of Las Americas (Santo Domingo), Punta Cana and Del Cibao. It is important to note that eight of top 10 outbound routes from Dominican Republic are to United States in 2018.

Chart 5: Evolution of the air transport market in Dominican Republic (2005-2018), United States (pax)



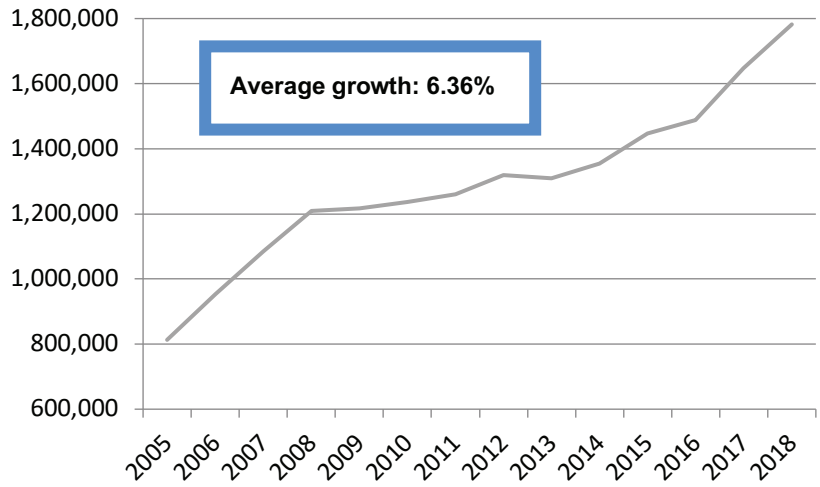
Route[1]	Total pax, 2018 (Departures+Arrivals)	% of total U.S. pax
KJFK - MDSD	952,038	12,99%
KJFK - MDST	950,773	12,98%
KJFK - MDPC	490,600	6,70%
KMIA - MDSD	437,769	5,98%
KATL - MDPC	436,058	5,95%
KMIA - MDPC	380,963	5,20%
KEWR - MDPC	268,416	3,66%
KFLL - MDSD	261,433	3,57%
KFLL - MDPC	227,941	3,11%
KEWR -MDST	213,337	2,91%
TOTAL	**4,619,328**	**63,05%**
US TOTAL	**7,326,465**	

Source: JAC

Canada ranks second in terms of air transport flows to the Dominican Republic. The State accounted for 12% of the total flow of passengers to the island in 2018. The average growth rate between 2005-2018 was 6.36% annually. The main flights left and returned to the cities of Toronto (45% of all Canadian passengers) and Montreal (30%) to Punta Cana and Puerto Plata.

1 KJFK (John F. Kennedy International Airport); KMIA (Miami International Airport); KATL (Atlanta International Airport); KEWR (Newark International Airport); LFLL (Fort-Lauderdale International Airport); MDSD (Santo Domingo International Airport); MDST (Cibao International Airport); MDPC (Punta Cana International Airport).

Chart 6: The evolution of the air transport market in the Dominican Republic (2005-2018), Canada

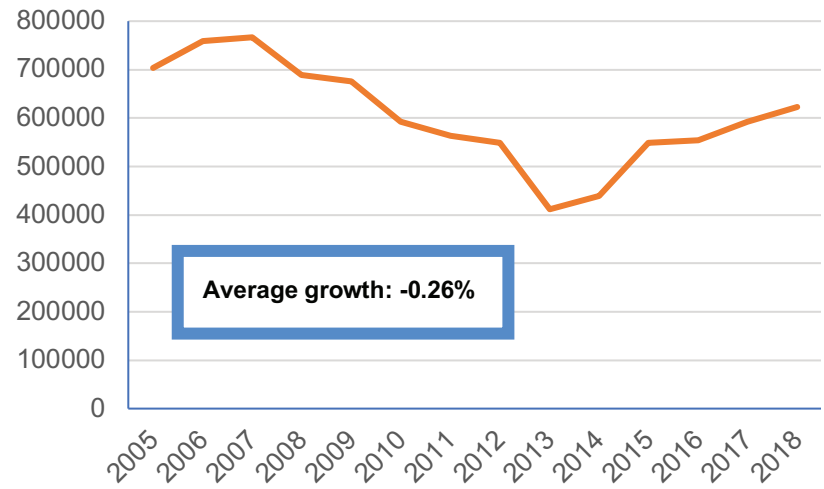


Route[2]	Total pax, 2017 (Departures+Arrivals)	% of total CAN pax
CYYZ - MDPC	629,363	35%
CYUL - MDPC	402,057	23%
CYYZ – MDPP	185,500	10%
CYUL - MDPP	113,234	7%
TOTAL	**1,326,819**	**74%**
CAN TOTAL	**1,326,819**	

Source: JAC

Spain is the third State in passengers flows to the Dominican Republic, accounting for approximately 4% of all passengers in 2018. Between 2007 and 2013, the number of passengers from Spain dropped consistently, but recovered from 2014 onwards. The main flights departed from two cities, which account for 97% of all passengers: Madrid-Santo Domingo and Madrid-Punta Cana.

Chart 7: The evolution of the air transport market in the Dominican Republic (2005-2018), Spain

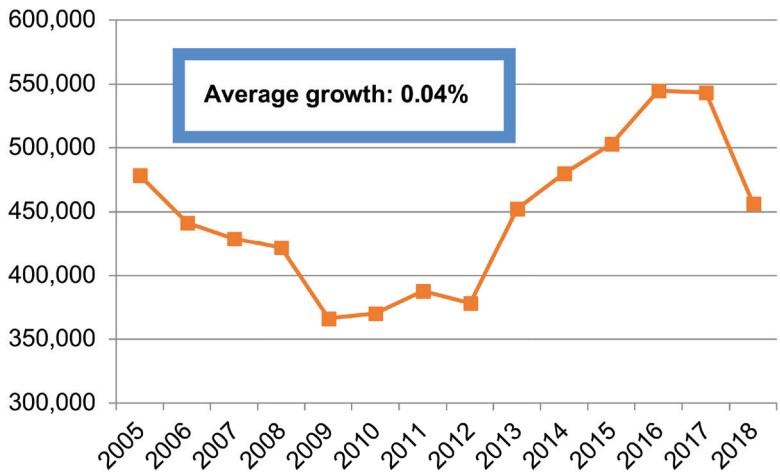


Route	Total pax, 2018 (Departures+Arrivals)	% of total SPA pax
LEMD-MDSD	377,091	61%
LEMD-MDPC	225,221	36%
TOTAL	**602,312**	**97%**
TOTAL SPA	**622.681**	

2 CYYZ (Toronto Pearson International Airport); CYUL (Montreal International Airport).

Finally, Germany was the 4th State in terms of passengers flows to the Dominican Republic, accounting for approximately 3% of all passengers in 2018, a drop from 2017. Between 2005 and 2009, Germany registered a drop on the number of passengers to the Dominican Republic, but has recovered between 2012 to 2016. Germany registered an average growth of 0.04% between 2005-2018. The main flights to the Dominican Republic left and returned to the cities of Frankfurt (EDDF) (24%), Dusseldorf (EDDL) (22%) and Cologne (EDDK) (15%) to Punta Cana, in 2018.

Chart 8: The evolution of the air transport market in the Dominican Republic (2005-2017), Germany (pax)

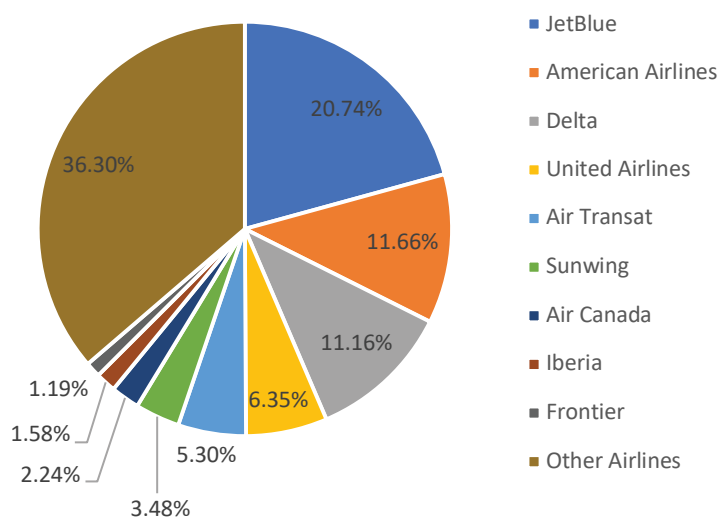


Route	Total pax, 2017 (Departures+Arrivals)	% of total GER pax
EDDF - MDPC	109,757	24%
EDDL – MDPC	101,363	22%
EDDK - MDPC	83,793	15%
TOTAL	279,033	59%

Source: JAC

In 2018, 60 airline carriers provided regular flights to the Dominican Republic, with ten of them making up 64% of the market share. JetBlue alone transported an estimated 21% of the total passengers to the Dominican Republic in 2018. The low-cost airlines3 stood out in 2018, accounting for an estimated 45% of all passengers.

Chart 9: Market share of air transport by airlines, Dominican Republic, 2018



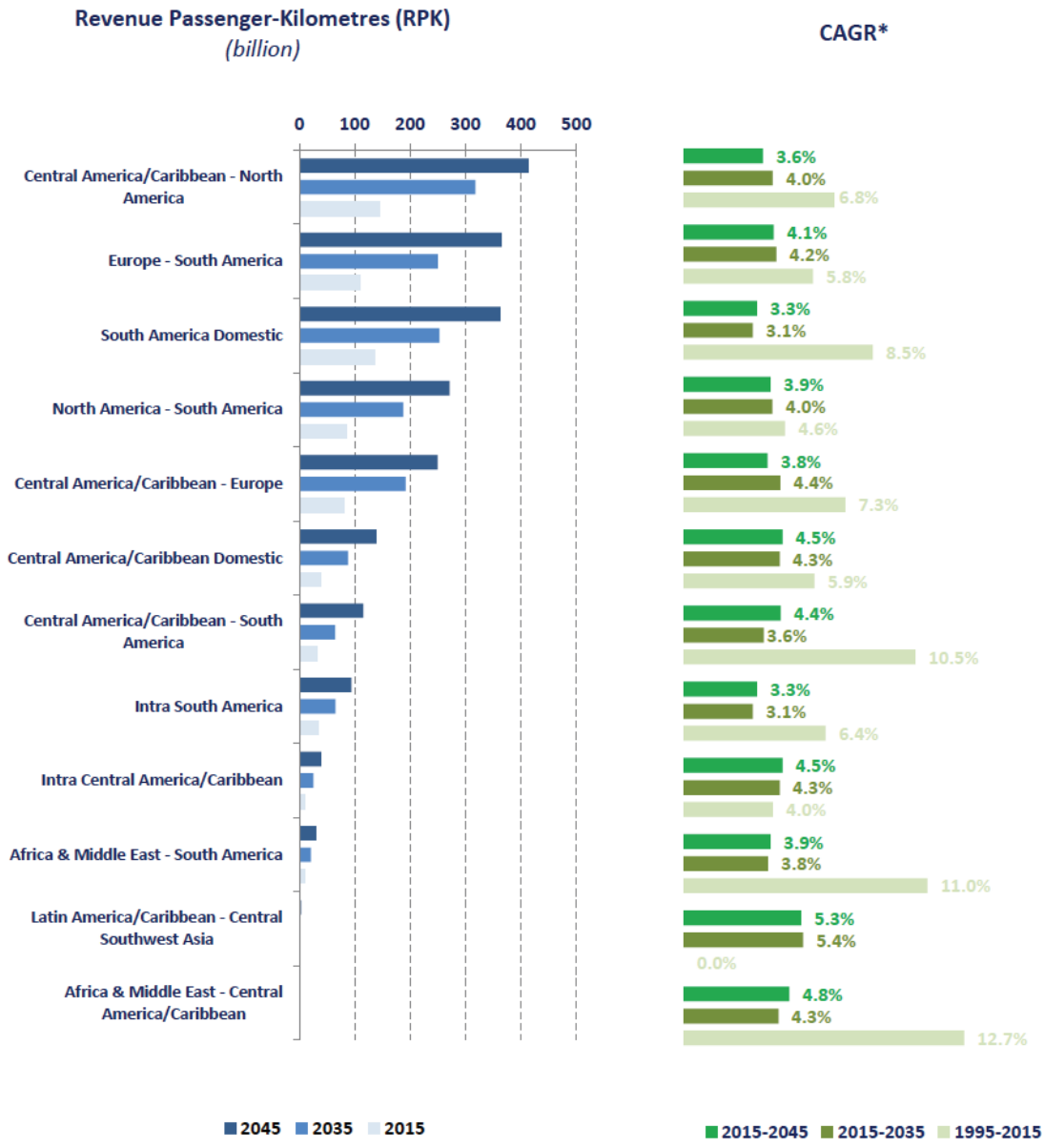
Source: JAC, OAG

3 ICAO defines low cost carrier as an air carrier that has a relatively low-cost structure in comparison with other comparable carriers and offers low fares and rates.

Forecast for Central America/Caribbean[4]

The forecast shows an average growth of CAGR 4% in the routes from Central America/Caribbean. CAGR 3.6% in the RPK from Central America/Caribbean – North America for 2015-2045, still ranking first in terms of RPK (billion). The largest growth will take place in Latin America/Caribbean – Central Southwest Asia (CAGR 5.3%).

Chart 11: ICAO Long-Term Traffic Forecast (2015-2045)



** CAGR: Compound Annual Growth Rate*

Source: ICAO

4 The Dominican Republic is part of this region.

4.2. DOMINICAN REPUBLIC AIRLINES

The number of passengers transported by Dominican airlines has significantly grown between 2015 and 2018, contributing to better connectivity between the DR and Curazao, Cuba, Haiti, Puerto Rico, Saint Martin, British Virgin Islands, Aruba, Antigua and Barbuda and Jamaica. They also performed charter flights to Central and North America.

In 2016, PAWA Dominicana started operating in the State, bringing some dynamism to the airline market. PAWA Dominicana contributed to a 337% growth in the number of passengers transported by national airlines compared with 2015, and 147% compared with 2017. The flight movements (entries and exits) reached 5,987 operations in 2016, representing a growth of 58.9%. In 2017, the number of flights was 9,865, a growth of 64.8%. However, PAWA ceased operations in the beginning of 2018, negatively impacting the market but also creating space for new national operators.

The market of national airlines is dominated by Air Century S.A., a Dominican private firm, which operates 16 regular routes and charter flights in the region. In 2016, Air Century grew 151% in number of flights made, followed by 85.3% growth in 2017 and 82.4% growth in 2018. Sky High Aviation, another Dominican airline company, has expanded its operations since 2016, servicing the British and Dutch Caribbean. The company is planning to operate larger airplanes in the future. The State has granted authorization for a new operator, Servicios Aéreos GECA, S.A., to operate from the airport Jose Francisco Peña Gómez to Puerto Príncipe and Haitian Cape in Haití, Habana, Santiago and Camaguey in Cuba, Agudilla in Puerto Rico, Curazao, Aruba and Sant Martín, Tórtola, Kingston and Providenciales. Annex 2 shows detailed information about routes and companies.

Dominican Republic Airlines
Flight movements, 2015-2018

Airlines	2015	2016	2017	2018
Helicópteros Dominicanos S.A./Helidos	1,017	1,594	2,211	2,390
Air Century, S.A./ACSA	651	1,452	2,098	3,004
Pawa Dominicana	470	2,040	3,685	224
Servicios Aéreos Profesionals, S.A.	471	400	1,0515	1,947
Sky High Aviation Services, S.R.L	307	343	698	2,123
Aerolíneas Mas S.A.	719	4	-	-
Aerolíneas Santo Domingo S.A.	109	42	39	34
Dominican Wings, S.A (Dw)	-	58	88	-
Tropical Aero Servicios S.R.L (Tas)	15	49	1	-
Republic Flight Lines, S.R.L	-	3	34	1
Aeronaves Dominicana//Aerodomca	6	-	3	-
Aerojet Services, S.A.	-	2	2	-
Transporte Aéreo S.A.	2	0	0	0
TOTAL	**3,767**	**5,987**	**9,865**	**9,723**

Source: JAC/IDAC

Dominican Republic Airlines Number of passengers, 2015-2018				
Airlines	**2015**	**2016**	**2017**	**2018**
Pawa Dominicana	11,477	114,998	288,530	19,330
Air Century, S.A./ACSA	4,001	10,075	18,673	34,061
Sky High Aviation Services, S.R.L	2,871	3,243	7,940	30,753
Servicios Aéreos Profesionals, S.A.	2,490	2,406	9,875	18,970
Dominican Wings, S.A (Dw)	-	2,204	6,657	-
Helicópteros Dominicanos S.A./Helidos	1,082	1,688	2,338	3,456
Aerolíneas Mas S.A.	8,109	39	-	-
Aerolíneas Santo Domingo S.A.	784	257	197	132
Republic Flight Lines, S.R.L	-	10	126	2
Tropical Aero Servicios S.R.L (Tas)	30	78	2	-
Aerojet Services, S.A.	-	5	3	-
Aeronaves Dominicana//Aerodomca	1	-	1	-
Transporte Aéreo S.A.	1	-	-	-
TOTAL	**30,846**	**135,003**	**334,342**	**106,704**

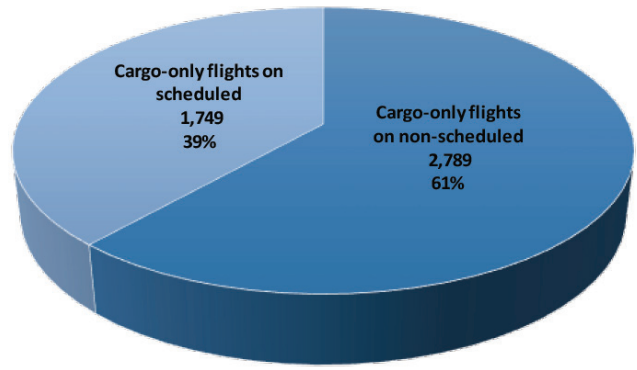
Source: JAC/IDAC

4.3. CARGO STATISTICS

Cargo Flights[5]

In the Dominican Republic, as is standard global practice, most of the freight traffic by air is on combined flights (passengers, freight and mail). Nevertheless, in 2018, there were 4,538 cargo-only flights, about 6 per day on average. More than 60% (2,789) were charter flights and the rest scheduled (1,749).

Chart 12: Dom. Rep. Cargo-only flights stages on scheduled and non-scheduled flights 2018



Source: By the JAC, with data provided by the IDAC

5 This section was copied from the Air Transport Statistics Report: Dominican Republic 2018, produced by JAC.

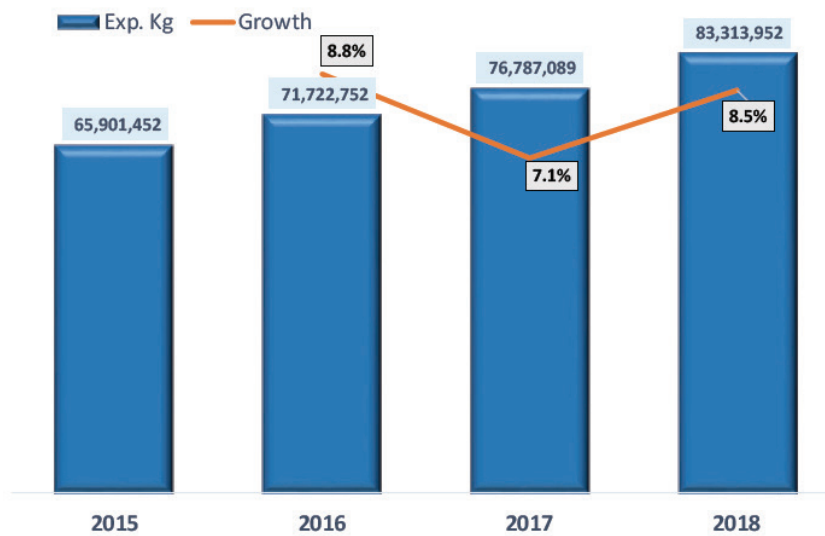
Freight traffic

In 2018, 126,647,638 Kg. of cargo was moved by air, of which, 83,313,952 were exports and 43,333,686 were imports. This translates to a total FOB value of USD 5,092,549,832, which makes up about 20% of total value of imports and exports of the Dominican Republic. In regards to FOB, imports were much more valuable than exports, with the former averaging FOB USD 55/KG, while the latter averaged USD 32.68/KG.

Exports – 2014-2018

83,313,952 kg of goods were exported in 2018, representing 8.5% growth from 2017. As illustrated chart 13, there was steady yearly growth in exports since 2015, approximately 8% annually with a high-point of 8.8% growth in 2016.

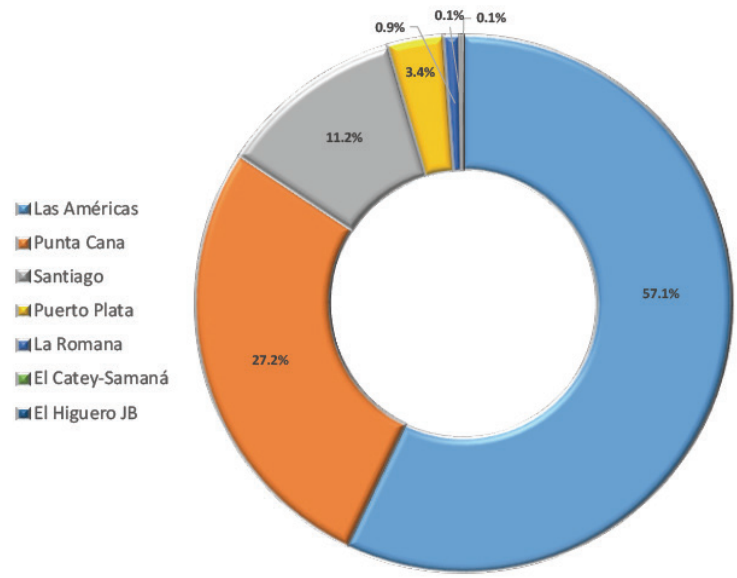
Chart 13: Dominican Republic Exports 2015-2018



Source: By the JAC, with data provided by General Directorate of Customs

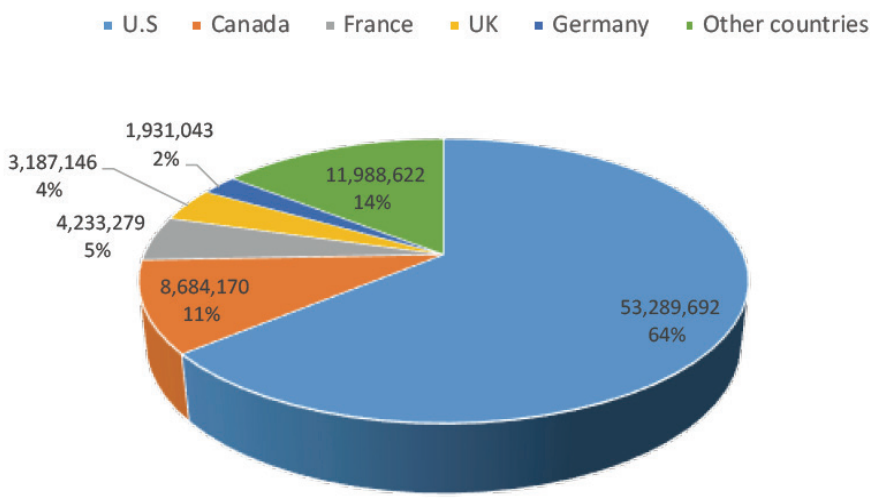
95% of the exports from the Dominican Republic departed from the Las Americas JFPG, Punta Cana and Santiago airports, led by Las Americas JFPG with 47,601,023 Kg. (57% of the total).

Chart 14: Dominican Republic Exports - Airports 2018



In 2018, 75% of exports from the Dominican Republic went to North America; 53,289,692 kg to the USA and 8,684,170 kg to Canada. Exports towards Europe also played an important role, especially to France, the UK and Germany; these three destinations accounted for 11% of total exports.

Chart 15: Dominican Republic Exports by State of destination 2018



Source: By the JAC, with data provided by General Directorate of Customs

The most exported product from the Dominican Republic, by weight, are produce items, accounting for 56,464,527 kg.; this number represents almost 70% of the total weight exported. By FOB standards, the most exported product from the State were fine pearls, stones and precious metals, valued at USD 1,934,796,379, more than 70% of the total export value.

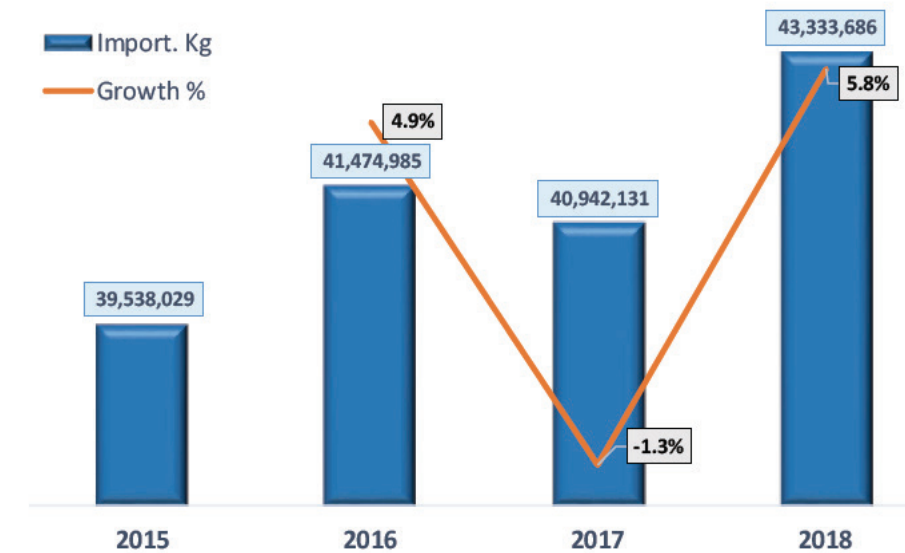
	Load (Kg)	FOB value	V. FOB/KG
Products of the Vegetable Kingdom	56,464,527	48,806,877	0.9
Animal or Vegetable Fats and Oils	6,340,796	76,772,814	12.1
Fine Pearls, Stones or Precious Metals, Costume Jewelry, Coins	6,275,824	1,934,796,379	308.3
Machines and Apparatus	3,256,969	283,506,197	87.0
Products of the Chemical Industries	2,866,157	81,584,958	28.5
Others	8,109,679	297,057,526	36.6

Source: By the JAC, with data provided by General Directorate of Customs

Imports (2015-2018)

There was a significant recovery on imports in 2018 after a downturn in 2017. The recovery represented a (5.8%) rate of growth in imports, +7.1 more than 2017 (-1.3%).

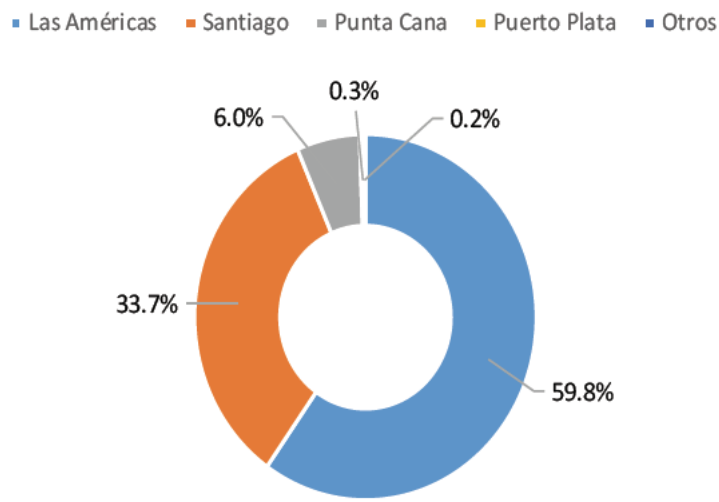
Chart 16: Dominican Republic Imports 2015-2018



Source: By the JAC, with data provided by General Directorate of Customs

99% of the imports to the Dominican Republic in 2018 came through the Las Americas, Del Cibao and Punta Cana airports; Las Americas led the way receiving over 25 million Kg. in imports, accounting for more than half of the total amount.

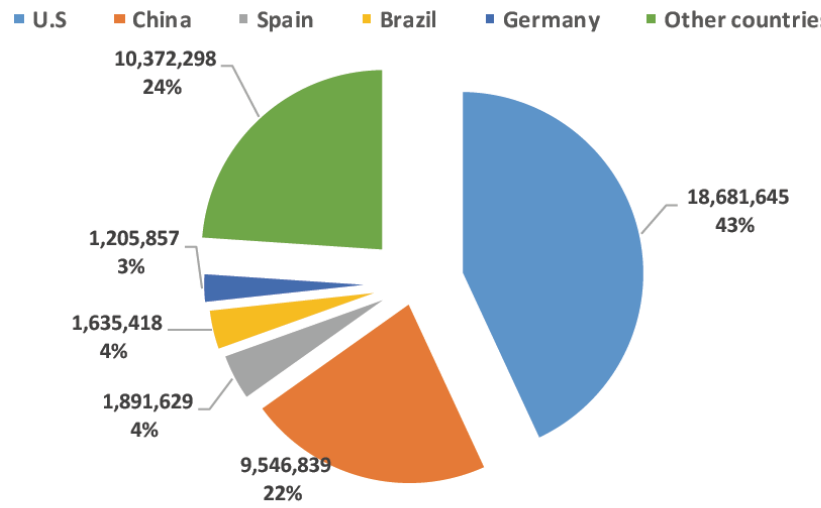
Chart 17: Dominican Republic Imports - Airports 2018



Source: By the JAC, with data provided by General Directorate of Customs

The majority of imported goods to the Dominican Republic in 2018 came from North America or Asia, specifically the USA, 18,681,645 Kg, and China, 9,546,839 Kg. These two countries account for 65% of total imports.

Chart 18: Dominican Republic Imports by State of destination 2018



Source: By the JAC, with data provided by General Directorate of Customs

Machinery and appliances are the most imported products, by air, to the Dominican Republic, both FOB-wise (USD 806,290,488) and weight-wise (13,435,975 kg.). Chemical Industry products are the 3rd most imported product to the Dominican Republic in regards of weight, but its's the most expensive imported product among the top 5 listed below with an average value of USD 105/KG.

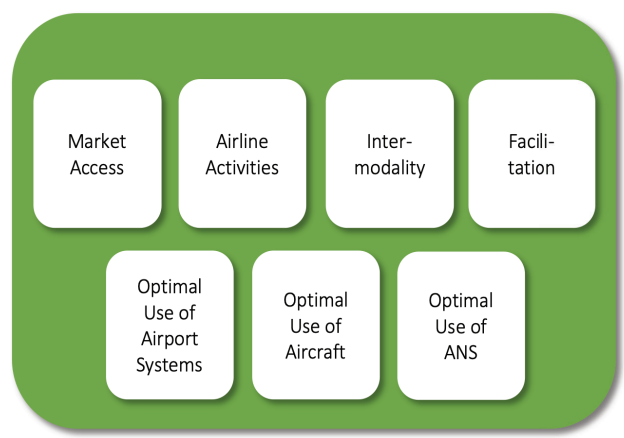
	Load (Kg)	FOB value	V. FOB/KG
Machines and Apparatus	13,435,975	806,290,488	60.0
Plastics	4,475,465	96,081,902	21.5
Products of the Chemical Industries	4,220,413	444,897,133	105.4
Common metals	3,477,661	80,151,252	23.0
Textile materials	3,333,169	90,414,028	27.1
Other products	14,391,003	852,190,279	59.2

Source: By the JAC, with data provided by General Directorate of Customs

4.4. AIR CONNECTIVITY: DIRECT ROUTES, DESTINATIONS AND AIRLINES

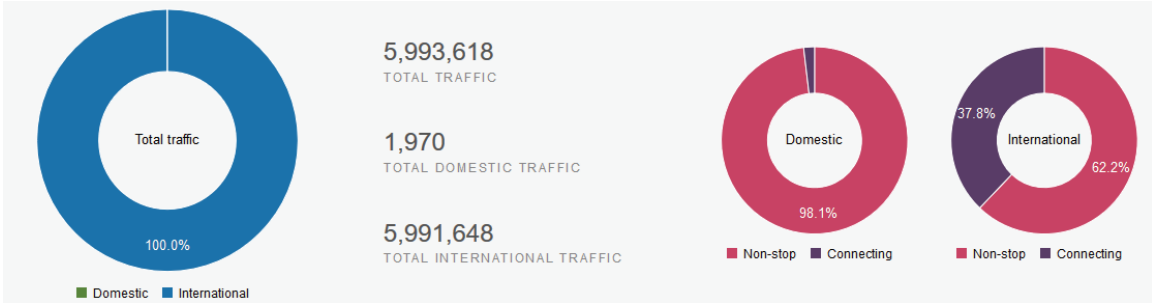
As a Small Island Developing State (SIDS), air and maritime connectivity is crucial to the development of tourism and international trade in the Dominican Republic, as they are the main drivers of the State's GDP growth. Air connectivity is defined as the movement of passengers, mail and cargo using the minimum number of transit points, i.e. making trips as short as possible and at the lowest price. The figure below outlines the major variables impacting air connectivity.

Figure 1: Variables of Air Connectivity



The DR, which accounts for 0.43% of the total passengers in the world, ranked 47th based on 2016 results at the Global Air Connectivity Index, a World Bank indicator that focus on understanding the role of connectivity in economic growth and development. About 62% of total passengers arrived via direct flight to the State, while 36% made one stop and 2%, two stops. States like France, the United Kingdom and the United Arab Emirates are well-connected, for example, with about 85% of their passengers arriving via direct flights. The figure below describes the passenger traffic composition of the State in 2017.

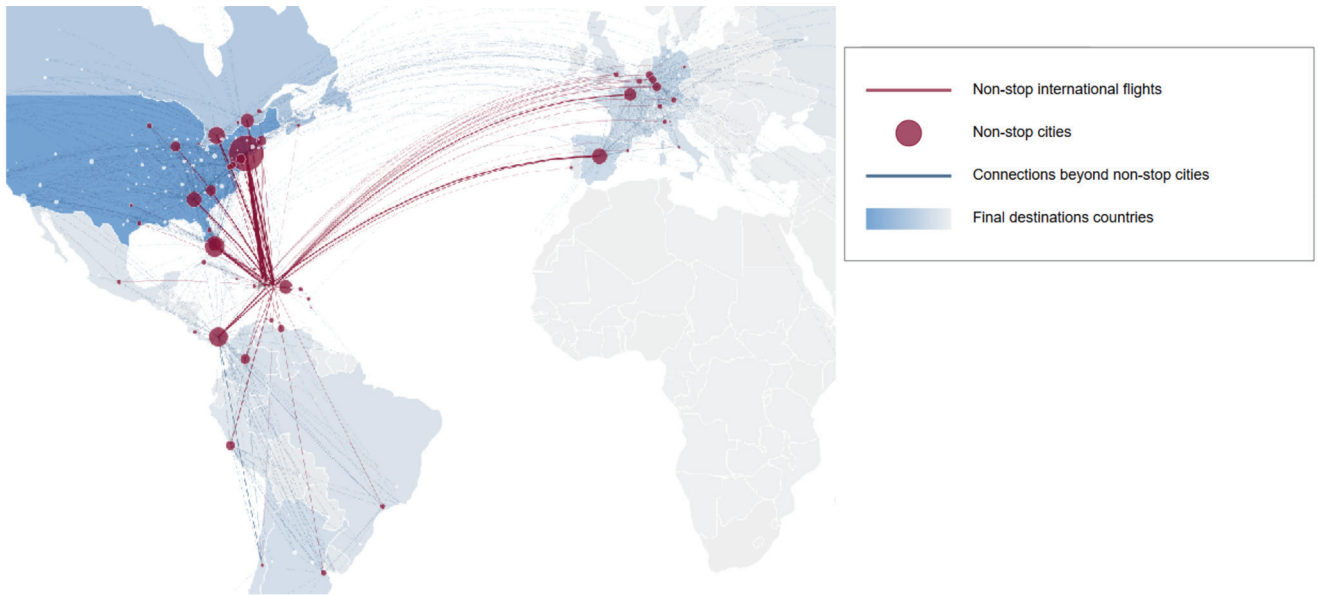
Figure 2: Passenger Traffic Composition of Dominican Republic, 2017



Source: ICAO-ICM Global Air Transport Diagnosis using Marketing Information Data Transfer (MITD) Data

By 2018, passengers flew via 242 direct routes from/into 38 countries/territories provided by 43 airlines, through the DR's 7 operational international airports. Most of the direct routes connect the Dominican Republic to United States (29%), Canada (22%), Germany (8%) and France (5%), accounting for 64% of the total. The map below shows the main direct routes with connections beyond non-stop cities.

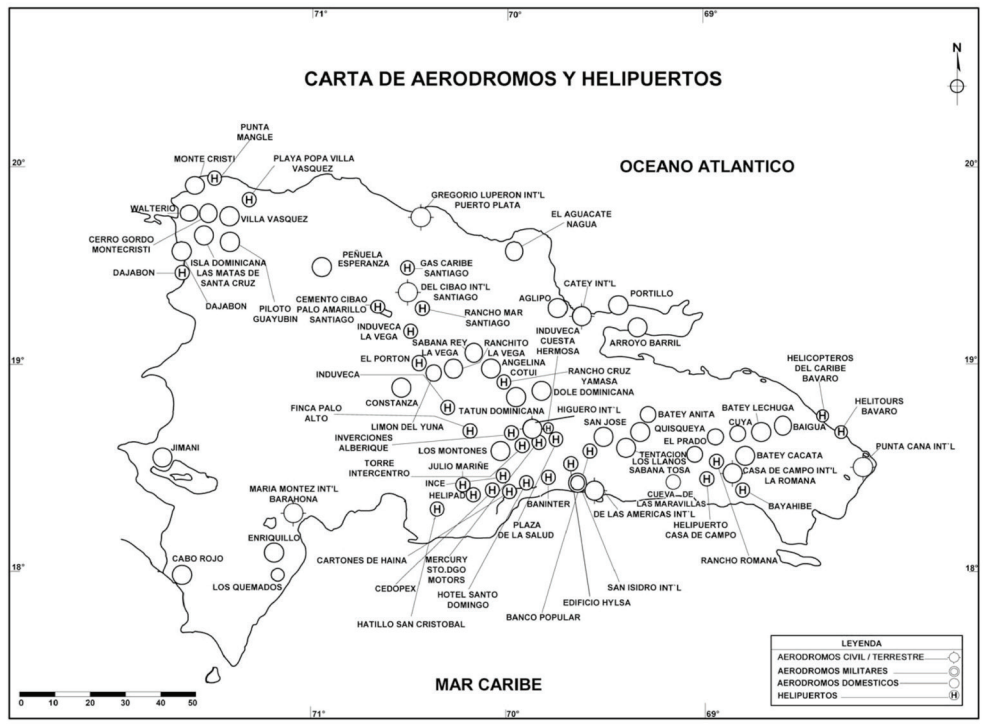
Figure 3: Air Connectivity of Dominican Republic, 2017



Source: ICAO-ICM

As mentioned before, the optimal use of the airport system is one of the important elements of the DR's advantageous air-connectivity. The State has 36 airports, aerodromes and runways, categorized by public (direct administration and concessions) and private.

Figure 4: Main Airports and Heliports



Source: IDAC

The table below lists the main international airports. These are administered by the private sector, either through concessions (five) or are privately-owned (three). It is important to note that concessions were granted for the same firm, Aeropuertos Dominicanos Siglo XXI (Aerodom), which has been part of the VINCI Airports group since 2016. Though the airports are managed by private firms, they need to comply with international security norms established by Law 491-06 by applying for an air-operating certificate, granted by the General Department of Civil Aviation.

Table 1: International Airports in Dominican Republic, 2017

Name	Since	Pax flow and Connectivity (2018)	Management	Technical Information
Punta Cana International Airport (PUJ/MDPC)	1983	Passengers: 7,852,417 (2nd in the Caribbean; 24th in Latin America). - 109 direct routes from/to 33 countries/territories provided by 40 airlines. - Charters from 46 countries/ territories.	Private (Grupo Punta Cana)	- Two runways (3,100 x 45) ICAO RC: 4E - two terminals
Las Americas JFPG (Santo Domingo – SDQ/ MDSD)	1959	Passengers: 3,781.,25 (5th in the Caribbean) - 54 direct routes from/to 26 countries/territories provided by 30 airlines - Charters from 34 countries/ territories.	Public (concession in 2000 for 30 years to Aerodom/ VINCI Airports)	- one runway (3,354 x 60) ICAO RC: 4E. - two terminals
Cibao International Airport (STI/MDST)	2002	Passengers: 1,598,569 - 15 direct routes from/to 6 countries/ territories provided by 10 airlines. - Charters from 8 countries/ territories.	Private (Aeropuerto Internacional de Cibao S.A.)	- one runway (2,620 x 45) ICAO RC:4D - two terminals
Gregorio Luperón International Airport (Puerto Plata, POP/ MDPP)	1979	Passengers: 873,481 - 36 direct routes from/to 9 countries/ territories provided by 12 airlines. - Charters from 23 countries/ territories.	Public (concession in 2000 for 30 years to Aerodom/ VINCI Airports)	- one runway (3,081 x 46) ICAO RC:4E - one terminal
La Romana International Airport (LRM/MDLR)	2000	Passengers: 197,547 - 14 direct routes from/into 9 countries/territories provided by 18 airlines. - Charters from 38 countries/ territories.	Private (Central Romana Corportation, LTD)	- one runway (2,950 X 45) ICAO RC:4D - one terminal
Samaná El Catey/Juan Bosch International Airport (AZS/MDCY)	2006	Passengers: 165,419 - 12 direct routes from/into 5 countries/territories provided by 8 airlines. - Charters from 10 countries/ territories.	Public (concession for 30 years to Aerodom/VINCI Airports)	- one runway (3000 x 45) ICAO RC:4E - one terminal
La Isabela Dr. Joaquín Balaguer International Airport/ El Higuero (JBQ/ MDJB)	2006	Passengers: 47,779 - 7 direct routes from/into 4 countries provided by 4 airlines. - Charters from 36 countries/ territories.	Public (concession for 30 years to Aerodom/VINCI Airports)	- one runway (1659 X 30) ICAO RC:3C - one terminal
María Montez International Airport (Barahona, BRZ/MDBH)	1996	- Did not perform any international flights in 2018.	Public (concession in 2000 for 30 years to Aerodom/ VINCI Airports)	- one runway (3000 X 45) One terminal Not operating

Source: IDAC

The government of the Dominican Republic manages most of the domestic airports, with the exception of the Arroyo Barril Airport, which is operated by Aerodom. As illustrated in table 1, traffic is concentrated in two main airports: Punta Cana (PUJ) and Santo Domingo (SDQ). Around 80% of passengers originating in the Dominican Republic departed from these two airports in 2017, via 50% of the total routes.

The international airports are distributed across different tourist destinations in the State in order to decentralize services provided by the Santo Domingo Airport, which still is the most important access point for international tourists to the Dominican Republic. The Puerto Plata Airport was built in 1979, to allow tourist access to the beaches in the North region, and of the Punta Cana International Airport was built in 1983, to improve access to the Eastern region. In the capital area, the La Isabela Airport, formerly la Herrera, complements the Santo Domingo Airport as a more affordable airport for Caribbean airlines to fly to Haiti, Puerto Rico and Jamaica. The airport is also used for charter flights and even for some international and domestic flights.

During the 2000s, due to the improvement of road transportation and investments in the tourism sector, the airport system incorporated two new airports: La Romana International Airport (2000), which serves the southeastern coast of the Dominican Republic; the Cibao International Airport (2002), which connects the second biggest city of Dominican Republic to the world and serves Dominicans who reside in the U.S., Cuba, Panama, Haiti, Puerto Rico, Turks and Caicos Islands and the Dutch Antilles; and finally the Juan Bosch International Airport (2006), that serves the Las Terrenas and Las Galeras beaches. The María Montez International Airport, which provides access to the southwest region, one of the most beautiful tourist destinations in the State, does not yet receive international flights. This airport is two hours from the Haitian border. Since 2017, the private sector has invested in developing the La Ciniega area, building hotels and summerhouses and providing asphalt road access from the airport to the beaches. This investment will likely increase the number of international tourists to the area starting in 2019-2020.

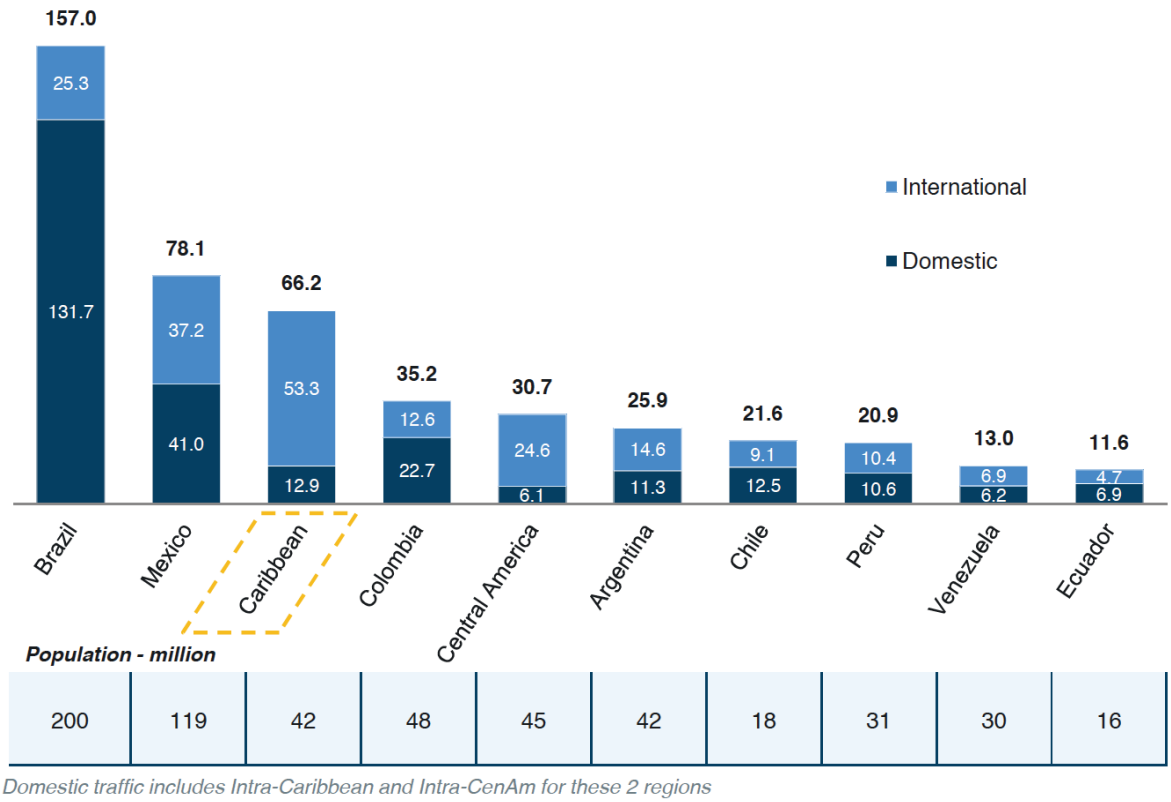
Over the next few years, the Dominican Republic will move to an organic airport system in which each airport transitions from a regional monopoly to a more competitive environment where tourists and other customers have multiple options for travel. For many years, a given airport was the only safe and fast mode to access some beaches, but this is no longer the case. The intermodality strategies between port (cargo and passengers), roads and airports will be key to creating a more efficient use of the airports.

4.5. THE CARIBBEAN: REGIONAL BENCHMARKING

The Caribbean is the region with the largest travel and tourism (T&T) contribution to the GDP in the Americas, registering around 14% (the average for Latin America is 8.9%), according to ALG (2014). The region receives around 21.2 million tourists annually, which makes up a 2% share of world tourism. The forecast predicts that the T&T contribution will grow 3.7% annually over the next decade, accounting for 52 million jobs.

Air transport is key for the tourism industry and for national and regional integration, because remote and or island nations rely on this mode of travel almost exclusively. Most islands in the Caribbean are above the world average in terms of air transport seats per capita compared to income per capita. In the Americas, the Caribbean ranks third in seat capacity and first in terms of international airlift capacity (2013). Most of the traffic for Caribbean territories is inbound (tourists visiting the countries), and the outbound traffic is weak from most of territories. The chart below shows the distribution amongst Latin American countries and the Caribbean.

Chart 19: Schedule seats capacity - million seats, 2013

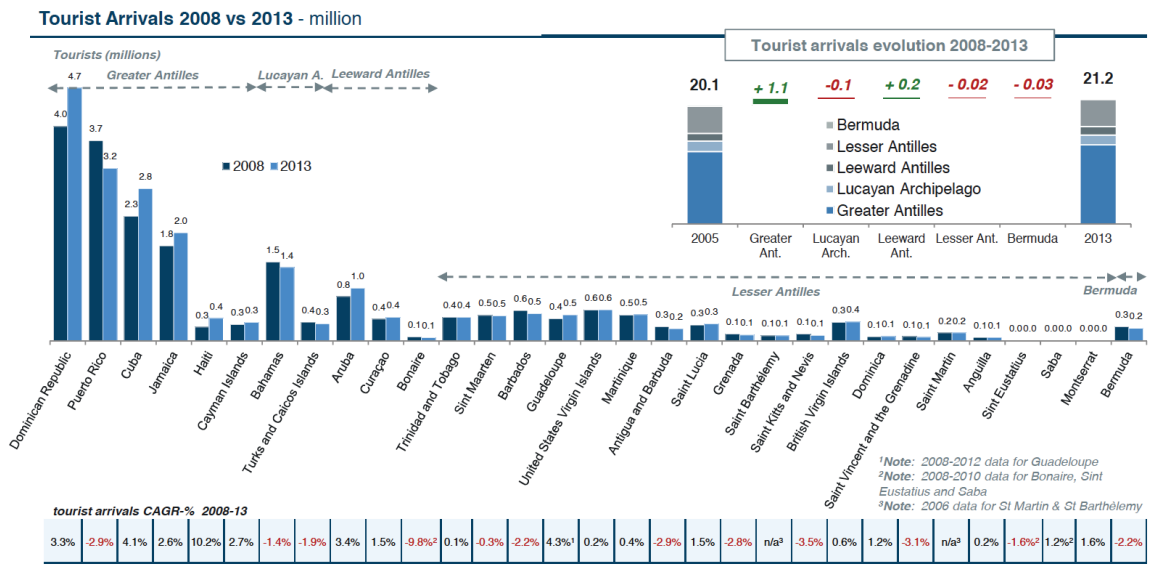


Domestic traffic includes Intra-Caribbean and Intra-CenAm for these 2 regions

Source: ALG, 2014.

While the world average of international tourist arrivals has grown 3.8% (CAGR 2005-13), the Caribbean air transport market has experienced one of the slowest capacity growth rates in recent years (1.5%, CAGR 2005-2013). Moreover, there is uneven growth across the territories of the region. Islands with more tourists have, in general, more positive evolution (ALG, 2014). As we can see at the chart below, the Dominican Republic is the first in the region, accounting for 22% of total tourist arrivals in the Caribbean in 2013.

Chart 20: Tourist arrivals by State in the Caribbean region, 2013

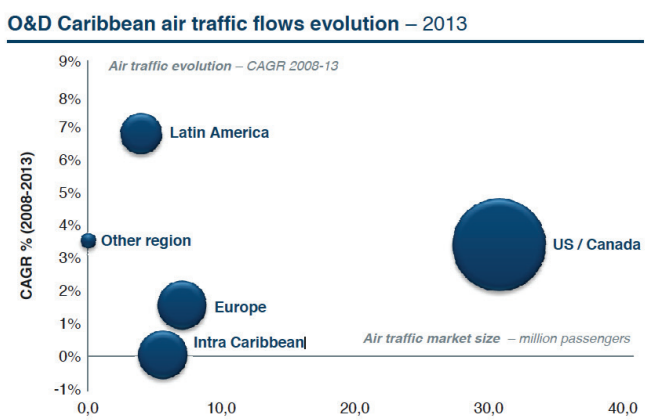


Source: ALG, 2014 (with data from UNWTO)

In terms of origin markets, North America accounts for two thirds of the incoming tourists in the region, showing an increase of CAGR 1.5% between 2008 and 2012, while European tourist arrivals have decreased by CAGR 1.9% during the same period. The routes from North America to the Caribbean are very concentrated: the five top North American airports with flights to the Caribbean account for 75% of the routes offered to the region, while the top 10 accounts for 90%. Miami, New York, Toronto, Fort Lauderdale and Atlanta are the main gateways to the Caribbean.

Surprisingly, the Latin American market weight increased by CAGR 8% between 2008 and 2012, accounting for 6.6% of the total market. Domestic & Intra-Caribbean markets have experienced continuous capacity reduction, with an average decrease of 3.1% (CAGR 2005-2013) (ALG, 2014), and a 2.3% CAGR reduction in the number of routes. The region has a large airport network (67 with more than one weekly international flight), but limited traffic volumes. The top ten airports account for 57% of the region's capacity and the top 20 account for nearly 80%.

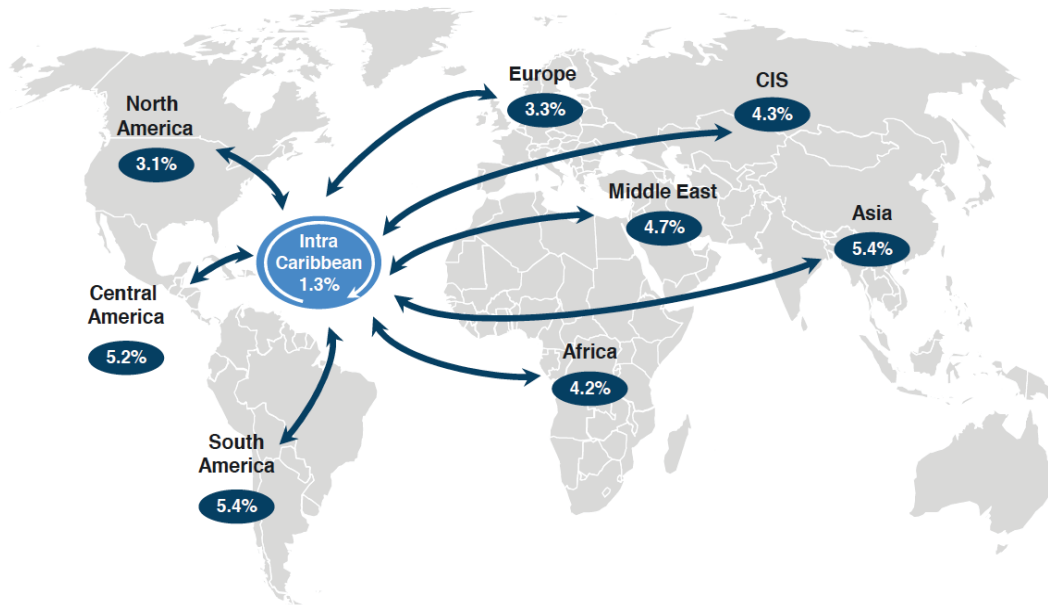
Chart 21: O&D Caribbean air traffic flows, 2013



Source: ALG, 2014.

Finally, Airbus predicted significant growth for international Caribbean traffic in the next 20 years (CAGR 2013-2032), but it is pessimistic about Intra-Caribbean traffic. Airbus expects a growth rate of around 3% per annum for the countries that have already reached maturity (like Europe, Canada and the United States); and around 5% for emerging markets, such as Latin America and Asia; and lowest expected growth is in intra-Caribbean countries, at around 1.3%. The map below shows the forecast for different regions.

Figure 5: Airbus traffic forecast - Average annual growth rates 2013-2032 between Caribbean (CAGR %)



Source: ALG, Airbus, 2013.

5. Policy and Regulation

There are further policies that could impact the air transport sector and therefore the economy as a whole. These policies are, mainly, a civil aviation law that defines the institutions, norms and regulations for the sector and the level of liberalization achieved, the air services agreements with foreign nations, airport investments, pilot and technical training, policies to promote activities that could benefit aviation, such as international trade and tourism and measures to mitigate the impact of aviation on the environment. This section will describe the effective policies the Dominican Republic has implemented that fostered improvements in air transport.

5.1. NATIONAL FRAMEWORK FOR THE AIR TRANSPORT SECTOR

The Dominican Republic chose to make aviation a priority sector in their national development, planning and policies. The State promulgated Law No. 491-06 in December 2006, modernizing the legislation to cope with the new standards in the sector. This initial law was followed by two amendments, Law 67-13 and Law 29-18. JAC also released Resolution 180 (2010) and updated the requirement manual (Version 6.0, first version from 2010), signaling further liberalization of the air transport market. The major changes reflected in these measures are summarized below.

1. *A set of strong institutions to define the air transport policies and to carry the technical and economic regulations of the civil aviation, air traffic control, investigation of accidents and sector's oversight:*

According to Law 505-69, two institutions share the responsibilities for civil aviation in the Dominican Republic: the Civil Aviation Board (*Junta Aeronautica Civil - JAC,* in Spanish*)* and the General Department of Civil Aviation (*Dirección General de Aviación Civil - DGAC*, in Spanish). While the Civil Aviation Board[6] was in charge of defining aviation policies and authorizing the air transport services (frequencies, routes through permits), the Department of Civil Aviation was in charge of the technical and economic regulation, of air traffic control, of airplanes registry, of investigating accidents and of airport construction, management and oversight.[7] They also shared some responsibilities regarding the construction, maintenance and rehabilitation of airports and in defining technical regulations.

The new laws aimed to address gaps in the institutional framework. First, the new laws were more explicit about the responsibilities of JAC and the Dominican Institute of Civil Aviation (the former DGAC), to avoid any overlap or conflict of interests between the two entities. The new JAC has the responsibility of defining the general policy for civil aviation and regulating the economic aspects for the air transport.

Second, it strengthens JAC by providing the commission with technical staff and an annual budget to carry out their responsibilities. JAC also expanded its activities, for example, negotiating and signing air service agreements with other countries, defining and modifying the rules of the Committee for Investigation of Aviation Accidents and representing

6 The Civil Aviation Board was a committee formed by members of the General Department of Civil Aviation, the Dominican Armed Forces, General Director of Tourism, two aviation specialists and an attorney. The main activities of this committee were to: (i) define the civil aviation policies; (ii) define the general plan for airports and aerodromes and air navigation; (iii) submit the budget for construction, maintenance and rehabilitation of airports, aerodromes and air navigation; (iv) advise the State about taxes and duties for airports, aerodromes and air navigation; (v) define the aviation services; (vi) study the treaties and international agreements; (vii) approve or deny agreements and contracts signed between national firms, or between national firms and foreign firms; (viii) propose norms, regulations and procedures to the Executive; (ix) promote the aviation for tourism, trade, agriculture.

7 The General Department of Civil Aviation was created under the Executive branch as a technical organization with the following activities: (i) implement the decisions and resolutions by the Executive and Junta; (ii) enforcement of aviation laws and norms of air navigation; (iii) promote the civil aviation activities; (iv) control of the air traffic and security of air navigation; (v) propose, with the Civil Aviation Committee, the regulation needed for the implementation of OACI recommendations; (vi) National Licensing of airplanes; (vii) requirements for titles and licenses; (viii) administrative sanctions; (ix) investigating aviation accidents; (x) oversees the construction and management of airports; (xi) organize and manage the air traffic in the State; (xii) meteorological services.

the Dominican Republic in international conferences and meetings about aviation. The organization is under the authority of the President.

Third, Law No. 491-06 grants autonomy to the Dominican Institute of Civil Aviation (*Instituto Dominicano de Aviação Civil* - IDAC, in Spanish), which was previously under the control of the President. This status means that the Institute has its own budget, technical staff and the power to organize their own approach to oversee and control the national civil aviation. This means the Institute and issue regulations and take decisions according to the functions defined by the law.

Fourth, legislators created the National Air Transport Facilitation Committee (*Comité Nacional de Facilitación - CNF,* in Spanish)[8], which is in charge of procedures and coordination for the clearance of aircrafts, people and goods through the security processes required at international airports, and the Facilitation Committee for each international airport. The CNF is under the authority of JAC, which is in charge of defining the composition, functions and activities. These committees are a forum for air transport facilitation issues to be raised and to explore new means of addressing or resolving them. Furthermore, this structure promotes sharing of information and best practices in relation to air transport facilitation issues and provides a platform for informing stakeholders of relevant developments in recommended international regulations from different international organizations, such as the ICAO.

In 2009, Decree 500-09 created the Facilitation Division, with the primary function of inspecting airports. The division schedules five inspections for each airport that handles more than 500,000 passengers and 3 for those who process less than 500,000. The main results of the decree are: (i) the development of the National Facilitation Program (PNFTA in Spanish), in lines with SARPs; (ii) the implementation of Norms for Air Transport Facilitation (RFTA, in Spanish), to be approved by the CNF; (iii) and the development of a program on accessibility for disabled people accessing airports. Regarding the last initiative, the Division delivered an assessment report about the conditions of three international airports for disabled people's mobility and organized seminars about the topic in 2018. As a result, the three international airports adapted their terminals to ease the accessibility of disabled people. Currently, the Institute for Technical Training (INFOTEP, in Spanish) is giving a course about sign language to JAC professionals and CNF representatives.

Fifth, the state created the Commission on Aviation Accidents Investigation, an autonomous committee to investigate aircraft incidents and accidents on Dominican soil or Dominican aircraft accidents on foreign soil. According to the previous law, the DGAC was in charge of investigating aircraft accidents, which can bring about potential conflicts of interest. For example, if accidents causes were related to the air navigation system, the DGAC would investigate problems in the system they managed, which is a conflict of interest. An external and neutral body is preferable and will make more accurate non-blaming assessments and recommendations.

In short, Law 491-06 provides autonomy, independent technical staff and financial resources to the aviation agencies in the Dominican Republic to carry out the activities of the aviation sector with greater efficiency. Moreover, the new law created a mechanism of division of labor along with checks and balances between the different aviation agencies in order to avoid redundancies or conflicts of interest.

2. The incorporation of the Chicago Convention agreement and its annexes under the national framework:

Dominican legislators incorporated the rules and procedures on International Civil Aviation and its annexes under the national law. Law 491-06, and the amendments, granted primacy to the best practices stated at the Chicago Convention as follows:

(a) **Air traffic control**: IDAC must offer and oversee the services of air traffic control according to ICAO standards (Art. 6, g);

(b) **Operational security:** IDAC must adopt any measures to guarantee the operational security for civil aviation, following the norms, methods and recommended practices in the annexes of the Chicago Convention (Art. 26, *d;* Art. 112, *a*);

8 The Decree 746-08 established the organigram, functions and regular meetings.

(c) **Air Transport of cargo, luggage and dangerous goods**: Any individual has to accept or offer transport for any cargo or luggage according to the dispositions in the annexes of the Chicago Convention and to the technical instructions for safe air transport of dangerous goods issued by ICAO (Art.140);

(d) **Airports:** IDAC must adopt the necessary measures to keep the airports in an optimum level of service, according to ICAO standards and IDAC regulations (Art. 157 and 158). The law requires mandatory airport certification to operate an airport, which includes security and quality requirements for efficient airport service.

(e) **Pilots and cabin crew**: Law 29-18 grants the IDAC Director General the responsibility to limit, through decree, the flight of pilots and cabin crew, following domestic and international best practices.

3. More flexibility for foreign operators and relaxation of ownership requirements for national operators.

The laws reforms also increased the participation of foreign operators in the Dominican air sector. First, Law 491-06 allows a faster process for signing air service agreements with other countries by granting autonomy to JAC in negotiating ASAs. The majority of air services agreements/memorandum of understanding between the Dominican Republic and other countries were signed after 2006, and many have been updated since then.

Second, the new laws allow aviation authorities to grant air service permits to foreign air carriers, even if there is no air service agreement signed by the State where the air carrier is based. For this privilege, the Dominican Republic should ask the foreign State for reciprocity for Dominican airlines. Third, the law extends the period that an authorization is required for the operation of private foreign airplanes while on Dominican soil from 30 days to 90 days.

Four, JAC Resolution 108-10, currently under review, has established an open sky policy that aims to lower restrictions on frequency, type of airplane, number of seats and cargo volume, letting the market determine these factors. JAC also grants 6th freedom rights for passengers, cargo and combined, and 7th freedom rights for all-cargo. Moreover, JAC intends to let the demand and supply determine the airfare, to expand the traffic rights, to allow multiple operators for the same route and flights through shared code agreements, and to foster more charter and non-regular flights as a way to contribute to the growth of tourism and the national economy.

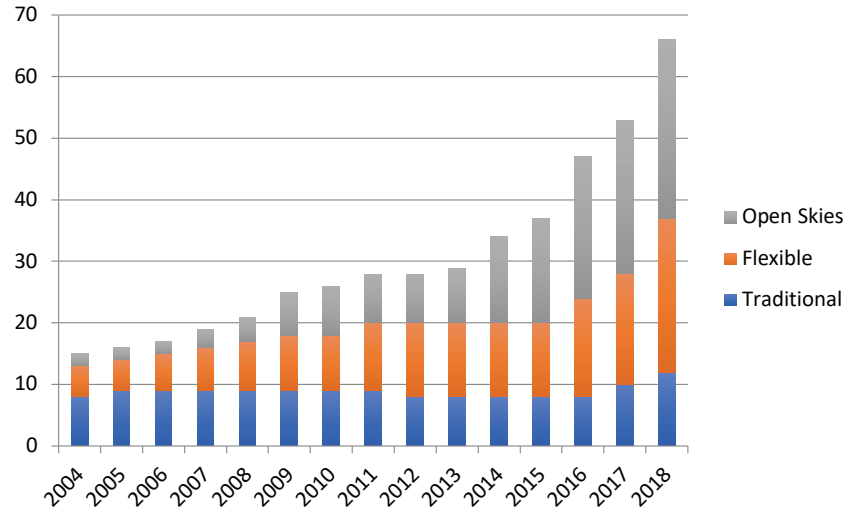
Five, Law 67-13, an amendment of Law 491-06, relaxed ownership requirements for national operators, by considering allowing companies with primarily foreign capital (up to 100%) to qualify as national carriers provided that the investment is from an internationally known airline. Last, the JAC Requirement Manual, the regulatory framework for the Civil Aviation Board, introduces and simplifies the requirements for the issuance of operating permits for foreign operators and includes a regulatory framework for charters, approval of shared code agreements between air operators and special permits.[9] Six, the Dec. 375-10 exempted the airport tax for transit passengers who are boarding cruises.

5.2. AIR SERVICES AGREEMENT (ASAS) AND SHARE CODE AGREEMENTS

Until 2007, the Dominican Republic had signed bilateral agreements[10] with 19 countries, most of them traditional in nature (limited frequencies and routes). However, Law 491-06 has impacted the liberalization of the air services in the State. By giving JAC the mandate to sign ASAs on behalf of the State and a technical staff to carry out the activities, the new law boosted the number of agreements towards more liberal agreements signed between the Dominican Republic and other countries, reaching agreements with a total of 66 countries.

9 The process for special permits takes only 10 days to conclude.
10 This includes Memorandum of Understanding, Understanding Agreement, Consultation Agreement and the Air Services Agreements.

Chart 22: Number of Bilateral Agreements that the Dominican Republic has with other countries in a specific year, 2004-2018



Source: JAC, 2018

The chart above shows that the Dominican Republic has liberalized its market to foreign carriers by prioritizing open skies and more flexible agreements. It is worth noting that the open sky agreements went from two (2) in 2007 to 29 in 2018, while agreements under a flexible modality went from 7 to 25 during the same time span. Agreements under a traditional modality became stable over the years. From the total of 66 agreements: the majority includes 5th freedom for passenger, 19 includes 6th freedom for passengers and cargo flights combined and 23 includes 7th freedom for cargo.

Table 2: Bilateral Agreements between Dominican Republic and foreign countries, 2018

Approach for the Agreement	Countries
Traditional (limited routes and frequencies)	Argentina (2006); Belgium (1998); Cuba (1987/2005[1]); El Salvador (1998); Israel (2017); México (1994); Portugal (2018); Switzerland (2000); South Africa (2017); Trinidad and Tobago (1992); Germany (1992/2018)[6];
Flexible (some flexibilities, such as tariff defined by the market, capacity or frequencies)	Austria (1999/2007); Bahamas (2018); Canada (2008); Colombia (2008/2011); Spain (2010/2012)[2]; Qatar (2012/2017); Russia (2009); France (1969)[4]; Guatemala (1998); Haiti (2017); Hungary (2003); India (2011); Italy (1971); Jamaica (2018); Norway (2016); Denmark (2016); United Kingdom (1951/2006)[5]; Czech Republic (2016); Singapore (2016); Venezuela (1970); Bolivia (2018); Morocco (2018); Bahamas (2018), Jamaica (2018); Kenya (2018); Poland (2018); Rwanda (2018).
Open Skies	Antigua and Barbuda (2014); Aruba (2014); Brazil (2018); Chile (2011); Costa Rica (1998); Dubai (2007); Ecuador (2014); United Arab Emirates (2014); United States (1949)[3] ; Finland (2016); Luxembourg (2015); Guyana (2016); Iceland (2009); Jordan (2009/2017); Kuwait (2016); Nicaragua (2016); New Zealand (2016); Panamá (2008); Paraguay (2010); Sweden (2106); Curacao (2015); Saint Marteen (2013); Netherlands (2010); Serbia (2015); Peru (2009); Sri Lanka (2017); Turkey (2014); Uruguay (2018); China (2018).

[1] The year on the left is when the State signed the MoU and, on the right, it is the year the ASA was signed.
[2] Spain and the Dominican Republic signed an ASA in 1968 under the traditional approach.
[3] The United States and the Dominican Republics signed an ASA in 1986 and 1999, but the Congress did not ratify these. Since 2010, they have been negotiating an open skies agreement.
[4] France and the Dominican Republic signed an ASA in 1969, under the traditional approach. In 2011 and 2013, they updated the ASA through an MoU, under a more flexible framework.
[5] The United Kingdom and the Dominican Republic signed an ASA in 1951, under the traditional approach. In 2006, they updated the ASA through an MoU, under a more flexible framework.
[6] The ASA is traditional for tariffs but flexible regarding capacity.

The Dominican Republic is also a signatory state of the Air Transport Agreement of the Association of Caribbean States, which grants rights of 5th freedom for passenger and cargo flights combined to all member states; and of the Multilateral Agreement for Open Skies between Member States of the Latin American Civil Association, which grants 6th freedom for passenger and cargo flights combined and 7th for cargo.

JAC has also accepted more code share agreements following the reforms, as a way to bring more routes to the State. Currently, there are 15 active code share agreements, which provide 25 routes from Panamá, Spain, the United States, Guadeloupe, Guyana, and the United Kingdom, involving 15 airlines. In fact, Law No 491-06 not only defined this role for JAC, but also dedicated articles 256-259 to this matter.

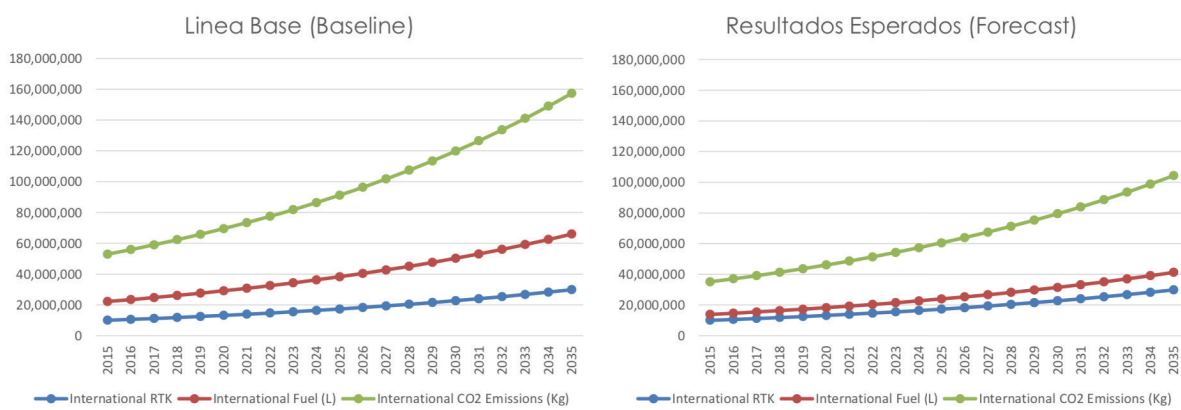
5.3. AVIATION AND ENVIRONMENT

Environmental protection is one of the priorities of IDAC. Since 2012, the organization has participated in the National Council for Climate Change and the Clean Development Mechanism. In 2013, IDAC prepared the first action plan to reduce CO_2 emissions from national aviation and participated to the World Conference on Climate Change in Poland.

The International Civil Aviation Organization (ICAO) and the European Union (UE) signed an agreement in 2013 to implement a capacity building program for CO_2 mitigation in international aviation. The Dominican Republic was one of 14 states who were selected to participative on this initiative, serving as the ICAO office for the Caribbean States. The project is the first phase of the Carbon Offsetting Scheme for International Aviation (CORSIA), an ICAO program joined by the Dominican Republic.

The project has the following objectives: (i) to improve the capacity of the National Civil Aviation authorities to develop an Action Plan on CO_2 emissions reduction in accordance with ICAO recommendations; (ii) to design an efficient CO_2 emissions monitoring system for international aviation developed in each selected Member State; (iii) to identify, evaluate and partiality implement priority mitigation measures. In 2014, ICAO, UE and IDAC organized the Kick-Off Seminar to create a plan to achieve the objectives of the project. The 2015 Action Plan defined the expectations in terms of CO_2 emissions in the DR aviation sector for 2035 compared to a non-action scenario.

Chart 23: Baseline and Forecast for CO_2 emissions derived from aviation in the Dominican Republic



Source: IDAC, 2018.

Between 2012-2018, Dominican stakeholders invested around USD 13 million in measures to mitigate CO_2 emissions, including solar power plants, equipment to improve energy efficiency in the airports, LED lights, more efficient refrigeration systems and engine wash procedures, implementation of Preconditioned Air (PCA) units and electronic Ground Power Units (GPU) to reduce the use of auxiliary power units (APU) in seven positions at the Punta Cana Airport, new Performance Based Navigation (PBN) flight paths and continuous descent and continuous climb operations, and the partial implementation of the Air Traffic Flow Management (ATFM) concept in the main building of Air Navigation Services Norge Botello. ICAO-UE measured 16.800 CO_2 fewer tons of emissions from international flights and airports compared to the 2018 baseline (without project scenario).

The table below summarizes the main activities undertaken as a part of the environment program between 2015-2018.

Table 3. Evolution of environmental activities for the aviation sector in the Dominican Republic

Year	Activity
2015	• IDAC installed the Aviation Environmental System (AES): the Monitoring, Reporting and Verification (MRV) tool. The AES is composed of a core database and an internal engine for data validation and verification (to treat imported data), as well as a component for data aggregation and analysis (to generate exported data). • Release of the Action Plan to Reduce Emissions from the aviation sector[1].
2016	• The Dominican Republic released the first official report of CO_2 emissions in Aviation generated by the AES. • Agreement between IDAC and the National Committee of Energy to facilitate the implementation of renewable energy. The partnership will include a feasibility study for the production of biofuel for the industry. • Agreement between IDAC and the Ministry of Environment to foster capacity building in both organizations and align activities and goals. • Punta Cana Declaration, in which the National Council for Climate Change and Clean Development Mechanism, the National Committee of Energy, the IDAC, the JAC, the Airport Department and the Ministry of Environment agreed on a road map to foster the use and local production of biofuel for aviation.
2017	• Inauguration of an 1MW solar power plant "Norge Botello" to provide clean energy to the "las Americas airport complex. • Creation of the Sustainable Development Unit and a Monitoring Division in the IDAC. • The establishment of the Sustainable Development Units (UDS) under IDAC. • Creation of the Environment Protection Committee (EPC), for all decision making on environmental issues, integrated for all area directors and the IDAC Director General.
2018	• The release of the feasibility studies for biofuel for the aviation sector. • 0.8MW power plant installed at La Isabela International Airport (43% of the energy consumption). • 0.5 MW power plant installed at Puerto Plata International Airport (22% of the energy consumption). • 0.2 MW power plant installed at Barahona International Airport (78% of the energy consumption). • Aerodom obtained level 1 "Mapping" for all of its airports under the Airport Carbon Accreditation (ACA) program. • Cibao Int. Airport obtained level 2 "Reduction" for its facility under the Airport Carbon Accreditation (ACA) program.
2019	• Cibao airport added 1.5 MW to its power plant, reaching a total of 3 MW (80% of the total airport consumption).

Source: CORSIA/IDAC

In 2018, the Dominican Republic updated its Action Plan by defining goals and mitigation measures for the coming years. These goals included: (i) to adopt the best practices defined by ICAO to reduce the consumption of biofuel and CO_2 emissions by 2019; (ii) to reduce 25% of the use of APUs in the international airports by 2020; (iii) to reduce at least 15% of emissions generated by airport activities by 2030; (iv) to evaluate the CO_2 reductions for the PBN/ATFM activities; (v) to implement a pilot project for local biofuel production for the aviation sector; (vi) to adopt a mechanism of voluntary compensations for 2020.

5.4. OTHER POLICIES THAT HAVE BENEFITED THE AVIATION SECTOR

The Dominican Republic has developed a group of policies to promote tourism directly or indirectly over the past twenty years, many of which benefit the aviation sector. The main policies/regulations are:

- Reduction of barriers to open business;
- Liberalization of immigration policies for foreign workers;
- No-discrimination between foreign and national suppliers in government procurement;
- 100% of repatriation of profits;
- Double taxation agreements with many countries;
- Through Law 16-95, equal treatment between national and foreign investors;
- Through Law 185-02, tax exoneration of 100% for the firms based in the State, and tax deductions of up to 20% for individuals who decided to invest in the tourism sector each year for five years;
- Import tariff and tax exonerations for machines and equipment needed for building or renovation (for tourism investments of at least 5 years) tourist facilities and installations.
- Promotion of the State throughout 23 international offices;
- The creation of the Official Fund for Tourism Promotion and the Promotion of the Tourism Development in undeveloped regions, though Law 158-01;

These policies have boosted investments in the tourism sector mainly in less explored areas, such as the beaches in the provinces of Barahona and Pedernales, in the south of the State, and expansions in well-established areas, such as Samaná and Puerto Plata. The FDI for the tourist sector accounts for 23% of the total. Furthermore, the government has been promoting tourism in the city of Santo Domingo by revitalizing the historical downtown. The number of foreign tourists who visited the capital increased by 64%, and the hotel load factor increased from 55% in 2014 to 74% in 2016.

The Dominican Republic invested massively in its road network starting in 2012, which had major positive impacts on tourism and productivity. Between 2012-2018, the government rehabilitated, maintained and built 4,173 km of roads, 3,350 km of rural roads and 8,708 mt of bridges. The development of the roads in the southern region will be crucial to foster tourism there.

6. Civil Aviation Safety and Security Oversight: Regulatory Framework, Operations and Capacity Building

6.1. REGULATORY FRAMEWORK AND OPERATIONS

Since the enactment of Law No. 491-06, the Dominican Republic has implemented measures to improve civil aviation safety and security oversight, by adjusting the legal framework, improving operations and implementing training programs. Law 188-11 regarding Airport and Civil Aviation brought about the changes summarized in the table below.

Table 4. Changes though the Law 491-06.

Topic	Law 491-06	Law 188-11
Acts of unlawful interference	The sentences vary between 2 to 30 years, while the previous law defined sentences between 2 to 5 years.	The formalization of the acts of unlawful interference with different sentences according to the crime's severity, following ICAO standards.
Violations to the National Plan of Civil Aviation Safety and Security (PNSAC) and related programs	No formal punishment for violations.	A mechanism of sanctions defined and detailed through the Law and the Decree 376-16.
Jurisdiction of acts	Acts committed by Dominicans, at Dominican airplanes in Dominican land and by foreigners at foreign airplanes in Dominican land.	Extension of acts committed by foreigners at foreign airplanes in foreign land in which the next destination is the Dominican Republic.
Other acts	No sanctions	Sentences/punishment for acts that are not acts of unlawful interference but can interfere with the development of airport activities, such as acts of disobedience.
Institutions	CESAC was the authority in charge of safety and security matters in civil aviation.	The specialized body of Airport and Civil Aviation Safety and Security (CESAC) is the authority in charge of safety and security matters in civil aviation. CESAC is also the public enforcement institution for this law, supporting the Public Prosecutor's Office during investigations.

6.1.1. Aviation Security

The Safety and Security in Civil Aviation, the Body of Airport and Civil Aviation Safety and Security (CESAC) has been the organization in charge of aviation security at international airports since 1997. However, only during the 2000's, with the creation of the National Plan for Aviation Security and Safety in the Civil Aviation (PNSAC), did CESAC expand their activities in these matters in a systematic way. The timeline below shows the evolution of CESAC's work.

1997 – the specialized body of Airport and Civil Aviation Safety and Security (CESAC) was created.

2000 – the first National Plan for Security and Safety in the Civil Aviation (PNSAC) and the programs for Airport Safety and Security were developed.

2002 – CESAC created the passenger canine screening team as a mechanism to detect threats due to TSA-USA recommendations. The Dominican Republic and the United States signed a memorandum of understanding.

2003 – The USA helped the Dominican Republic to create anti-explosive k-9 unit. The unit has, to date, 45 dogs and 59 security guards.

2007 – CESAC implemented the first Data Center.

2008 – The new headquarters of CESAC was built.

2009 – CESAC implemented the Integrated and Automated System of Aeronautical Management (SIAGA-Security)

2010 – Review and approval processes were conducted for the security programs for airplane operators. In 2011, the process was expanded to all other categories.

2012 – Inspections of passengers and carry-ons with Multi-Mode Threat Detectors.

2014 – CESAC implemented the Integrated Video Systems for Airport Oversight that connected the control centers in the main airports to the CESAC control center.

2016-2017 – The second phase of the Video System for Airport Oversight was pursued, with technological improvements.

2018 – Real scale simulation was established at the Punta Cana International Airport, which generated recommendations to avoid and tackle threats.

The commitment of the Dominican Republic to security issues resulted in an improvement from 76.46% in the Universal Civil Aviation Security Program (USAP) to 96.98% in 2017, an increase of 20.52 percentage points, reaching the highest levels in terms of airport security and civil aviation.

6.1.2. Safety Matters

As part of the procedures, The Chicago Convention expects that countries implement processes and procedures to tackle any deficiencies detected in the operational security system. The Dominican Republic has taken the following measures regarding this critical element:

- IDAC 4000, the Inspector Manual for the Administrative Sanctions Application and Regulation RAD 20 - Administrative Sanctions, which guide the inspectors on the procedures to enforce the laws and regulations;
- The use of the Information System for the Regulations Administration (SIAR, in the Spanish acronym), a system developed by the Central American Corporation of Air Navigation Services (COCESNA, in the Spanish acronym), to identify deficiencies and address them;
- An efficient reporting system, in which the IDAC's Department of Safety identifies any deficiencies in the air navigation system followed by a corrective measure plan to be followed by the Department;
- Strict requirements for the air navigation controllers in regards to the use of English.

These efforts complement the CESAC's works on airport security. Since 1997, the organization guarantees the presence of security services at national and international airports, by applying the rules, methods and procedures established by ICAO. Furthermore, CESAC is the first line of defense in airport terminals to combat transnational criminal activities. CESAC implemented a Data Center in 2007, an Integrated and Automated System of Aeronautical Management (SIAGA-Security) and an integrated airport video surveillance system in 2013.

6.2. CERTIFICATION OF AIRPLANE GROUND HANDLING SERVICES COMPANIES

Until 2014, the ground handling services existed outside of any regulatory framework. Decree 232-14, License for Air Operators and Airplanes Ground Handling Operators, established that the airport ground handling companies should request a license from IDAC, which is in charge of creating the guidelines and requirements for the certification process. At the end of 2014, IDAC established Resolution 030/2014, which approved the RAD 24 regarding Ground Handling Services. This RAD defined the requirements and phases for the certification process, allowing a period of adaptation for companies. Companies began requesting the certification in 2016. Currently, 28 companies have been identified, five have been certified, and 18 are going through the certification process under RAD 24. An additional 10 companies have expressed interest in certification but not begun the process.

The IDAC Safety Oversight Department carries out document analysis and inspections, and releases a final report. Some companies have to outline a corrective action plan validated by the inspector. Certified companies are subject to yearly inspections through the Annual Programme of Safety Oversight Inspections.

6.3. CAPACITY-BUILDING

The Dominican Republic has implemented a comprehensive and continuous training program to improve oversight activities, transitioning from a government to a State policy[11]. The State counts on two important training institutions in this matter: The Superior Academy of Aeronautic Sciences[12] (ASCA, in the Spanish abbreviation) and the specialized body of Airport and Civil Aviation Safety and Security (CESAC, in Spanish abbreviation) schools.

6.3.1. Superior Academy of Aeronautic Sciences

The ASCA was founded in 2008, with the goal of becoming a specialized institution for aviation training programs that meet the high standards of quality and safety required by the sector. The timeline below shows the evolution of ASCA as a regional center of excellence.

2009 – ASCA is upgraded as a superior academy, under IDAC. Resolution No 13-2009 created the Career of Associate Degree in Aerodrome Air Traffic Control. ASCA is certified with ICAO TRAINAIR PLUS Programme Membership Certification.

2010 – Refresher courses on Radar and Aerodrome Control were launched.

2011 - ASCA received certification as ICAO TRAINIAR PLUS Associate Member, being the first of this kind in America and the ISO 9001:2008 Quality Management Standard system.

2012 – ASCA received certification as ICAO TRAINIAR PLUS Full Member.

2013 – First online courses. First class to graduate. Memorandum of Understanding between FAA and IDAC. ASCA created the Technical Superior Career on Aeronautic Administration.

2014 – ASCA became a regional partner of IATA for aviation courses. Agreement between APEC University and ASCA for research on the aviation sector.

2015 – ASCA received ICAO certification as a Regional Center of Excellence (RTCE) in air navigation, flight safety and safety management training, the first in the region. Agreement between the Spanish company Air Navigation Services and Studies (SENASA) and ASCA.

2016 – Agreement between the Pedro Henríquez Ureña University (UNPHU) and ASCA for courses and research.

2017 – ASCA certifies under the Norms ISO 9001:2015 regarding Quality Management System, ISO 14001:2015 about Environment Management and OSHAS 18001:2007 about Health and Labor Safety Management. The modernization and expansion of ASCA were concluded.

11 Since the 90's, the Dominican Republic has invested in training. The DGAC has created the Training Sector and launched the first training on air navigation, in 2001. In 2005, JAC approved an extensive budget for training on air navigation.

12 Academia Superior de Ciencias Aeronáuticas, in the original name in Spanish.

The offices and facilities of ASCA are:

- A vast aeronautical library;
- An advanced flight training device, REDBIRD, approved by the United States Federal Aviation Administration (FAA)
- Three familiarization flight simulators,
- Two last generation radar control simulators, with capacity for 12 radar control positions and 12 pseudo pilot positions;
- Two last generation Aerodrome Control simulators, with capacity for 02 control positions, 02 planning positions and 01 ground control position, as well as 06 positions of pseudo pilots and 02 manager positions;
- Seven classrooms suitable for teaching, equipped with projectors, LED TVs and Internet access.
- Two technology laboratories for network training modules or with computer use requirements, having capacity for 25 students with personalized access to computers.
- Two exhibition airplanes (DC-9 and L410).
- Healthcare facilities;
- Sports field.
- Photo Gallery Museum of aviation and airport history.
- Lecture Hall for commencement events, training, meetings, lectures and workshops.

In the past 10 years, ASCA, as a TRAINAIR PLUS Regional Centre of Excellence, has designed more than 100 academic programs related to the aviation specialties certified by the TRAINAIR program, which include Air Navigation, Flight Safety and Safety Management. These programs are presented in the modalities of CMDN, basic courses, advanced courses, seminars and workshops. These programs are offered to providers of air navigation services, aircraft operators and airports, Civil Aviation Authorities and other aviation sector companies. Between 2008-2018, 291 students graduated from Aerodrome Air Traffic Control and Aeronautic Administration Associate Degree (since 2013) and 9,265 students graduated from the Continuous Education Progamme (since 2008).

Furthermore, the institution signed cooperation agreements with:

- The Panama Civil Aviation Authority to deliver two courses on Basic Surveillance Radar and Area and Approach ATS Surveillance Radar for 38 people;
- The International Air Transportation Association (IATA), which led to 22 courses between 2014 and 2018, with 545 participants;
- The Haiti Civil Aviation National Office to impart courses on Area and Approach Procedural Control and Aerodrome Air Traffic Control, with 10 participants each;
- FAA to impart courses on Aircraft Alterations and Repairs, Extended Diversion Time Operation, Government Aviation Inspector Operations and Air Traffic Flow Management (ATFM) Basic Instruction between 2015 and 2018, with 101 participants;
- Jamaica Civil Aviation Authority to impart courses on Area and Approach Procedural Control, Surveillance Radar Control and Air Traffic Control Refresher with 24 participants;
- Turks and Caicos Airport Authority to impart courses on Aerodrome and Procedural Approach for two participants;
- Services and Studies for Air Navigation and Aeronautical Safety Department (SENASA, in Spanish abbreviation) to impart courses on European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS), Version 5, with 20 participants and;

- 10 universities, institutions and companies, such as UNAPEC, UNPHU, UNICARIBE, MICROSOFT, FAD, ZOHERGA, HELICLUB, MESCYT, CESAC, DEPARTAMENTO AEROPORTUARIO, JUNTA DE AVIACION CIVIL, ARMADA DOMINICANA.
- ICAO for two courses: ICAO Endorsed Government Aviation Inspector Operations Course and ATFM Course, for 51 participants.

Currently, ASCA is implementing four important projects regarding capacity building. The Dominican Republic joined the ICAO Next Generation of Aviation Professionals (NGAP) Programme Task Force in 2018, the main goal of which is to develop strategies, best practices, tools, standards and guidelines as applicable to facilitate information sharing activities that assist the global aviation community in attracting, educating and retaining the next generation of aviation professionals.

ASCA is also in charge of carrying out the capacity building activities under the Political, Economic and Juridical Matters of the Air Transport Group (GEPEJTA, in the Spanish acronym) of the Latin American Civil Aviation Commission (LACAC). The planned activities for 2019-2020 of the Training Macrotask are: (i) to create a regional library for aviation (CLACpedia); (ii) take a regional inventory of civil aviation training centers; (iii) update the training needs of the member states; (iv) provide training on air transport matters to the judicial power.

Third, ASCA is part of the Civil Aviation Training Centers of the North America and Caribbean Regions Working Group with the mission of fostering cooperation amongst members on harmonization of process, academic careers, technical assistance, joint database and research and innovative projects.

Finally, ASCA is championing the ICAO No Country Left Behind Initiative for Air Traffic Controllers Allocation, which aims to place Dominican air traffic controllers into the air navigation system of other countries. ASCA is also providing technical assistance and training to the participating countries.

6.3.2. Security and Safety in the Civil Aviation School

CESAC (*in Spanish abbreviation*) was created in 1997, with the objective of managing, coordinating and supervising training activities. The clearance granted by ICAO to the CESAC schools makes the Dominican Republic the first State in the Caribbean Region with an instruction center of this nature, and the fourth in Latin America. In 2013, ICAO certified the ESAC as a regional aviation security training center.

ESAC has provided different courses, both locally and internationally. Some of them directed to the personnel from the private sector of the airport system, as well as with international guests. Between 2009-2015, ESAC installed 31 training units for online courses in the airports of Samaná, Cibao, María Montes, La Isabela and Arroyo Barril. In total, 6,500 members of the security and safety of the civil aviation graduated from ESAC schools. Also, between 2009 and 2018, these schools certified 4525 people, through 252 courses:

- 3981 people certified on aviation security promotion;
- 2430 people certified on basic instructions about airport security through 126 courses;
- 270 people certified on security in Air Cargo and Mail through 14 courses;
- 206 people certified on aviation security management through 11 courses;
- 29 people certified on local inspections through 6 courses;
- 144 instructors certified on aviation security through 9 courses;
- 380 people certified on interpretation of X-ray machine images through 19 courses;
- 257 people certified on crisis management of aviation security through 13 courses;
- 474 supervisors certified on airport security through 19 courses;

- 122 people from the airport security personnel certified on basic instructions through 13 courses;
- Periodic training for 116 instructors and 1 supervisor through 13 courses;
- Periodic training on Management instruction for 11 people through 3 courses;
- 20 people received a Diploma in Airport Security and Civil Aviation through 1 course.
- 26 people certified on explosive detection by dogs through 1 course.
- 196 foreigners from 17 countries were certified in 11 courses at the Regional Instructional Center ASTC-ESAC.

In 2010, the CESAC Management System was certified with the ISO-9001: 2008, which was renewed in 2012 and for the period of 2013--2016. In 2018, the CESAC conformed to the ISO 9001:2015, updating its certification.

CESAC also implemented a Certification Procedures for Private Security Services for the Civil Aviation sector (RAPSPSAC), due to the lack of any regulations and control regarding security provided by private firms in private airports. In 2011, CESAC certified six security firms for civil aviation. These companies received authorization to provide security services to DR airports. In 2012, CESAC established the category of Private Security Inspector of the Civil Aviation, with procedures for certification, and in 2016 developed a license to facilitate the identification, control and supervision of certified officers.

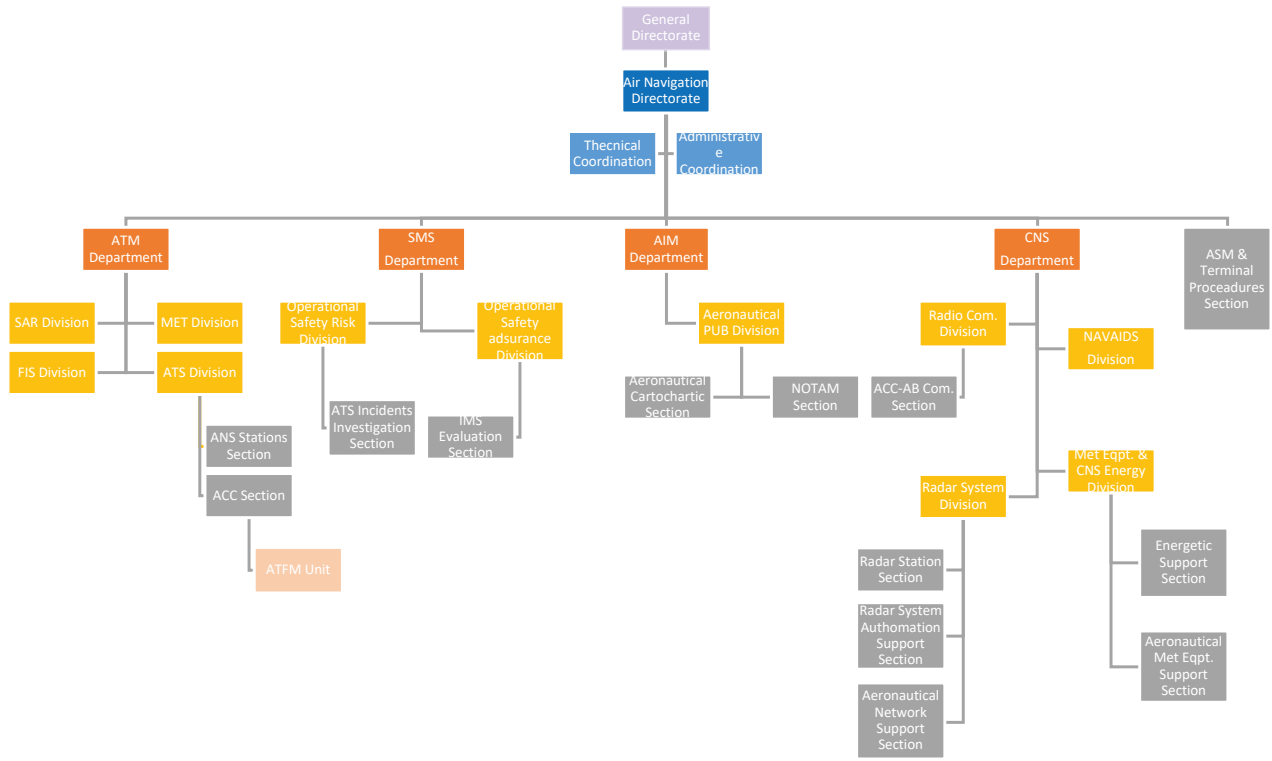
6.3.3. Universidad Nacional Pedro Henríquez Ureña

In the private sector, through an interinstitutional agreement with ASCA and the IDAC, the Universidad Nacional Pedro Henriquez Ureña (UNPHU, *in Spanish abbreviation*) has developed a Training Program on Aviation Matters, since 2017. To date, the university has already organized eight master lectures, one superior specialization in Aeronautic Management and one bachelor program on Aeronautic Management. UNPHU is also planning to release specializations in Civil Aviation Security, Airport Management and Aeronautic English, as well as a bachelor program on Aircraft System Management, as a dual degree with *Universidad Interamericana de Puerto Rico*.

7. National Air Navigation Services

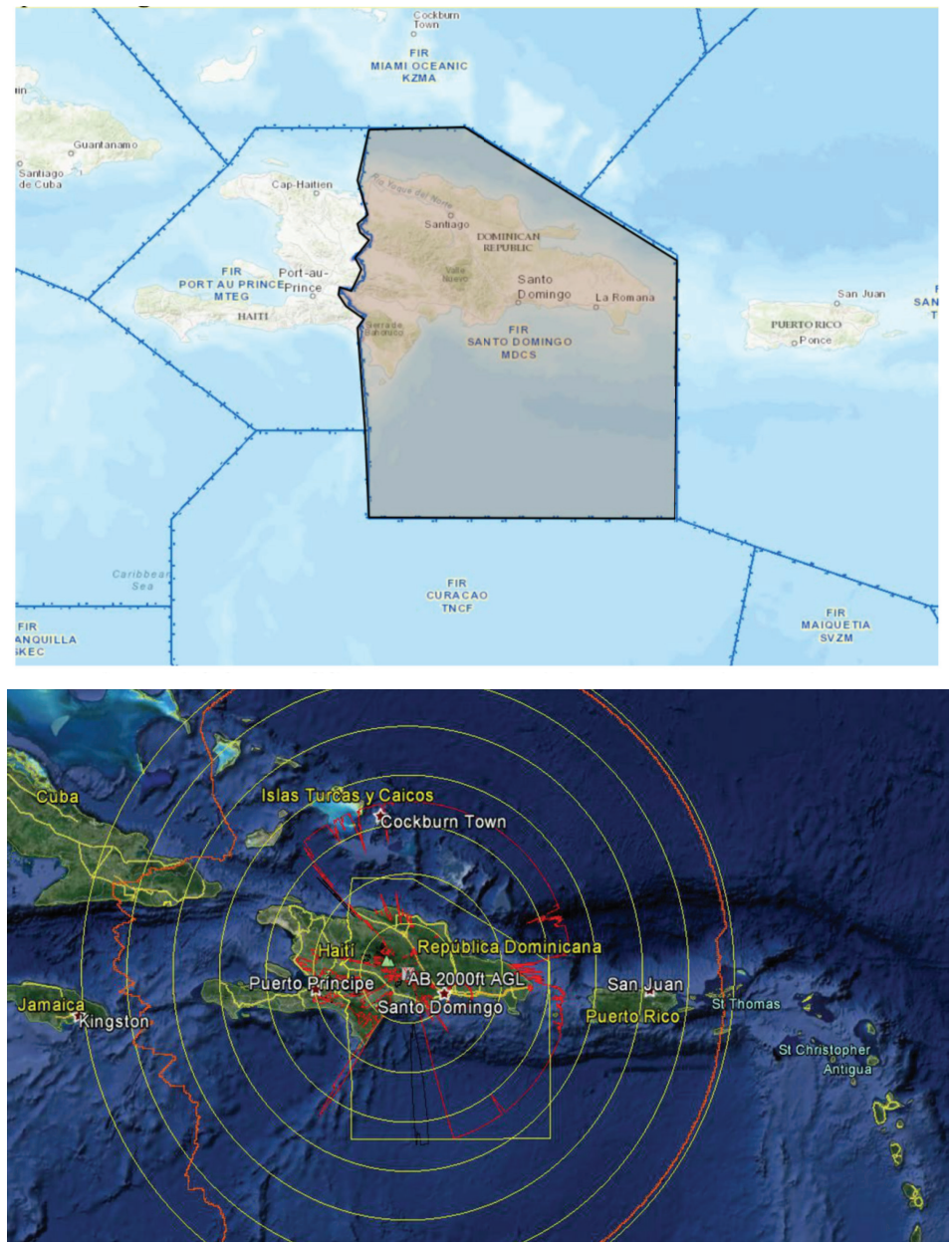
The Dominican Institute of Civil Aviation, through the Air Navigation Directorate (DINA, in the Spanish abbreviation), is the provider of air navigation services and manages the Santo Domingo Flight Information Region (FIR).

DINA Organigram



The MDCS Santo Domingo FIR has a dimension of 172,578 km^2, surrounded by the FIRs of Miami (KZMA), San Juan (TJZS), Curacao (TNCF) and Port-au-Prince (MTEG).

Figure 6: MDCS Santo Domingo FIR and the Dominican Republic Territory



Source: IDAC, 2018.

7.1. INFRASTRUCTURE AND PERSONNEL

The air navigation infrastructure is formed by:

(1) Facilities:
- 1 Area Control Center (ACC) combined with APPs and FIC facilities.
- 1 Terminal Control Area (TCA) in MDPC.
- 9 Control Towers (TWR).
- 1 Traffic Management Unit (TMU) for the Air Traffic Flow Management (ATFM).

(2) FIR Sector distributions
- 2 Lower/Upper ACC Sectors.
- 3 Terminal Areas (TMA).
- 9 Airdrome Control Zones (CTR).

(3) Navigation Aids
- 8 Very High Frequency (VHF) Omni-Directional Range (VOR).
- 2 Instrument Landing Systems (ILS).

[4] Surveillance systems
- 3 Radar Antennas with 10 Channels.
- 2 Radar data processors with duplicated channels.

[5] Communications
- 3 VHF Ground to Air Long and Medium Range Transmitter/Receivers Sites
- National Inter Facilities ATN for Voice and Data
- VISAT Station, MEVA-III, for Voice and Data International Communications.
- AMHS Gateway connected to worldwide ATN.
- Many direct commuted and uncommuted phones lines.

[6] 100% PBN Implementation:
- Lower and Upper Airspace RNAV Routes interconnecting all International airports and the neighboring FIRs.
- All the Runways Thresholds from the 8 internationals airports, are served with harmonized RNAV/GNSS SIDs, STARs and Arrivals Procedures.

[7] A Search and Rescue Coordination Center (RCC)
- The Santo Domingo RCC is responsible for alerting the Search and Rescue units to support in case of an aircraft be declared in distress. The RCC is also the hotspot for the Cospass-Sarsat alert messages. The International Cospas Sarsat Programme is a satellite-aided search and rescue initiative dedicated to detecting and locating radio beacons activated by persons, aircraft or vessels in distress, and forwarding this alert information to authorities that can take an action for rescue. The system utilizes a network of satellites that provide coverage of the entire surface of the Earth.

[8] Air Traffic Flow Management Unit
- The Unit, under the Santo Domingo Area Control Center (ACC), has a staff of 13 specialists who monitor and evaluate the traffic situation in the airports and the Santo Domingo Flight Information Region (FIR), generating deliverables designed for optimal execution of air flows. The unit analyzes Capacity vs. Demand in the subsequent hours of each shift and identifies where imbalances exist, informing the Control Center supervisor, who defines what type of internal or external traffic management initiative (TMI / TMM's) should be pursued if necessary. This unit plans and reports any situation that could affect and support the Control Center. Since December 2016, as part of ATFM Data Exchange Network of the Americas (CADENA), an initiative of Civil Air Navigation Services Organization (CANSO), there are weekly operational teleconferences between Units of different ANSPs of the region and Stakeholders, coordinated and managed by Santo Domingo ATFM Unit as Regional Leadership.

The Air Navigation System has the following personnel:

Sector	Number of personnel
Total Air Navigation Service Provider personnel	+600
Aviation Technical Operation	266
Air Traffic Controllers	334

The above-summarized personnel, spread throughout the different Air Navigation facilities, supported air navigation services for 215,770 air operations during 2018.

7.2. SAFETY MANAGEMENT SYSTEM (SMS)

The DINA has a certified Safety Management System (SMS), as a requirement of the International Civil Aviation Organization (ICAO), established in different annexes and manuals. This SMS prescribes the need for the providers of Air Navigation Services to implement a Safety Management process according to the size of their organizational structure. The DINA SMS is certified from the Planning and Development Directorate (DPD), responsible to carry the State Safety Program (SSP) and by the Civil Air Navigation Services Organization (CANSO).

The IDAC, through the Air Navigation Directorate (DINA) created the Department of Safety Management, which is responsible, together with the different departments within it, to manage the safety as one of its most important goals.

The Department of Safety Management is a specialized technical unit responsible for the SMS in air navigation services as well as the subsequent continuous operation of said system. As part of its structure, it has the Safety Assurance Division, which developed in response to international requirements and the system's own needs in terms of the implementation

of a Safety Management System (SMS). Safety Assurance is one of the four pillars of the SMS and seeks the continuous improvement of the system, a management of functional and effective operational changes as well as achieving the monitoring and measurement of performance in terms of safety. The Division of Safety Risk Management (DGRSO) performs, together with the different departments of the DINA, the Risk Management process and at the same time, through the ATS Incident Investigation Section (SII), investigate all ATS Events.

The Department of Safety Management has two divisions, one for Safety Risk Management and the other for Safety Assurance. These Divisions include the primary responsibilities of the SMS regarding the identification of hazards, mitigation and risk management, change management, measurement and supervision of operational safety, promotion and communication of Operational Safety, as well as the continuous improvement of SMS. The Division of Safety Assurance has control over an operational section called the IMS Evaluation Section. On the other hand, the Division of Operational Safety Risk Management is in charge of Incident Investigation Section. It is important to note that the Department of Safety Management has highly qualified and experienced personnel to carry out the delicate task of safety management.

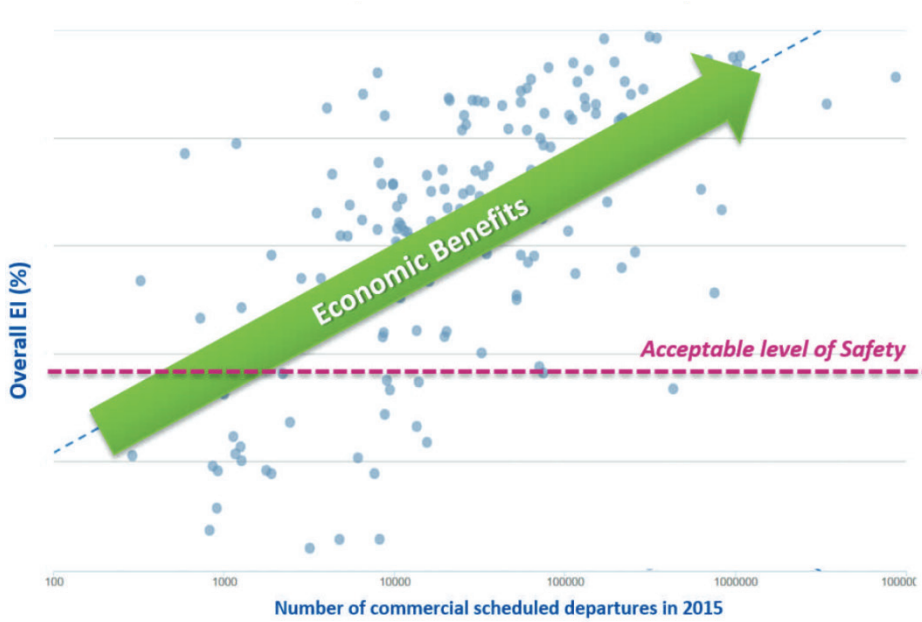
The Dominican Republic is upgrading its Aviation System Block, starting with Block 0, which has the capacity to be implemented with supporting documents such as standards, procedures, specifications and training materials. The State expects to start upgrading Block 1 in 2019, Block 2 in 2025 and Block 3 in 2031, with ICAO's support.

8. Safety Audit Results and Lack Effective Implementation (EI)

Safety is crucial for the aviation sector, and became even more important with the growth of air transportation between countries. Governments are still the main agency in charge of ensuring air safety through laws, regulations, means of enforcement and active policies.

Safety reputation might affect a traveler's choice of destination or airline. Accidents and incidents might lead to an immediate decline in tourism. Using an econometric model, it is estimated that a 10 percent improvement in the effective implementation of a State's safety oversight is positively correlated to, on average, an additional 1.8 percent of aircraft departures from the State concerned.

Figure 7: Aviation Safety and Economic Development



Source: ICAO, 2018.

In the interest of promoting air safety among State members, ICAO launched the Universal Safety Oversight Audit Programme (USOAP) [13] in 1999. USOAP audits focus on a State's capability to provide safety oversight by assessing whether the State has effectively and consistently implemented the critical elements (CEs) of a safety oversight system, which enable the State to ensure the implementation of ICAO's safety-related Standards and Recommended Practices (SARPs) and associated procedures and guidance material. The programme was expanded in 2005 to the USOAP Comprehensive Systems Approach (CSA) to include safety-related provisions contained in all safety-related Annexes of the Chicago Convention.

13 The Resolution A32-11, approved in the 32nd Session of the Assembly, resolved that "a universal safety oversight audit programme be established, comprising regular, mandatory, systematic and harmonized safety audits, to be carried out by ICAO; that such universal safety oversight audit programme shall apply to all Contracting States; and that greater transparency and increased disclosure be implemented in the release of audit results".

ICAO also launched the No Country Left Behind (NCLB) initiative to assist Sates in implementing ICAO Standards and Recommended Practices (SARPs). The main goal of this work is to help ensure that SARPs implementation is better harmonized globally so that all States have access to the significant socio-economic benefits of safe and reliable air transport. The NCLB effort also promotes ICAO's efforts to resolve Significant Safety Concerns (SSCs) brought to light through ICAO's safety oversight audits as well as other safety, security and emissions-related objectives.

8.1. BACKGROUND

The Federal Aviation Administration (FAA) downgraded the Dominican Republic to Category II in 1993. As a consequence, Dominican air operators lost the right to fly to U.S. central destinations. By 2000, FAA/ICAO released a Technical Review, pointing out the main concerns about the Dominican Republic's compliance with ICAO safety and security standards, such as: (i) regulatory changes to give more autonomy and responsibility to the Director General to guarantee that the DGAC can carry out an effective regulatory regime; (ii) lack of updated and organized manuals; (iii) lax certification process for the air transport operators; (iv) no continuous training programs for the inspectors; (v) lack of verification of pilot and crew training; (vi) lack of an annual inspection program. The State prepared an action plan to solve these problems.

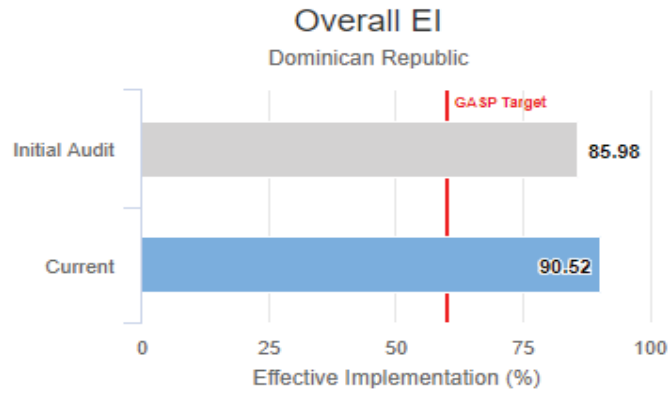
In 2003 and 2004, ICAO and FAA performed a follow-up audit to ensure that the Dominican Republic implemented the action plan as promised. Even though both institutions acknowledged the required changes in the regulations and organization, they still believed that Dominican Republic had to establish a new, comprehensive law to comply with ICAO standards and to train personnel to improve their inspections. The FAA offered technical assistance upon the condition that the State would modify the legislation according to previous recommendations.

In 2006, the Dominican Republic approved the new aviation law. As a consequence, the FAA elevated the Dominican Republic aviation safety rating to Category I in 2007. The upgrade meant that Dominican commercial airliners could operate in U.S. airports as well as enter into code-share agreements with U.S. carriers.

8.2. THE DOMINICAN REPUBLIC RESULTS IN THE USOAP

The audit under the new USOAP assessment was carried out in the Dominican Republic in January 2009, with missions to validate the corrective measures in 2016 and 2017. The State has achieved great results in the ICAO's Universal Safety Oversight Audit Program (USOAP), improving the Effective Implementation (EI) from 85.98% (2009) to 90.52% (the global average is 66.32%).

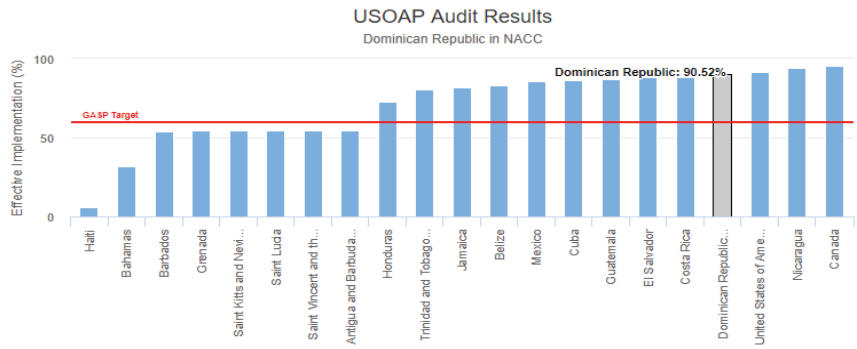
Figure 8: Overall EI - Dominican Republic



Source: ICAO

These results allowed the State to reach the Global Aviation Safety Plans (GASPS) Targets, ranking 4 out of 21 in the North American, Central American and Caribbean (NACC) region.

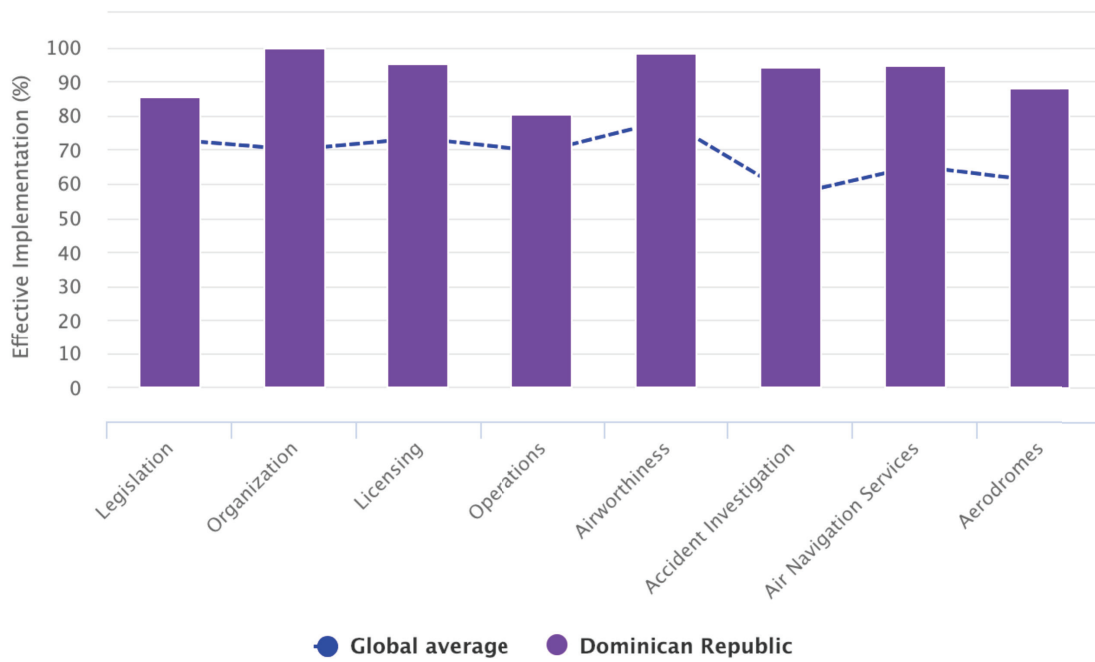
Chart 18: USOAP Audit Results



Source: ICAO

The Dominican Republic achieved higher scores than the global average in all seven categories, according to the chart below.

Chart 24: Disaggregated Safety Audit Results, Dominican Republic, 2017



Source: ICAO.

8.3. OVERALL PERFORMANCE OF THE DOMINICAN REPUBLIC

ICAO and the Dominican Republic agreed to a Corrective Measures Plan and indicators to monitor the State's performance based on ICAO Audits. The table below shows the current performance of the Dominican Republic. Among 13 indicators, the Dominican Republic has reached its target in ten of them.

Table 5: Performance Dashboard based on ICAO Safety Audits

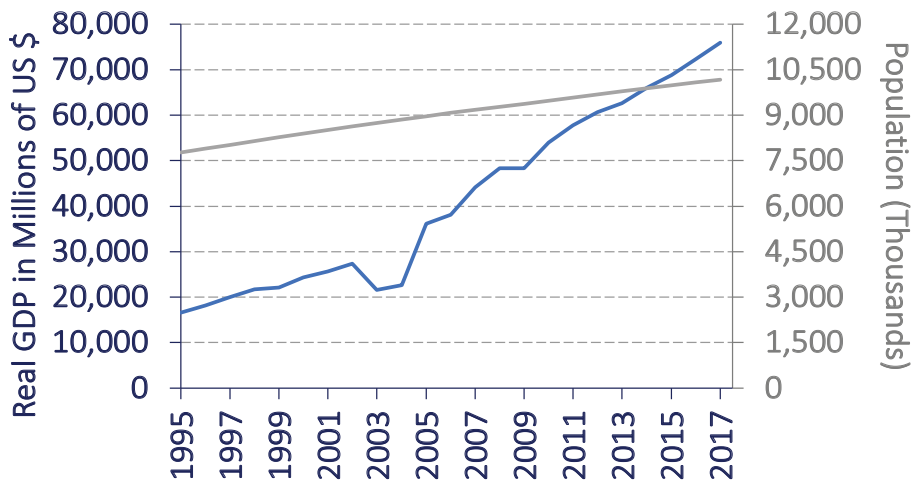
Indicator	Target	Value	Achieved
USOAP EI *USOAP overall EI (%)*	60%	90.5%	**YES**
Significant Safety Concerns (SSC) *Number of SSCs*	0	0	**YES**
Fatal Accidents *Number of fatal accidents in last 5 years*		0	✔
Aerodrome Certification *(Validated Status of USOAP Protocol Questions)*	Satisfactory	Satisfactory	**YES**
State Safety Progamme (SSP) Foundation Percentage of SSP *Foundation protocol questions validated by USOAP or submitted as completed*	100%	99.6%	**NO**
State Safety Programme (SSP) *Level of SSP Implementation*	Level 2	Level 3	**YES**
The IATA Operational Safety Audit (IOSA) *Number of IOSA certified operators*	→0	0	**NO**
FFA International Aviation Safety Assessment (IASA) Program *IASA categorization*	Cat 1	Cat 1	**YES**
EU Safety List *Number of operational restrictions*	Unrestricted	Unrestricted	**YES**
PBN (Performance-Based Navigation) *Percentage of international instruments runways with PBN approaches*	100%	94.44%	**NO**
Global Aviation Training Activities *Number of courses delivered by TRAINAIR PLUS Members in the last 12 months*	→0	3	**YES**
Corrective Action Plan Update *Number of updates in the last 12 months on the Online Framework (OLF)*	→0	1	**YES**
Positive Safety Margins *Number of areas (Operations, Air Navigation, Support) with a positive Safety Margin*	3/3	3	**YES**

Source: ICAO

9. Benefits of Aviation to the Dominican Republic: An Impact Evaluation Analysis

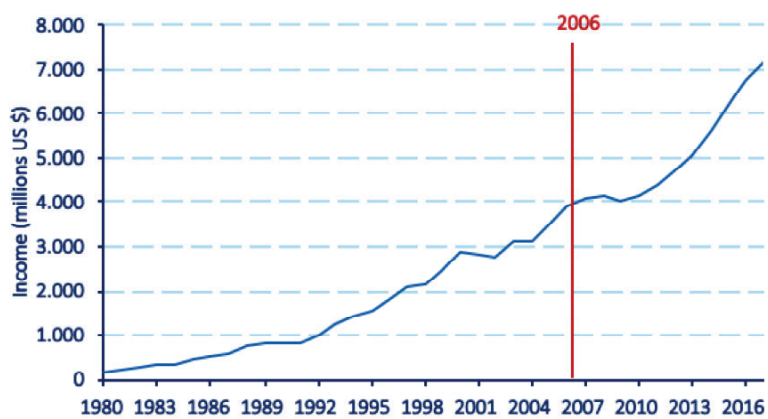
The Dominican Republic has enjoyed strong economic growth in recent years and a significant reduction in poverty.

Chart 25: Real Gross Domestic Product and Population of Dominican Republic (1995-2017)



Part of this growth was pushed by the tourism sector. The chart below shows how income generated by tourism increased, especially after 2006, when the aviation reforms were enacted.

Chart 26: Income generated by tourism (1980-2017)



Both tourism and the overall DR economy depend on the aviation sector, and so it is important to evaluate whether aviation policies bring a positive outcome for the Dominican economy. If this result is positive, what is the total impact of this set of policies?

One of the contributions of this report is to quantify these impacts by using rigorous econometric models. The purpose of this endeavor is to create a framework to assess the impact that could be applied in other contexts and show the effectiveness of these reforms for States that still need to change their policies. Rigorous impact studies are always useful to the sector in advocating internal policy change.

To answer these questions, there are two relevant models. One model will account for changes in the flow of passengers between the Dominican Republic and the USA, and the other will assess the macroeconomic impact of the reforms.

In the macroeconomic model, there was an estimated net effect of 15.5% increase in GDP per capita between 2006-2012, which can be translated in USD 607. In the model for passengers, we estimated an increase between 23% and 27% in the participation of passengers going to the Dominican Republic from the U.S., controlling for passengers going to other destinations. Moreover, due to the policy changes, the increase in U.S. tourists to the DR increased tourism spending by between 837 million and 1.016 billion USD between 2006-2012. The results show a causal relationship between the reforms and the increase of passengers, thus positively impacting the economy. Section 9.1. describes the details of the model. Furthermore, the increase in the number of passengers due to policy changes in turn increased the taxes collected by the State, creating new revenue for the DR government.

Both indicators, GDP per capita change and increase of passengers, are linked with some SDGs, such as reducing poverty, sustainable development, inclusive and sustainable economic growth, full and productive employment, decent work for all and resilient infrastructure.

9.1. POLICY EVALUATION STRATEGY

There are a wide variety of quantitative methods to evaluate policies in applied economics. Several of those methods can be classified (or just called) as difference-in-difference (DID) estimators. These methods are typically used when some groups, like cities or states, experience a treatment, such as a policy change, while others do not. In this situation, the selection of which groups experience the treatment is not necessarily random, and outcomes are not necessarily the same across groups in the absence of the treatment. The groups are observed before and after the treatment.

The challenge for causal inference is to come up with a credible estimate of what the outcomes would have been for the treatment group in the absence of treatment. This requires estimating a (counterfactual) change over time for the treatment group if the treatment had not occurred. The assumption underlying difference-in-differences strategies is that the change in outcomes over time for the control group is informative about what the change would have been for the treatment group in the absence of the treatment.[14] One of the most prominent methods of DID is the synthetic control approach.[15] In the words of Athey and Imbens (2017, p.9) the synthetic control approach "is arguably the most important innovation in the policy evaluation literature in the last 15 years. This method builds on difference-in-differences estimation but uses systematically more attractive comparisons."

14 Susan Athey and Guido W. Imbens. "The State of Applied Econometrics: Causality and Policy Evaluation." *Journal of Economic Literature*, 31 (2), 2017, p. 9.

15 Synthetic control groups was developed by Alberto Abadie and J. Gardeazabal ("The Economic Costs of Conflict: A Case Study of the Basque State," *American Economic Review*, 2003) and Alberto Abadie, Alexis Diamond, and Jens Hainmueller ("Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association*, 105 (490), 2010).

A. Synthetic Control Group

In the DID estimator, the econometrician applies a simple average between units (cities, states, countries) in the control group. In the synthetic control approach, there is a weighted average that is applied to each unit. The main idea is that the composite control group reproduces better the behavior of the treatment unit before and after the policy treatment.

A formal explanation of the method can be found in Abadie, Diamond, and Hainmueller (op. cit.). Consider the observation of $j = 1,2, \cdots J+1$ units in the following time periods $t = 1,2, \cdots T$, and the first unit was treated by a new policy. The following units will be the synthetic control group. Define Y_{it}^{N} as the values for the target variable for the unit i at the time t for the nontreated unit and Y_{it}^{I} for the unit that was exposed to the intervention (the policy). The synthetic unit should be able to mimic the treated unit before the treatment period. Be U_i a vector $r \times 1$ of observed relevant variables for each unit, define the vector $K = (k_1, \cdots k_{T_0})$, where T_0 is the period before the intervention, as the weights of a linear combination before the intervention: $Y_i^K = \sum_{s=1}^{T_0} k_s Y_{is}$.

To form the control synthetic group is needed a vector $(J \times 1)$ with weights $W = (w_2, \cdots w_{J+1})$ with $w_J \geq 0 \forall j$ and $\sum_{j=2}^{J+1} w_j = 1$. Each value of W represents a weighted average of the available control regions and, therefore, a synthetic control.

The optimal vector of weights W^* such that the synthetic unity is the best fit with respect to U_i and $M \leq T_0$ linear combinations for the interest variable before the intervention. Formally W^* is such that $\sum_{j=2}^{J+1} w_j^* \tilde{Y}_j^{K_1} \approx \tilde{Y}_1^{K_1} \cdots \sum_{j=2}^{J+1} w_j^* \tilde{Y}_j^{K_M} \approx \tilde{Y}_1^{K_M}$ and $\sum_{j=2}^{J+1} w_j^* U_j \approx U_1$, then:

$$\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$$

Is the estimator of α_{1t} in the periods after the intervention. The vector of weights is estimated using the follow minimization:

$$||X_1 - X_0 W||V = \sqrt{(X_1 - X_0 W)' V (X_1 - X_0 W)}$$

where $V_{k \times k}$ is a symmetric and positive semidefinite matrix. Abadie e Gardeazabal (op. cit.) and Abadie et al. (op. Cit.) choose $V_{k \times k}$ according to:

$$argmin_{v \in v} (Z_1 - Z_0 W^*(V))' V (Z_1 - Z_0 W^*(V))$$

where v is the set of all positive semidefinite diagonal matrixes.

B. The Control Group

The donor's pool for the potential control group chosen is a mix of Latin American and Caribbean countries and some tourist destinations around the world, like New Zealand and Australia. New Zealand, as an open-skies State, controls for this technological trend.

The countries in the control group are Antigua and Barbuda, Chile, Colombia, Fiji, Guatemala, Honduras, Jamaica, Malaysia, New Zealand, Nicaragua, Panama, Peru, Philippines, Seychelles, St. Vincent and Grenadines, Thailand, and Trinidad and Tobago. The choice of the synthetic control group will be discussed below.

In the next subsection, a model for GDP per capita and the estimation for aggregate figures using the synthetic control model is illustrated. This model estimates the impact for other variables like income from tourism and total number of passengers, but these factors are not significant.

9.2. A MODEL FOR GPD PER CAPITA

The model estimated for GDP per capita was selected using a panel data estimation with data in growth rates. This model is simple and was estimated only to selected correlates and it's not intended to "explain" the GDP per capita. The variables assigned to the model selection are inflation (CPI), exchange rate, the added value of industry and services, the share of tourism expenditures in the GDP, tourism expenditures, population, and the inflow of FDI. In Annex 2, there is a table describing each variable.

As the proposed model is a reduced form, there is no theory for data selection. Chosen variables must correlate with GDP per capita.

To select variables, it is possible to run a model of growth for the countries pre-selected as the control group. The results for GDP per capita are presented at Table 6.

The models contain 160 to 141 observations for 20 countries. The standard error is robust to the correlation for each State (clustered on each State). Those regressions relate the growth rate of GDP per capita with the growth rate of the variables lagged one year (those variables are in (t-1) to guarantee a minimum level of exogeneity). The variables are: exchange rate (domestic currency to the USD), inflation rate (local currency), the growth rate of inflation (inflation (t) – inflation (t -1)) - this variable captures an acceleration or deceleration of the inflation in each State-, the value of services and manufacture in local currency and per capita (as measured in GDP), FDI (inflow), total of tourists arriving by air, the total income generated by tourism, and the share of tourism income in the GDP, and the total population.

That regression suggests that the services per capita, added value at industry per capita, FDI (inflow) as correlated with the GDP per capita. These three variables are selected because the confidence is higher than 99% (this result is tagged with (***) at Table 1), i.e. the p-value is lower than 1%. Unfortunately, FDI was excluded from the final estimation due to lack of data for several countries. There were 13 missing values for FDI. The selection regressions assign a low explanation power from FDI.[16]

One explanation is on the regressions that appears on Table 6. The distinction between the three regressions is the presence of inflation, the growth of inflation or the absence of this measure. There is a relationship between the exchange rate, inflation and interest rate. This relation is called UIP (uncovered interest parity). This means that the exchange rate is partially explained by home inflation, so when the inflation is included the exchange rate loses explanatory power. The results of those regressions show that inflation and exchange rate should be included as an explanatory variable for the GDP per capita along with added-value of services and industry.

16 Share of tourism is not included in final analysis due to a very low coefficient with GDP per capita growth.

Table 6: Selection of Variables for GDP per Capita, Growth Rates of Variables, 1996-2005

Variable	Models for GDP per capita		
Exchange rate	-0.0284(*)	-0.035(***)	-0.0293(**)
	0.0154	0.0124	0.0125
Δ Inflation			-0.0429(**)
			0.0161
Inflation	-0.0280(**)		
	0.0177		
Services	0.554(****)	0.5554(***)	0.5384(***)
	0.070	0.0731	0.0813
Industry	0.2979(***)	0.2918(***)	0.2940(***)
	0.0524	0.0512	0.0541
FDI	-0.0028(*)	-0.002(***)	-0.0024(**)
	0.0011	0.001	0.001
Arrival	-0.0075	0.0106	0.0101
	0.0103	0.0110	0.0103
Share of Tourism	-0.0017(**)	-0.001(**)	-0.0012(**)
	0.0006	0.0014	0.0005
Income Tourism	0.0142	0.0099	0.0097
	0.0086	0.0087	0.0085
Population	-0.1560	-0.2055	-0.2817(**)
	0.1166	0.1289	0.1313
Time Dummy	Yes	Yes	Yes
F	793.23	880.55	926.86
N	160	165	141

Note: SE values below each coefficient. SE are clustered over countries. Significance level is (***) for 99%, (**) for 95%, and (*) 90%.

10. Estimation of Treatment Effect

The synthetic control group is estimated using added-value of services per capita, the added-value of industry per capita, inflation, and the exchange rate. The estimation of the synthetic control DID was applied using a nested maximum likelihood routine to guarantee robustness when estimating the weights to the control group. Table 7 shows the estimated weights for the synthetic control group.17

17 Another model was run including share of tourism in exports and population. The results are similar but with less robustness in the final analysis.

Table 7: Estimation of Weights for GDP per Capita Model

State	Weight
ANTIGUA AND BARBUDA	0
AUSTRALIA	0.066
CHILE	0
COLOMBIA	0
COSTA RICA	0
FIJI	0
GUATEMALA	0
HONDURAS	0.175
INDONESIA	0
JAMAICA	0.552
MALAYSIA	0
MAURITIUS	0
NEW ZEALAND	0
NICARAGUA	0
PANAMA	0
PERU	0
PHILIPPINES	0
SEYCHELLES	0
ST. VINCENT AND THE GRENADINES	0
THAILAND	0
TRINIDAD AND TOBAGO	0.207

From 20 countries in the potential control group, the optimization method selected four: Australia, Honduras, Jamaica, and Trinidad and Tobago. This small selection is the standard result for the synthetic control approach. In the paper of Abadia, Diamond and Hainsmuller (op. cit.) the estimator selected 5 out of 38 control states to evaluate a change in the tobacco control program that California implemented in 1988.

Table 8 describes the predictor's balance, that is the comparison of the pretreatment characteristics of the actual Dominican Republic with that of the synthetic Dominican Republic. . The synthetic Dominican Republic is the control group in this class of model. The Table shows that the pre-treatment averages are well reproduced by the control group.

Table 8: Predictors for the Dominican Republic

Variables	Treated	Synthetic
Services	11.13886	11.14427
Industry	10.50495	10.40595
Exchange rate	2.991984	2.993094
Inflation	10.32984	8.317799

Note: these values are averages between 1996 and 2004.

The results for the synthetic model for GDP per capita are in Chart 27 and Chart 28. Chart 28 is the synthetic and the actual Dominican Republic. Chart 27 shows the difference between the synthetic and the actual GDP per capita – The gap in the GDP.

The result is direct – the increase of GDP is greater than could be predicted without the reforms. The average increase in GDP per capita was 15% over 6 years (2006-2012). The increase in GDP per capita is lower in the second half of the 2000s and sped up in the 2010s. In the year 2012, as shown in Figure 27, the GDP per capita was 23% higher than the synthetic Dominican Republic.

Chart 27: Synthetic and Actual Dominican Republic

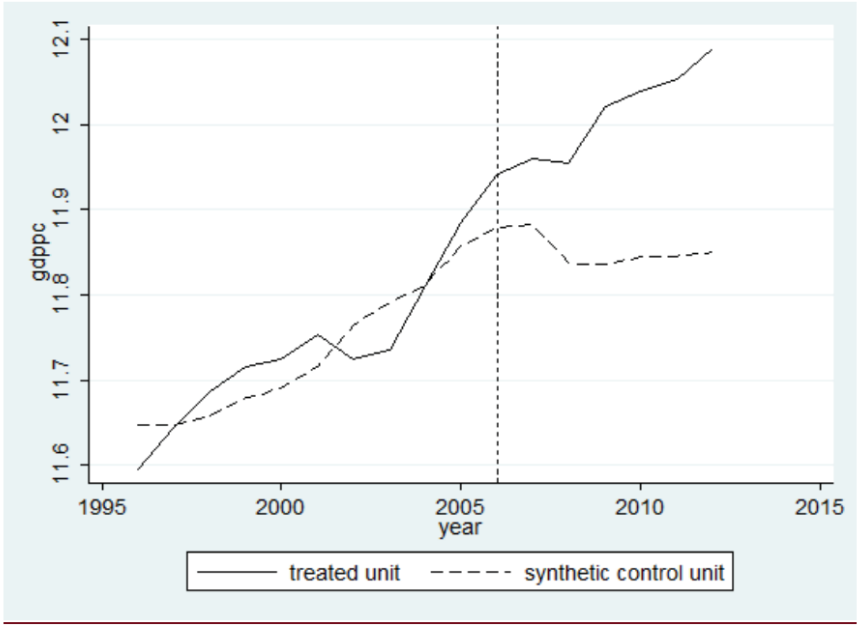
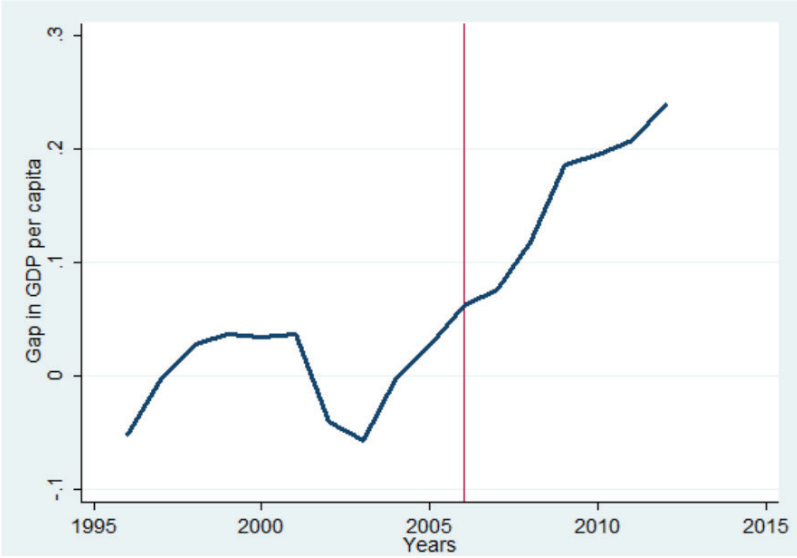


Chart 28: Gap between Synthetic and Actual GDP per Capita



The total income benefit from the reform is expressed in Table 9. The gains from the reforms are expressed in average effect over GPD per capita and GDP. The net effect was a 15.5% increase in GDP per capita between 2006-2012, which can be translated into USD 607 of income. The average effect on the GDP was USD 5.5 billion over 7 years, approximately (this amount is 9% of GDP in 2012).[18] This amount accounts for externalities flowing from the tourism sector to

18 Is possible to look at the components of synthetic group vs treatment State to understand (gain intuition) about the driving forces of change. Table W decomposes the averages of the four regressors (see Table 3) by pre and post intervention in Dominican Republic.

Table W – Averages of Regressors, Pre and Post Intervention (2006)

Variables/Groups	Averages Pre 2006	After 2006
Exchange rate:		
Dominican Republic	2.9920	3.5833
Synthetic	2.9931	3.3189
Industry per capita:		
Dominican Republic	10.5050	10.6847
Synthetic	10.4059	10.5030
Inflation:		
Dominican Republic	10.3298	5.8947
Synthetic	8.3178	8.2338
Services per capita:		
Dominican Republic	11.1389	11.4356
Synthetic	11.1443	11.3132

The Pre-2006 averages are essentially the same in Table 3, what is relevant here is the change between pre and post intervention and the between synthetic the control group and the treatment group. This is what is summarized in Figures 1 and 2. The change in averages is the following (all variables are in natural log, except inflation): (i) exchange rate: the synthetic currency lost less value than the actual; (ii) industry per capita: the industry per capita grow more than in the synthetic Dominican Republic – in the control group the industry grow also, but less than in the actual Dominican Republic; (iii) inflation: inflation in the synthetic control group is essentially the same, while in the actual Dominican Republic the inflation as much more lower (an indication of stability and good economic environment); (iv) services per capita: there is positive growth in actual and the synthetic Dominican Republic, but the growth in the actual economy was much more prominent, 11.43/11.31 = 1.0108, meaning 10.8% higher in per capita value (in local currency).

other sectors. This is a common effect studied in economics for decades that establishes that growth in one sector create an effect in other sectors.[19]

Table 9: Average Gains from Reform in GDP: GDP per capita and GDP over 2006-2012

Total Income Increase	Average effect
Average net effect on GDP per capita	15.50%
Average net effect on GDP per capita in USD	$607.00
Average net effect on Services in USD	$3,122,143,330.49
Average net effect on GDP in USD	$5,598,452,324.09

In Charts 27 and 28, it is clear that the gap between the actual and synthetic GDP per capita start to grow one year before the main change in the regulation of the Dominican Republic. There are two possible explanations for this happen. First, in markets, firms anticipate changes in the economic environment and take actions to get a better position to face rivals and increase profits.[20] Second, the change between 2006 and 2005 lies in the pre-intervention variance interval (i.e., the gap observed before 2006 has some variance and the change in the gap could be only a usual shift, as one observed in between 1998 and 1997 – see Figure 27). In the Annex 2, the robustness of these measures is further illustrated.

9.3. MARKET RESULTS: MICROECONOMIC EVIDENCE

There is a large academic literature in economics about the impact of competition in airline markets. In general, those papers focus on entry and exit in each market. [21]

The main idea is to apply a DID estimation of the policy using information based on the market definition in airline passenger services. In the field of industrial organization and antitrust the relevant market is the pair of airports: origin/destination at one point in time.[22]

We learned from previous studies in the industrial organization field that the deregulation of the airline market changed the profitability in each relevant market (the pair of cities/airports). The profitability can change through the increase of competition: more firms can enter is a market after deregulation. The deregulation can reduce the firm-specific cost of entry. What is expected is that more entry can increase competition and this will increase the total of passengers that choose the Dominican Republic. This is a starting point for an analysis of deregulation in the airline market.

19 For example, in the recent past, commodities producers' countries experienced great prosperity due to externality effect from exporter sector to the entire economy. Countries with large investments in R&D of products and process experienced a spillover effect over the entire economy generating prosperity (long-term growth). For more details see Paul Romer, "Endogenous Economic Growth." *Journal of Political Economy*, 98 (5), 1990; Simeon Djankov, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer. "The Regulation of Entry," *The Quarterly Journal of Economics*, 117(1), 2002. Charles I. Jones, *Introduction to Economic Growth*. 3rd ed. New York, WW Norton, 2013.

20 There is evidence that firms anticipate changes in economic environment. Goolsbee and Syverson find that the threat of entry in the US airline industry led to price cuts by incumbents before the entry occurred (Austan Goolsbee, and Chad Syverson, "How do incumbents respond to the threat of entry? Evidence from the major airlines." *Quarterly Journal of Economics*, 123 (4), 2008). A similar case was observed at Brazil with the bill that open the market for oil and gas exploration. The state-owned company, Petrobras, lost the legal monopoly in exploration in 1994, but the competitors start to make investments one year before the bill be sanctioned (Benjamin Bridgman, Victor Gomes, and Arilton Teixeira, "Threatening to Increase Productivity: Evidence from Brazil's Oil Industry," *World Development*, 39 (8), 2011).

21 To name a few academic articles: Steve T. Berry. Estimation of a Model of Entry in the Airline Industry. *Econometrica*, 60, (4), 1992. Austan Goolsbee and Chad Syverson, "How do Incumbents Respond to the Threat of Entry? Evidence from the Major Airlines," *Quarterly Journal of Economics*, 123 (4), 2008. Eli Tamer and Federico Ciliberto, "Market Structure and Multiple Equilibria in Airline Markets," *Econometrica*, 77, (6), 2009.

22 J. Bruce McDonald. "Antitrust for Airlines." DOJ, 2003. (https://www.justice.gov/atr/speech/antitrust-airlines). Randy C. Chugh, Nathan G. Goldstein, Eric K. Lewis, Jeffrey S. Lien, Deborah Minehart, and Nancy L. Rose, "Economics at the Antitrust Division 2015–2016: Household Appliances, Oil Field Services, and Airport Slots." *Review of Industrial Organization*, 49, 2016.

A. Market Share for US Carriers

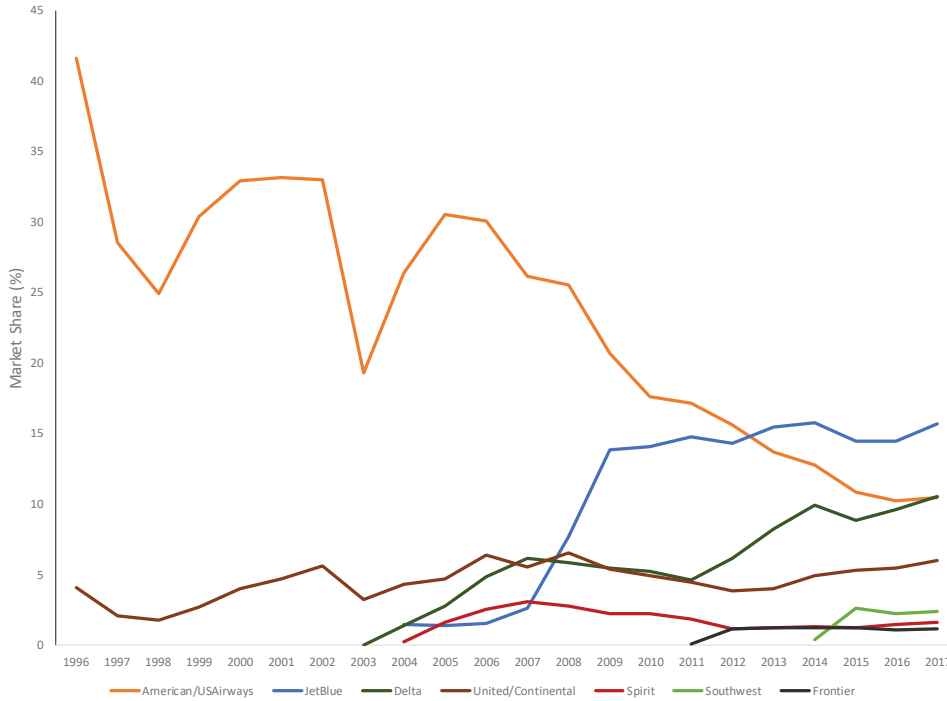
In Chart 28, we show the market share (%) for the American carriers that operate in the Dominican Republic between 1996 and 2017. The market share here is computed by the total of passengers per year arriving from the United States. Only for the USA is it possible to build a panel with the number of firms in each pair of cities.

An important characteristic in the market of the Dominican Republic after deregulation is the entry of JetBlue. In fact, Jet Blue was able to expand the activities in the Dominican Republic after deregulation.[23]

In December of 2007, Lufthansa bought a 19% share of JetBlue.[24] The causality here is not so important, but after this investment strategy by Lufthansa, JetBlue expanded operations to the Caribbean using the Orlando airport as a hub. New international routes from Orlando included: Bridgetown (Barbados), Bogotá (Colombia), Cancún (Mexico), Nassau (Bahamas), San José (Costa Rica), and Santo Domingo (Dominican Republic). The deregulation allowed the JetBlue strategy of expansion into the Caribbean destinations.

Chart 28 shows reported figures for United and American Airlines despite mergers and acquisitions of Continental and US Airways, respectively. The merger between United and Continental took place in 2010. The merger only increased the combined market share by 0.11%, since United operations were almost inexistent. The acquisition of US Airways by American Airlines took place in 2015, and increased the market share of American by 2.21%. This allowed American to surpass Delta as the number 2 airline in terms of market share in the Dominican Republic. The conclusion is that these mergers changed very little in the market structure.

Chart 28: Market Share of US Carriers in the Dominican Republic, Annual, 1996-2017



23 JetBlue is a low-cost airliner based in New York City. JetBlue started operations in 1998, going public in 2002. Currently is the sixty-largest airline in US. The operational focus of the company is Boston, NYC, Fort Lauderdale, Long Beach, Orlando and San Juan (Puerto Rico).

24 The Wall Street Journal, "Lufthansa to buy 19% Stake in JetBlue," December 2007.

B. Entry: The Number of Airlines

The first feature of deregulation was more firms entering the Dominican market. This follows the evidence of several studies in the airline market.[25] If the entry and exit in the State change a lot, it is difficult to identify the parameter related to the 2006 intervention.

Table 10 shows the three year average of the number of firms, the number of entry firms (when it was inactive in the past year and active in the current year), and the number of exit firms (when it was active in the current year but will be inactive in the next year). If a firm offers a charter flight she it is flagged as a charter entry or charter exit. Regular carriers could offer charter flights, so charter entry and exit is not a pure measure of charter flights.

The facts described in Table 10 are that the turnover of firms was higher before the law changed in 2006. On average, there are more firms active before 2006 than after, but 23 carriers is a recurrent figure.

The patterns of entry and exit are slightly different before and after 2006. There is more turnover of firms before 2006. This behavior is explained by the reduction of entry of charter companies. These trends are described in Chart 29 below.

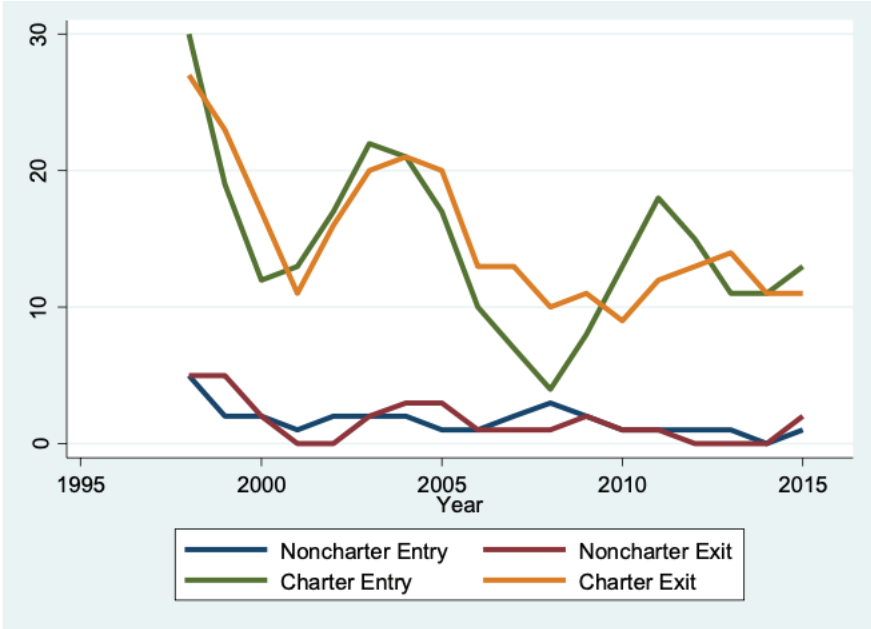
Table 10: Three-years Average Numbers of Firms, Entry, and Exit by Type, 1997-2016

Years	Total Airlines	Entry	Exit (t+1)	Charter Entry	Charter Exit (t+1)
1998	25.0	4.7	6.3	4.0	5.7
1999	23.3	4.7	3.7	4.3	3.7
2000	26.0	6.3	5.3	5.7	5.3
2001	28.7	8.0	7.3	7.3	6.7
2002	29.0	7.7	8.0	7.0	7.0
2003	27.0	6.0	7.7	5.7	6.7
2004	23.0	3.7	4.7	3.3	4.3
2005	21.3	3.0	4.7	2.3	4.3
2006	19.0	2.3	3.7	1.3	3.3
2007	18.7	3.3	4.3	2.7	3.7
2008	19.0	4.7	3.3	4.3	3.0
2009	22.0	6.3	4.3	6.0	4.0
2010	23.0	5.3	4.3	5.0	4.3
2011	22.7	4.0	4.7	3.7	4.7
2012	21.7	3.7	3.7	3.7	3.7
2013	22.7	4.7	4.3	4.3	3.7
2014	23.5	5.5	4.5	5.0	3.5
2015	25.0	6.0	6.0	5.0	4.0

Note: Three-years average assigns the same weight for every observation. Exit (t+1): the firm is not active in the next year.

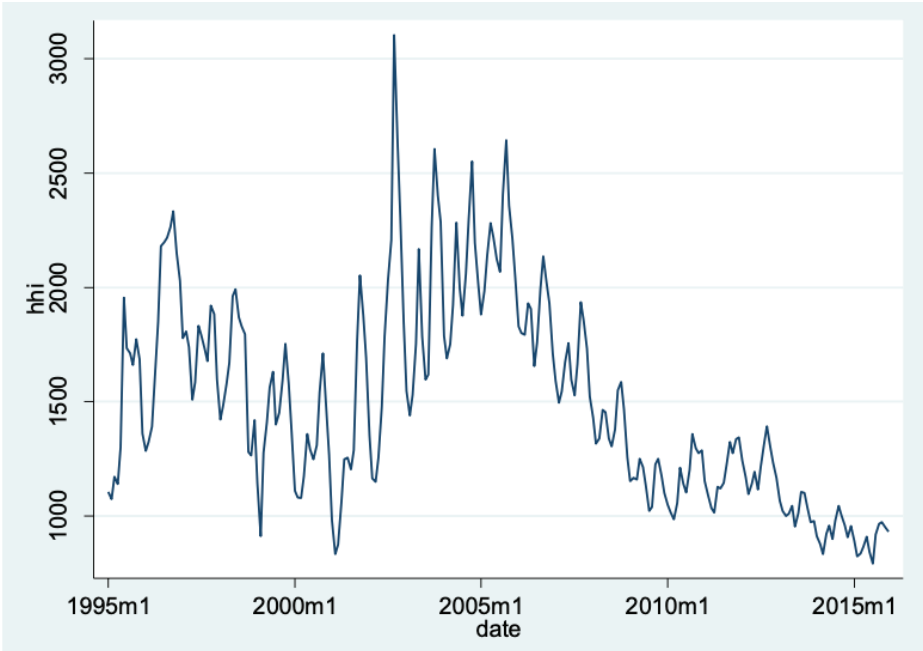
25 See Berry, 1992, op.cit., and Steve T. Berry and Peter C. Reiss. Empirical Models of Entry and Market Structure. In: *Handbook of Industrial Organization*, Volume 3, 2006.

Chart 29: Three-years Average for the Number of Entry and Exit by the Type of Airline: Charter and Noncharter, 1996-2015.



The most prominent feature that illustrates what took place in the Dominican Republic market is the increase in competition. This is illustrated in Chart 30, which shows the HHI index calculated by the market share for each carrier arriving in the Dominican Republic.

Chart 30: HHI for Airline Transportation in the Dominican Republic, Total number of Passengers per Month, 1995-2015



C. A Model for Passengers

The quantitative analysis explores a large dataset by origin in the United States and destinations abroad. The variables selected for the models are the following: number of passengers, distance, price of kerosene, exchange rate and a measure of the cycle of the income in the USA. A description is available in the Annex 2.

As the Dominican Republic is a tourist destination, the control group was chosen for airports below the tropic of Cancer (it should be an indication of most tourist destinations with beaches and mountains). This simple selection excludes the bulk of business travelers. This is a kind of selection of North-South, excluding the North-North routes that contain the most active trade routes in the world.

Two classes of models are utilized: a classical difference in differences (DID) model and panel data DID model. For an explanation of these models, see Angrist and Pischke (2009).[26] For the panel data estimation, a Hausman-Taylor model estimation is applied.[27] The estimation of a panel using the Hausman-Taylor method has the potential to reduce the selection bias caused by the entry and exit of airlines in each market.

The results are separated into two groups. The first group is characterized by models of market share. The market share of each route was calculated for airlines taking into accunt the impact of the 2006 law on market share. Since the competition is higher after 2006, the expected effect is negative. The second group in the estimation is out to target: the average treatment effect of the 2006 intervention. For this estimation, data is aggregated t by each State of destination and calculated as a share of the total of passengers by State in the total number of passengers. So, if the 2006 intervention increased the relative number of passengers that chose the Dominican Republic, a positive value is expected for this coefficient.

C.1. Models of market share per route (origin-destination), monthly data.

This market share is the total number of passengers that flow between a pair of airports in the same month. Here are the routes for the treatment group (Dominican Republic) that arrive at the 5 international airports. I.e. $PAX_{carrier}$ / PAX_{route}. At Table 11 we describe the results (FE stands for fixed effect).

26 Joshua D. Angrist and Jorn S. Pischke. *Mostly Harmless Econometrics*. An Empiricist's Companion. Cambridge, MIT Press, 2009, chapter 5.
27 Jerry A. Hausman, and W. E. Taylor. Panel data and unobservable individual effects. *Econometrica*, 49, 1981, pp. 1377–1398.

Table 11: Impact in the Carriers/State Market Share

Variable	Model 1	Model 2	FE Model
Net effect	-0.1662	-0.1679	-0.2074
	0.021	0.021	0.0906
Policy time	0.1713	0.0122	-0.1374
	0.0536	0.0094	0.056
Dominican	0.1725	0.1733	
Republic	0.0158	0.0158	
Kerosene	-0.0233	0.0197	
	0.0432	0.008	
Distance	2.2262	2.2131	
	0.0892	0.0891	
Distance 2	-0.121	-0.1202	
	0.0056	0.0056	
Exchange Rate	-0.0091	-0.0092	0.0645
	0.0018	0.0018	0.0425
Cycle USA		0.13	
		0.0477	
Carrier Dummy	yes	yes	Yes
Time Dummy	yes		Yes
F	.	.	2.0751
N	171906	171906	171906

The results in the first set of analysis is a loss of market share for each carrier. This is the quantitative explanation of what happened in the market structure in the Dominican Republic. On average, carriers lost 16% to 20% of market share in the Dominican Republic after 2006.

C.2. Models of State market share (origin-destination), monthly data.

Here the market share is the total number of passengers that arrive in each State as a proportion of the total of passengers per month. I.e. ln(PAXState / PAXUS).

In this subsection, four models were run: two OLS models with all controls for DID,[28] one fixed effect (FE) model, and one Hausman-Taylor panel data model. The FE model captures everything that is constant within each destination. The drawback of the FE model is that every constant (like distance) is dropped out.

The Hausman-Taylor panel data model is a robust estimation of the FE model. This alternative model can be viewed as a hybrid model between FE and random effects. The Hausman-Taylor model has several advantages: it utilizes constants and instrumental variables associated with the treatment effect. Also, the model has fewer problems relative to selection bias. I.e., the Hausman-Taylor panel data model is generally robust for unbalanced panels. The estimator is based on instrumental variables and this model uses the endogenous variables, with respect to the flow of passengers,

28 The control of an OLS DID are time dummies, treatment group (here is Dominican Republic), time of the treatment (2006 onwards), and the average treatment effect = treatment group times the time of the treatment.

the cyclical index of activity and the treatment effect. The instruments are the exogenous variables to respect the flow of passengers, that is, distance, the price of oil, exchange rate, and the dummy for the treatment time.

The models are described in Table 12 using monthly data between 1995 and 2015. The total number of observations is 11,908. The average treatment in the FE model is not significant, but the coefficient matches the Hausman-Taylor estimate.

These results show that the change of level was between 23% and 27% in the participation of PAX going to the Dominican Republic over PAX going to other destinations with a high degree of confidence. Is important to remember that 23% is the same impact over the GDP per capita in the synthetic control group. The robustness checks are explained in the Annex 2.

Table 12: Average Treatment Effect from 2006 Intervention (Net effect)

Variable	OLS 1	OLS 2	FE 1	HTAYLOR
Net effect	0.2798	0.2764	0.2375	0.2357
	0.0613	0.0619	0.1441	0.0842
Policy time	0.1663	0.1418	-0.2063	0.1703
	0.3876	0.0694	0.2208	0.0219
Dominican	2.2106	2.2148		
Republic	0.0465	0.047		
Kerosene	-0.2565	0.0858		-0.0189
	0.2933	0.064		0.0191
Distance	1.4528	1.4082		36.4159
	0.4442	0.4428		72.6184
Distance 2	-0.1654	-0.1628		-2.3354
	0.0271	0.027		4.3678
Exchange Rate	0.1305	0.131	0.1379	0.1405
	0.01	0.01	0.1987	0.022
Cycle USA		-0.7544		-0.0848
		0.3566		0.1116
Time Dummy	Yes		yes	
F	53.9947	1698.554	.	33.551
N	11908	11908	11908	11908

The translation of those effects in USD are summarized in Table 13. The average effect estimated above is used and applied to the *level effect* over the amount of 2005 PAX (the pre-intervention volume). As described in Chart 4, the large increase of PAX came from the United States, so we can assume this is a good representation of the impact over the total volume of non-residents passengers (tourists) arriving at the Dominican Republic in 2005.[29] Also, the model assumes an average expenditure of 948 per PAX in 2006 numbers (figures estimated by the Central Bank of the Dominican Republic). In each column are the average effect estimated by each model. The figures are in terms of *change in level* (7 years average):[30]

- Increase in PAX: 980,996 to 1,191,596
- Increase in PAX expenses: 837 million to 1.016 billion of current USD

29 The total flow of passengers includes non-residents and residents. To calculate the total impact in USD we should exclude the share of residents from the total of PAX. The monthly average share of non-residents of PAX (Jan 2008 to Dec 2017) is 90% of the total. For example, in 2006 there was a total of 4,383,765 passengers of which 3,965,055 are non-residents, accounting for a share of 90.4%.

30 Also, these figures can be translated into the total amount of taxes collected. The total amounted is the average collected tax (80 USD) multiplied by the change in *level* in PAX is (80 x 980,966 =) 78,477,255, approximately.

Table 13: Net Effect in USD

Net effect Variable	did1	did2	FE1	HTAYLOR
Net effect	0.322865213	0.318375109	0.268074997	0.265794515
Average PAX before 2006	3690692	3690692	3690692	3690692
Share of non-residents PAX	0.9	0.9	0.9	0.9
Average expenses 2006 (USD)	948	948	948	948
Net increase of PAX (total)	1,191,596	1,175,024	989,382	980,966
Net average gain from non-resident PAX (USD)	1,016,669,757	1,002,530,875	844,140,932	836,959,926

9.4. SOME CONSIDERATIONS ON TAXATION AND CHARGES

ICAO, for the purpose of its policy objectives, makes a distinction between a charge and a tax. Charges are levies to defray the costs of providing facilities and services for civil aviation while taxes are levies to raise general national and local government revenues that are applied for non-aviation purposes.

ICAO policies on airport and air navigation charges (DOC 9082) are provided as guidance to Member States, wherein States are encouraged to incorporate the four key charging principles of non-discrimination, cost relatedness, transparency and consultation with users into their national legislation, regulation or policies, as well as into their future air services agreements. This ensures compliance by airport operators and air navigation services providers (ANSPs).

It is important to note that the guidance provides that Airports may produce sufficient revenues to exceed all direct and indirect operating costs (including general administration, etc.) and so provides for a reasonable return on assets at a sufficient level to secure efficient financing in capital markets for the purpose of investing in new or expanded airport infrastructure and, where relevant, to remunerate holders of airport equity.

Air navigation services may produce sufficient revenues to exceed all direct and indirect operating costs and so provide for a reasonable return on assets (before tax and cost of capital) to secure efficient financing for the purpose of investing in new or enhanced air navigation services infrastructure.

ICAO's guidance on taxation is provided in the 'ICAO's policies on taxation in the field of international air transport' (DOC 8632). The recommendations primarily deal with the following areas:

i) taxation of fuel, lubricants and other consumable technical supplies when an aircraft registered in one State arrives in or departs from a customs territory of another State;

ii) taxation of fuel, lubricants and other consumable technical supplies when an aircraft registered in one State makes successive stops at two or more airports in one customs territory of another State;

iii) taxation of the income and aircraft of international air transport enterprises; and

iv) taxes related to the sale or use of international air transport.

With respect to taxes on fuel, lubricants or other consumable technical supplies and the taxation of income of international air transport enterprises and taxation of aircraft and other moveable property, the recommendations call for the exemption of all customs and other duties and all taxation on the basis of reciprocity.

With respect to taxes on the sale and use of international air transport: each Contracting State shall reduce to the fullest practicable extent and make plans to eliminate as soon as its economic conditions permit, all forms of taxation on the sale or use of international transport by air, including taxes on gross receipts of operators and taxes levied directly on passengers or shippers.

The expression "customs and other duties" shall include import, export, excise, sales, consumption and internal duties and taxes of all kinds levied upon the fuel, lubricants and other consumable technical supplies. The duties and taxes include those levied by any taxing authority within a Contracting State, whether national or local.

The policies related to taxation of international air transport as well as the policies on airport and air navigation services charges of the Dominican Republic were examined in light of the recommendations and guidance provided by ICAO.

This study compares the charges and taxation collected by the State and compares it with those collected by other similar economies in the region where tourism is also a significant contributor.

Air Navigation Charges

Air navigation Charges for flight Miami – Punta Cana for an A320 (ICAO Aero Tariffs)

FIR	State	Charge Type	Distance	Cost Currency	Cost USD
SANTO DOMINGO	Dominican Republic	En Route	359.50km	120.00 USD	120

Air navigation Charges for flight Miami – Montego Bay for an A320 (ICAO Aero Tariffs)

FIR	State	Charge Type	Distance	Cost Currency	Cost USD
HABANA	Cuba	En Route	462.77km	197.42 CUP	197.42
KINGSTON	Jamaica	En Route	172.82km	160.00 USD	160
KINGSTON	Jamaica	Approach	172.82km	68.00 USD	68
KINGSTON	Jamaica	Communication Service Charge	172.82km	22.00 USD	22

On a Miami – Punta Cana flight operated by an A320, the Dominican Republic collects USD 120 in air navigation charges. On the Miami – Montego Bay flight, Jamaica collects USD 250 in air navigation charges.

Airport Charges (aircraft related component only)

The following tables indicate the landing charges for an arriving international flight operated by an A320 (ICAO Aero Tariffs)

Punta Cana (PUJ)	
Landing	54.40
Total	54.40

Montego Bay (MBJ)	
Landing	390.39
PAX Boarding Charge	113.41
Total	503.80

Antigua (ANU)	
Landing	201.48
Aircraft parking charge	5.00
Total	206.48

The landing charges listed above indicate that aircraft related charges in the Dominican Republic appear to be reasonable and not excessive when compared to similar economies that depend on tourism traffic by air transport.

Taxes and charges levied per passenger

In this example we look at the taxes and charges levied per passenger as indicated on the ticket price breakdown. The total airfare is the roundtrip ticket price bought 2 weeks in advance from Miami to the following destinations. Fare and taxes per ticket.

	Total airfare including taxes	Tax levied by the US	Tax levied by the destination
Punta Cana (PUJ)	USD 547	USD 64.03	USD 92.60
Cancun (CUN)	USD 493	USD 64.03	USD 59.17
Montego Bay (MBJ)	USD 512	USD 64.03	USD 114.09
San Juan (SJU)	USD 531	USD 57.40	N/A
Antigua (ANU)	USD 1189	USD 64.03	USD 75
Saint Martin (SXM)	USD 395	USD 64.03	US D56.32

Source: airline website

- The Dominican Republic collects USD 92.60 (USD 30 Airport Authority fee, USD 20 Airport Departure tax, USD 32.60 Airport Infrastructure fee, USD 10 various taxes)
- Mexico collects USD 59.17 (USD 30.18 International Airport Departure tax, USD 28.99 Tourism tax)
- Jamaica collects USD 114.09 (USD 20 Airline Passenger levy, USD 5 Airport Improvement fees, USD 8 Passenger Aviation Service charge, USD 3 Passenger Facility charge, USD 23.09 Passenger Service and Facility fee, USD 20 Tourism enhancement fee, USD 35 Travel tax)
- Antigua collects a USD 75 Airport Administration charge
- Saint Martin collects USD 56.32 (USD 39 Airport Departure tax, USD 5.5 Airport Improvement fee, USD 11.82 Passenger Screening fee)

Charges and taxes levied per passenger are in the range of USD 56 to USD 114 for the destinations above.

The analysis above indicates that airport and air navigation charges as well as taxes in the Dominican Republic appear to be reasonable and not excessive when compared to similar economies that depend on tourism traffic by air transport. The State has recognized that high taxation and charges imposed on international air transport could have a detrimental impact on the growth of air traffic and could negate the positive impact of its air transport policies on its economy.

Contribution of taxation to the economy of Dominican Republic

The contribution of taxation to the economy (GDP) of Dominican Republic is significant. Estimates indicate that for the year 2017, taxation contributed around USD [non-residents 80 unit tax] 490 million to the economy of the State[31]. The proactive policies indicated in Chapter 5 saw a significant increase in tourists and passengers carried by air transport in the State. The growth of traffic directly benefited the State to the extent of USD 20 million each year between 2006 and 2012. Moderate taxation and charges imposed by the State, especially when compared with other similar States, ensured that traffic growth was not negatively impacted and the State was able to reap the full benefits of its policy interventions to grow air transport.

The increase in traffic to the Dominican Republic resulted in increases in taxes collected by the State, combining the direct tourist spending from the microeconomic model with the taxes collected from passengers by mode of air transport, showing that the beneficial impacts of policies aimed at air transport will be USD 490 million in 2017.

9.5. CONCLUSION

This report shows strong evidence that the reforms undertaken in the Dominican Republic generated benefits to the economy. Clearly, pro-market reforms had their intended effect.

This report relied on a large database that contains all passengers transported from any American airport to a destination abroad. With all possible choices that consumers of a (large) State can pursue, it becomes clear that nothing besides the legal reform could explain the increase in the flow of passengers choosing the Dominican Republic as their destination. The report shows that after deregulation the competition between the American airliners increased significantly. In a market that was previously dominated by American Airlines, there is now intense competition between four major airliners. The evidence suggests the reform accounts for this situation, and models estimate 23 to 27%, at least, in the total of passengers transported to the Dominican Republic.

The report also illustrates a significant impact on GDP per capita after the reforms. This report applied a synthetic control group approach to identify the total impact of reforms. Using a donor pool of 20 countries and a parsimonious model with the internal structure of GDP, and taking price shocks into account, there was a large impact on GDP per capita. The figures are around a 15% increase of GDP per capita in the years after deregulation.

Using a conservative estimate, the total net benefit to Dominican Republic in the period of 2006-2012 attributable to the policy, is USD 837 million through American tourist spending, and USD 78 million in taxes charged by the State to non-residents, reaching a total of USD 915 million.

31 This is estimated using 2017 ICAO data from Dominican Republic which indicates around 6.8. million passengers. Assuming 90.5% of these passengers are non-residents and a unit tax rate of USD 80, total taxes collected in 2017 is estimated to be 490 million.

10. Policies that could further enhance the economic contribution of civil air transport in the Dominican Republic

The Dominican Republic selected the aviation sector as a state priority. In order to address negative outcomes during the FAA and ICAO audits that led to thirteen years at Category II, the island carried out important reforms to conform with international standards. These reforms, extensively described in this study, led to important benefits for the tourism sector and the State's economy as a whole. It also transformed the Dominican Republic into one of the top countries in the world in terms of USOAPs application, according to ICAO audits.

However, the Dominican Republic is still working on improving its aviation sector. The State, IDB and ICAO defined the next wave of reforms to achieve these objectives, such as:

(1) Assessing continuously the conditions of the airport infrastructure to deal with the growth of future demands;

(2) Studying ways to foster the development of national airlines, through regulation and legal reforms;

(3) Investing in civil aviation careers at the university level;

(4) Developing the aeronautic and aerospace industry;

(5) Developing general and executive aviation;

(6) Keeping the current tax and charge policies to foster the sustainable growth of the aviation sector;

(7) Implementing policies to mitigate the side effects of civil aviation on the environment, such as feasibility studies for clean fuel production, optimal routes to reduce fuel usage and the adaptation of the infrastructure to the use of clean energy; and

(8) Keeping the implementation of the Global State Safety Programme and the upgrade of the aviation system block.

ANNEX 1: Dominican Republic Airlines

Dominican Republic NUMBER OF FLIGHTS Dominican Republic Airlines and Routes 2015-2018 y Jan-June 2019								
Aerolíneas	**Rutas Aéreas**	**Ene**	**Feb**	**Mar**	**Abr**	**May**	**Jun**	**Total**
Aerolíneas Santo Domingo, S.A.	The Valley, Anguila/Las Américas, JFPG	-	-	-	29	95	35	159
	Montego Bay/La Romana	10	30	49	10	-	-	99
	Willemstad (Curazao)/La Romana	18	9	37	8	-	-	72
	Other Routes	-	-	-	-	-	-	-
	Total	**28**	**39**	**86**	**47**	**95**	**35**	**330**
Air Century, S.A.	Puerto Príncipe/El Higüero	1,112	1,059	1,223	1,078	1,238	864	6,574
	Willemstad (Curazao)/El Higüero	760	561	887	1,125	1,037	1,192	5,562
	Isla Verde, San Juan PR/El Higüero	937	783	1,093	1,129	656	835	5,433
	Saint Marteen/El Higüero	905	636	687	922	995	1,057	5,202
	La Habana/El Higüero	563	525	559	589	576	640	3,452
	Aruba (Oranjestad) /El Higüero	648	328	494	512	487	617	3,086
	Isla Verde, San Juan PR/Del Cibao	-	-	-	370	353	382	1,105
	Other Routes	386	192	203	187	24	58	1,050
	Total	**5,311**	**4,084**	**5,146**	**5,912**	**5,366**	**5,645**	**31,464**
Helidosa Aviation Group	Opa-locka-Florida/El Higüero	57	30	29	34	45	25	220
	Puerto Príncipe/El Higüero	30	39	9	18	36	45	177
	Isla Verde, San Juan PR/El Higüero	5	12	4	28	15	20	84
	Orlando-Florida/El Higüero	24	-	17	13	5	3	62
	Fort Lauderdale-Hollywood/El Higüero	5	2	32	1	-	13	53
	Other Routes	145	147	106	233	166	114	911
	Total	**121**	**83**	**91**	**94**	**101**	**106**	**1,507**
Sky High Aviation Services, S.R.L.	Melville Hall /Las Américas, JFPG	588	406	1,106	1,044	-	-	3,144
	Saint Marteen/Las Américas, JFPG	186	154	370	414	464	626	2,214
	Willemstad (Curazao)/Las Américas, JFPG	104	17	428	560	444	397	1,950
	Islas Vírgenes Británicas/Las Américas, JFPG	325	194	283	375	371	368	1,916
	Saint Johns, Antigua y Barbuda /Las Américas, JFPG	377	195	198	282	473	353	1,878
	Aruba (Oranjestad) /Las Américas, JFPG	216	111	228	382	405	335	1,677
	Isla Verde, San Juan PR/Punta Cana	-	-	-	-	293	1,248	1,541
	Aguadilla/Punta Cana	-	-	-	-	197	1,017	1,214
	Other Routes	414	192	427	765	644	968	3,410
	Total	**2,210**	**1,269**	**3,040**	**3,822**	**3,291**	**5,312**	**15,534**
Servicios Aéreos Profesionales (SAP).	Puerto Príncipe/El Higüero	1,138	1,003	1,209	1,334	1,097	-	5,781
	Melville Hall /Las Américas, JFPG	678	609	346	-	-	-	1,633
	The Valley, Anguila/Las Américas, JFPG	272	234	178	58	-	-	742
	Willemstad (Curazao)/Las Américas, JFPG	127	132	195	10	-	-	464
	Aruba (Oranjestad) /Las Américas, JFPG	187	55	115	-	-	-	357
	Saint Marteen/Las Américas, JFPG	143	147	60	-	-	-	350
	Basseterre/Las Américas, JFPG	111	111	36	-	-	-	258
	Saint Johns, Antigua y Barbuda /Las Américas, JFPG	104	79	55	-	-	-	238
	Islas Vírgenes Británicas/Las Américas, JFPG	112	68	57	-	-	-	237
	Other Routes	400	308	194	111	100	-	1,113
	Total	3,272	2,746	2,445	1,513	1,197	-	11,173
Total		**10,942**	**8,221**	**10,808**	**11,388**	**10,050**	**11,098**	**62,507**

Dominican Republic PASSENGERS FLOW Dominican Republic Airlines and Routes 2015-2018 y Jan-June 2019						
Airlines	**Routes**	**2015**	**2016**	**2017**	**2018**	**J-J 2019**
Aerojet Services, S.A.	The Valley, Anguila/Las Américas, JFPG	-	5	-	-	-
	Other Routes	-	-	3	-	-
	Total	**-**	**5**	**3**	**-**	**-**
Aerolíneas Mas S.A.	Puerto Príncipe/El Higüero	7,123	39	-	-	-
	Aruba (Oranjestad) /El Higüero	771	-	-	-	-
	Willemstad (Curazao)/El Higüero	197	-	-	-	-
	Tocumen/El Higüero	16	-	-	-	-
	Del Cibao/El Higüero	2	-	-	-	-
	Total	**8,109**	**39**	**-**	**-**	**-**
Aerolíneas Santo Domingo, S.A.	Isla Verde, San Juan PR/Las Américas, JFPG	504	61	179	10	-
	Barbados/Las Américas, JFPG	228	183	-	-	20
	The Valley, Anguila/Las Américas, JFPG	-	-	-	-	159
	Montego Bay/La Romana	-	-	-	40	99
	Willemstad (Curazao)/La Romana	-	-	-	9	72
	Barbados/La Romana	-	9	-	27	18
	Montego Bay/Las Américas, JFPG	-	-	-	20	30
	Melville Hall /El Higüero	-	-	-	-	28
	Isla Verde, San Juan PR/Puerto Plata	25	-	-	-	-
	Othe Routes	27	4	18	26	20
	Total	**784**	**257**	**197**	**132**	**446**
Air Century, S.A. / A C S A	Puerto Príncipe/El Higüero	21	6,882	11,101	12,029	6,574
	Isla Verde, San Juan PR/El Higüero	5	329	4,489	9,049	5,433
	Willemstad (Curazao)/El Higüero	33	-	-	2,945	5,562
	Saint Marteen/El Higüero	-	46	-	3,201	5,202
	Aruba (Oranjestad) /El Higüero	25	8	9	2,512	3,086
	La Habana/El Higüero	22	-	1	315	3,452
	Bonaire/Punta Cana	82	839	862	903	-
	Montego Bay/Punta Cana	358	280	642	281	76
	La Habana/Punta Cana	1,075	337	-	31	1
	Montego Bay/La Romana	149	97	190	644	347
	Isla Verde, San Juan PR/Del Cibao	-	-	-	-	1,105
	Barbados/Punta Cana	399	137	142	286	-
	Barbados/La Romana	145	253	272	101	-
	Aruba (Oranjestad) /Punta Cana	11	321	50	92	148
	Willemstad (Curazao)/Punta Cana	487	56	29	36	-
	Other Routes	1,189	490	886	1,636	478
	Total	**4,001**	**10,075**	**18,673**	**34,061**	**31,464**
Dominican Wings, S.A. (Dw)	Newark/Punta Cana	-	-	2,965	-	-
	Buffalo-Niagara/Punta Cana	-	-	2,844	-	-
	Piarco/Las Américas, JFPG	-	713	581	-	-
	Piarco/Punta Cana	-	356	179	-	-
	Isla Verde, San Juan PR/Punta Cana	-	329	-	-	-
	Piarco/Puerto Plata	-	326	-	-	-
	Other Routes	-	480	88	-	-
	Total	**-**	**2,204**	**6,657**	**-**	**-**

Airlines	Routes	2015	2016	2017	2018	J-J 2019
Helidosa Aviation Group	Puerto Príncipe/El Higüero	112	216	122	366	177
	Opa-locka-Florida/El Higüero	97	192	193	275	220
	Isla Verde, San Juan PR/El Higüero	47	14	148	208	84
	Saint Marteen/El Higüero	84	77	113	116	41
	Isla Grande, San Juan PR/El Higüero	38	98	244	18	12
	Maiquetía/El Higüero	67	10	101	122	18
	Teterboro/El Higüero	9	30	70	74	27
	Fort Lauderdale-Hollywood/El Higüero	26	32	36	41	53
	Aruba (Oranjestad) /El Higüero	3	-	60	95	25
	Kingston, Norman Manley/El Higüero	6	59	23	61	16
	Isla Verde, San Juan PR/La Romana	-	4	-	117	36
	Other Routes	593	956	1,228	1,963	798
	Total	**1,082**	**1,688**	**2,338**	**3,456**	**1,507**
Pawa Dominicana	Miami-Florida/Las Américas, JFPG	-	13,426	76,211	5,945	-
	Saint Marteen/Las Américas, JFPG	4,717	25,759	48,688	2,609	-
	Aruba (Oranjestad) /Las Américas, JFPG	3,209	15,711	42,925	2,439	-
	Willemstad (Curazao)/Las Américas, JFPG	3,551	24,591	30,831	2,081	-
	Isla Verde, San Juan PR/Las Américas, JFPG	-	12,586	43,049	3,423	-
	La Habana/Las Américas, JFPG	-	16,869	35,291	2,745	-
	Puerto Príncipe/Las Américas, JFPG	-	2,470	6,481	-	-
	Piarco/Puerto Plata	-	2,493	1,327	-	-
	Las Américas, JFPG/Puerto Plata	-	-	1,728	-	-
	Maiquetía/Las Américas, JFPG	-	-	1,061	-	-
	Other Routes	-	1,093	938	88	-
	Total	**11,477**	**114,998**	**288,530**	**19,330**	**-**
Republic Flight Lines, S.R.L.	Isla Grande, San Juan PR/El Higüero	-	-	45	-	-
	Puerto Príncipe/El Higüero	-	4	19	-	-
	Kingston, Norman Manley/Las Américas, JFPG	-	-	19	-	-
	Saint Marteen/El Higüero	-	-	12	-	-
	Matthew Town/El Higüero	-	-	11	-	-
	Other Routes	-	6	20	2	18
	Total	**-**	**10**	**126**	**2**	**18**
Servicios Aéreos Profesionales, S.A.	Puerto Príncipe/El Higüero	445	755	6,315	14,870	6,418
	The Valley, Anguila/Las Américas, JFPG	-	-	1,433	1,638	859
	Melville Hall /Las Américas, JFPG	-	-	-	154	1,642
	Barbados/Punta Cana	303	364	502	432	123
	Islas Vírgenes Británicas/Las Américas, JFPG	-	299	648	49	237
	Montego Bay/Punta Cana	449	149	52	240	114
	Saint Johns, Antigua y Barbuda /Las Américas, JFPG	391	-	-	38	238
	Holguín/Punta Cana	120	160	290	15	74
	Willemstad (Curazao)/Las Américas, JFPG	-	69	-	14	464
	Pointe a Pitre/Punta Cana	16	-	69	282	46
	Aruba (Oranjestad) /Punta Cana	124	102	22	63	64
	Aruba (Oranjestad) /Las Américas, JFPG	-	-	-	9	357
	Saint Marteen/Las Américas, JFPG	-	-	-	15	350
	Saint Johns, Antigua y Barbuda /Punta Cana	-	-	9	123	179
	Other Routes	642	508	535	1,028	877
	Total	**2,490**	**2,406**	**9,875**	**18,970**	**12,042**

Airlines	Routes	2015	2016	2017	2018	J-J 2019
Sky High Aviation Services, S.R.L.	Islas Vírgenes Británicas/Las Américas, JFPG	1,261	2,687	3,996	3,388	1,916
	Willemstad (Curazao)/Las Américas, JFPG	13	-	-	5,539	1,950
	Saint Marteen/Las Américas, JFPG	-	8	230	4,983	2,214
	Saint Johns, Antigua y Barbuda /Las Américas, JFPG	1,357	249	801	2,788	1,878
	Aruba (Oranjestad) /Las Américas, JFPG	12	-	4	5,168	1,677
	Melville Hall /Las Américas, JFPG	12	-	350	2,242	3,144
	The Valley, Anguila/Las Américas, JFPG	-	134	549	2,375	788
	Bonaire/Las Américas, JFPG	-	21	583	2,041	783
	Basseterre/Las Américas, JFPG	118	-	826	1,831	582
	Isla Verde, San Juan PR/Punta Cana	-	-	-	-	1,541
	Aguadilla/Punta Cana	-	-	-	-	1,214
	Aguadilla/Las Américas, JFPG	-	12	-	-	694
	St Eustatius/Las Américas, JFPG	-	-	259	246	21
	Isla Verde, San Juan PR/Las Américas, JFPG	-	-	-	20	405
	Other Routes	98	132	342	132	137
	Total	**2,871**	**3,243**	**7,940**	**30,753**	**18,944**
Tropical Aero Servicios, S.R.L. (Tas)	Puerto Príncipe/El Higüero	29	44	-	-	-
	Cabo Haitiano/El Higüero	-	22	-	-	-
	Cabo Haitiano/Del Cibao	-	11	-	-	-
	Other Routes	1	1	2	-	-
	Total	**30**	**78**	**2**	**-**	**-**
Total		**30,844**	**135,003**	**334,341**	**106,704**	**64,421**

ANNEX 2: Impact Evaluation variables and robustness checks

1.1. The table below describes each variable chosen.

Variable	Description
GDP per capita	GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant local currency. Source: World Development Indicators (WDI), World Bank.
Consumer Price Index (CPI)	Countries with more inflation could have less growth in GDP and less strong institutions.[32] The CPI reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. Data are yearly averages. Source: International Monetary Fund, International Financial Statistics.
Exchange rate	Countries with devaluated currency means more purchase power for tourists. Eventually, this can be a factor of the attraction of inflow of tourist meaning more growth if a State is making more income from tourism. Exchange rate could be correlated with inflation and with economic growth. The evidence is not conclusive but could be one factor in the determination of GDP in the short run. Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar). Source: International Monetary Fund, International Financial Statistics.
Value-added of industry (per capita)	Measures of industry and services are set to capture the domestic structure of the economy. In general, developed countries experienced the growing importance of services when compared to the industry. Industry corresponds to ISIC divisions 10-45 and includes manufacturing (ISIC divisions 15-37). It comprises value added in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water, and gas. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Data are in constant local currency. Source: WDI, World Bank.
Value-added of services (per capita)	Measures of industry and services are set to capture the domestic structure of the economy. Services correspond to ISIC divisions 50-99. They include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges and import duties. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Data are in constant local currency. Source: WDI, World Bank.
Population	Variable for per capita calculations and robustness. It can be applying as a measure of the size of a State. Source: WDI, World Bank.

32 See the evidence in Michael Bruno and William Easterly. "Inflation crises and long-run growth." *Journal of Monetary Economics*, 41, 1998, and Robert J. Barro and Xavier Sala-i-Martin. *Economic Growth*. Cambridge, MIT Press, 2014.

Variable	Description
International tourists arrival	Number of international tourists is set to test if the inbound of tourists can affect the GDP per capita or can be affected by the policy intervention. International inbound tourists (overnight visitors) are the number of tourists who travel to a State other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the State visited. When data on the number of tourists are not available, the number of visitors, which includes tourists, same-day visitors, cruise passengers, and crew members, is shown instead. Sources and collection methods for arrivals differ across countries. In some cases, data are from border statistics (police, immigration, and the like) and supplemented by border surveys. In other cases, data are from tourism accommodation establishments. For some countries, the number of arrivals is limited to arrivals by air and for others to arrivals staying in hotels. Some countries include arrivals of nationals residing abroad while others do not. Caution should thus be used in comparing arrivals across countries. The data on inbound tourists refer to the number of arrivals, not to the number of people traveling. Thus a person who makes several trips to a State during a given period is counted each time as a new arrival. Source: WDI, World Bank from World Tourism Organization, Yearbook of Tourism Statistics, Compendium of Tourism Statistics.
The share of tourism in the total of exports	Variables associated with tourism are used to the determination of GDP since we intend to study the impact associated with the inflow of passengers in a tourist destination. International tourism receipts are expenditures by international inbound visitors, including payments to national carriers for international transport. These receipts include any other prepayment made for goods or services received in the destination State. They also may include receipts from same-day visitors, except when these are important enough to justify separate classification. For some countries, they do not include receipts for passenger transport items. Their share in exports is calculated as a ratio to exports of goods and services, which comprise all transactions between residents of a State and the rest of the world involving a change of ownership from residents to nonresidents of general merchandise, goods sent for processing and repairs, nonmonetary gold, and services. Source: WDI, World Bank.
International tourism, receipts (in current USD)	Variable that would cause an increase in GDP but can be a dependent variable as well. International tourism receipts are expenditures by international inbound visitors, including payments to national carriers for international transport. These receipts include any other prepayment made for goods or services received in the destination State. They also may include receipts from same-day visitors, except when these are important enough to justify separate classification. For some countries, they do not include receipts for passenger transport items. Data are in current U.S. dollars. Source WDI, World Bank.

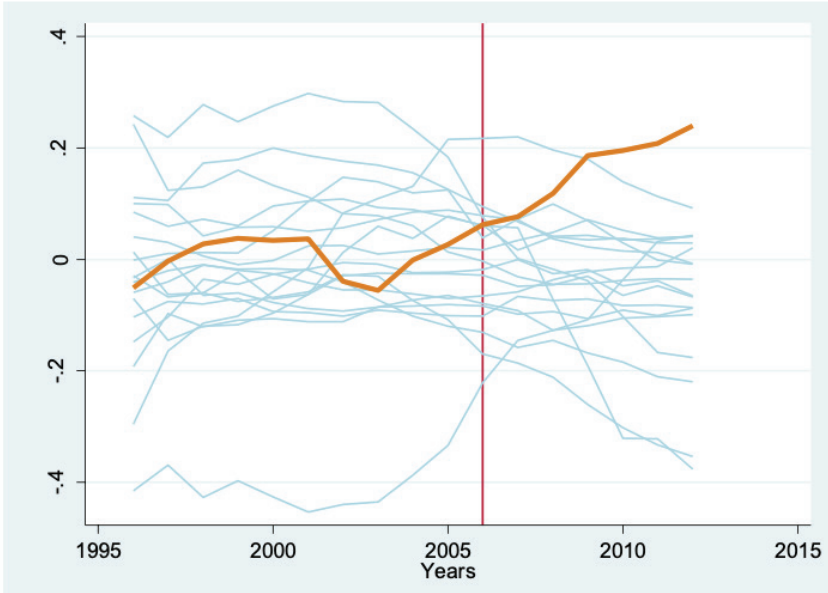
1.2. Robustness checks for the macroeconomic model

The recommended test for robustness is the placebo test applied in the original papers of the synthetic control group. Here we are following Abadie, Diamond, and Hainmueller (op. cit).

The idea of a placebo test is the following: How often would we obtain results of this magnitude if we had chosen another State in the pool of donators instead of the Dominican Republic? To apply this test, we ran the same estimation for all countries in the control group and estimate the GDP gap as shown in Figure 2. That is, the synthetic control method is reapplied for the 20 countries and calculated as 20 GDP gaps. The result of this procedure is described in Figure A. The solid orange line is the GDP gap between the actual and the synthetic Dominican Republic. All the remaining lines are GDP gaps for the countries that are in the pool of donators (all countries in the control group – see Table 3). Please, observe that for almost all countries the GDP gap is falling while in the Dominican Republic the gap is increasing.

Figure A also shows that the synthetic control approach provides a good fit before the intervention. A measure of the prediction error is the square error of prediction. That is, the difference between the actual and synthetic Dominican Republic to the square power. The square of the error in the pre-treatment time period is 0.0012. This is a good fit for the prediction. The median among the donor pool is 0.0062. This number also is small, indicating a good fit prior to the intervention.

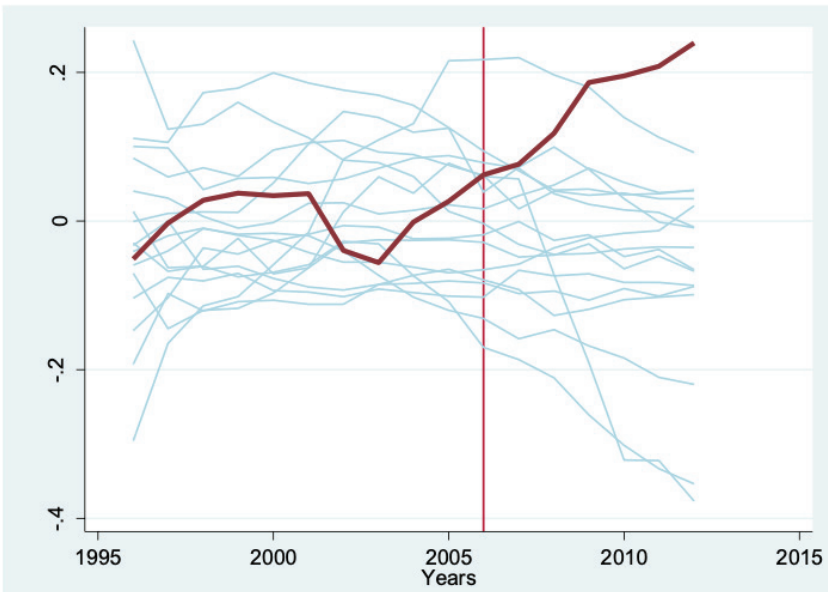
Figure A: Placebo Test for GDP per Capita in the Dominican Republic and in the Control Group



As in Abadie, Diamond, and Hainmueller (2010), Figure A also indicates that the GDP per capita cannot be well reproduced by all states. Previously, we excluded Indonesia from Figure 3 because the fit is very distinct from the other countries. We also excluded countries that were a bad fit in the pre-treatment period. The criteria applied is to remove countries with RMSE 5 times higher than the Dominican Republic synthetic model. This standard results in the removal of Fiji, Indonesia, and Panama.

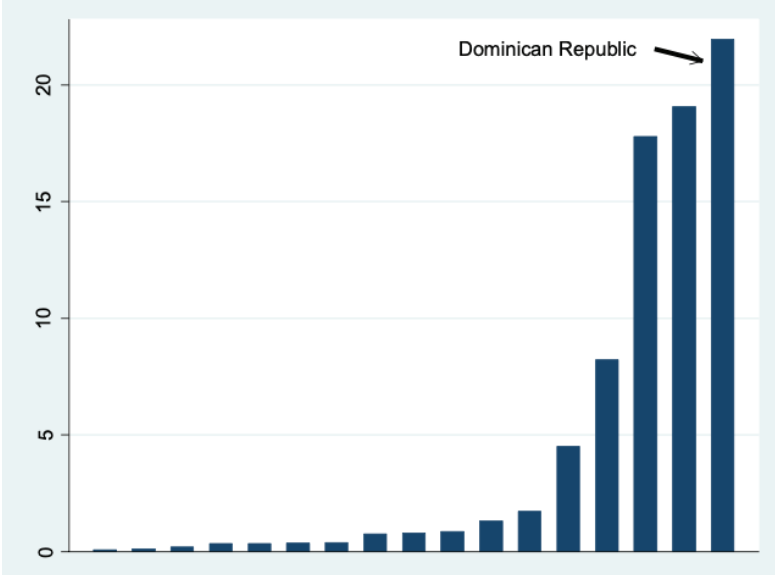
In Figure B, we removed three countries and got a better fit for the donor pool in the period of pre-intervention. Now, is easy to observe that the trajectory of GDP per capita for the Dominican Republic is quite distinctive from the other countries. Only one State had a GDP as high as the Dominican Republic, but the trajectory after 2006 is negative towards zero.

Figure B: Placebo Tests excluding Fiji, Indonesia, and Panama



One final test for Dominican GDP gap relative to the gaps obtained from placebo runs is to look at the distribution of the ratios of post/pre-intervention MSPE (see Abadie, Diamond, and Hainmuller, 2010, p. 503). The main advantage of such a test is avoiding the choice of a cutoff MSPE. In Figure C, we show the MSPE ratio for the countries in the control group. The ratio for the Dominican Republic is the highest between the countries assigned as a potential control group. It's important to note that this ratio is the highest.

Figure C: Ratio of the post and pre-intervention MSPE



Our final robustness check is a test to control for the possibility that a policy adopted by airliners in the United States distorted the distribution of passengers to international destinations. The question to be tested could be: was there also a policy in the US that enabled more passengers to R.D. or other destinations?

To address this question, we added the yearly flow of passengers to a foreign destination in our donor's pool.[33] The base model is revaluated and the changes are very small. First, there is no change in the control group. The countries are the same and the weights suffer a small change of 0.001. Second, despite the good explanatory power of "PAX USA" there are only marginal changes in the level of the base case variables (see Table B).

Table B – Predictors with Passenger from the USA for the Dominican Republic

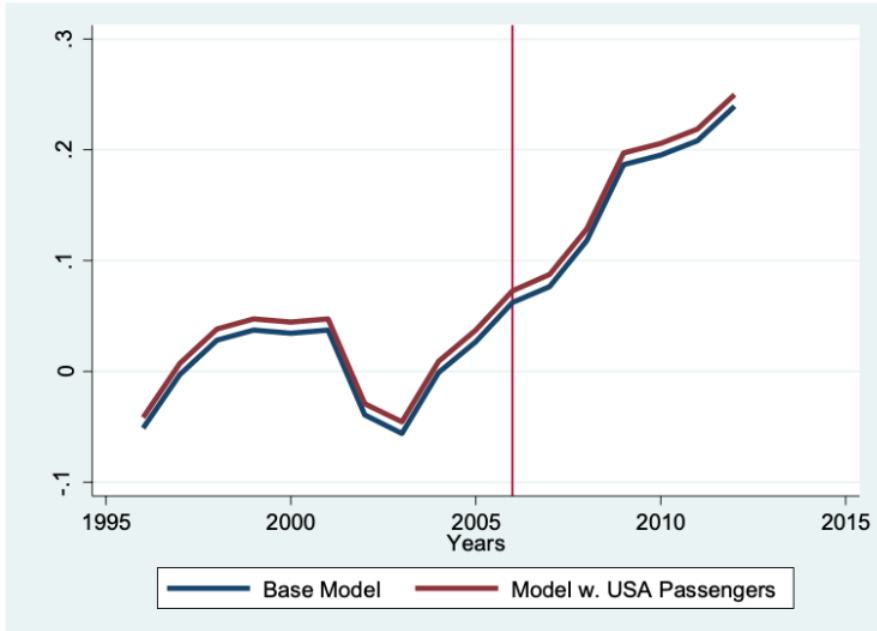
Variables	Treated	Synthetic
Services	11.1388	11.1353
Industry	10.5049	10.3964
Exchange rate	2.99198	2.98896
Inflation	10.3298	8.30530
PAX USA	17.8730	17.2561

Note: these values are averages between 1996 and 2004.

33 The data of (natural log) passengers from USA to foreign destinations is from DoT, and is the same used in the next section. Destination here is a State. When the flow of passengers is zero to a destination, say Indonesia, we replace missing by a small number to not change the estimation methodology. If the base model is a valid model this change should produce only insignificant changes.

The result of this alternative scenario is summed up in Figure Y. We plotted the gap between the actual GDP per capita and the synthetic group for the base model and the new model augmented with passengers from the USA. The result is that the model designed to capture some US policy change did not show any significant change in the trajectory. In fact, the new model is a little higher in level, but we choose to maintain the base case model.

Figure D: Gap between Synthetic and Actual GDP per Capita: Base Model and Model with Passenger from the USA



1.3. Variables for the microeconomic model

Variable	Description
Number of passengers	The total of passengers transported between two airports. One airport is within the United States and others abroad. The pair of cities is US-airport/Foreign-airport. The average treatment effect is over the flow of passengers at international airports in the Dominican Republic.
Distance	Distance is calculated between 2 airports using the pair of coordinates and using an approximate spherical constant to approximate the earth's curvature. Distance affects the willingness to travel and the cost of transportation. Distance is included as square to capture a curvature in the distance relationship with the number of passengers. In general, the microeconomic models of I.O. and transportation economics includes the distance and the populations of origin and destinations cities (see Berry, 1992). For tourism destination population is not the more important feature for demand, the number of hotels, quality of beaches or mountains, etc. are more important than the population. In the estimated models we maintain distance but excluded population.
Price of kerosene	Since the airfare is not available in the U.S. database we are including the price of kerosene to account to some variation in the price of one important input to air travel. This is a monthly variable.
Exchange rate	The relative price of local currency in US dollars. This is an important variable since could capture (i) the willingness to travel (purchasing power for the tourist), (ii) the cost of operation at the destination (foreign airport), and (iii) political/economic instability at the destination (see the synthetic control section), for example, a large devaluation could be an indication of some political turmoil. This is a monthly variable within each State.
Cycle USA	We added an index that captures the economic activity of the USA. Since we are fixing the origin (USA), the variation of economic conditions could affect the willingness to travel in the USA. This is a monthly variable.

1.4. Robustness checks for the control group (the Microeconomic model)

The models estimated above are already robust to various econometric problems. One of the problems not accounted for is a sensibility in the control group. We estimate the same model with some variations in the control group.

First, we removed African countries, followed by Europe, and then Mexico. Without African countries, the average treatment effect rises to 0.37 in all models (and the FE model is now significative). When we excluded Europe and Mexico, the Hausman-Taylor coefficient does not change significantly, but OLS estimations fell 0.32-0.33 figures.

Table C: Average Treatment Effect from the 2006 Intervention (Net effect), dropping Africa

Variable	did1	did2	FE1	HTAYLOR
Net effect	0.3721	0.3699	0.3843	0.3747
	0.0614	0.0618	0.139	0.0807
Policy time	0.0664	-0.054	-0.4556	0.0785
	0.5045	0.0711	0.2295	0.022
Dominican	2.0372	2.0406		
Republic	0.0442	0.0458		
Kerosene	-0.3163	0.0615		-0.0385
	0.3001	0.0676		0.0192
Distance	-0.2392	-0.2906		47.3198
	0.4562	0.4546		66.0135
Distance 2	-0.0449	-0.0419		-2.9803
	0.028	0.0279		3.9912
Exchange Rate	0.2128	0.2133	0.0429	0.0592
	0.011	0.011	0.1953	0.0239
Cycle USA		-0.3437		0.0767
		0.378		0.1117
Time Dummy	yes		yes	

Table D: Average Treatment Effect from the 2006 Intervention (Net effect), dropping Africa and Europe

Variable	did1	did2	FE1	HTAYLOR
Net effect	0.3328	0.3273	0.4034	0.3875
	0.061	0.0617	0.128	0.0725
Policy time	0.2847	0.1449	-0.3253	0.2009
	0.3829	0.0731	0.2715	0.0252
Dominican	1.222	1.2233		
Republic	0.0447	0.0459		
Kerosene	-0.5108	-0.0933		-0.1291
	0.3391	0.0652		0.0221
Distance	16.6767	16.8171		67.0873
	0.6055	0.6116		16.8733
Distance 2	-1.1192	-1.1292		-4.3478
	0.0409	0.0413		1.0726
Exchange Rate	0.0824	0.0822	-0.2248	-0.197
	0.0098	0.01	0.1948	0.0265
Cycle USA		0.2175		0.8351
		0.3647		0.1296
Time Dummy	yes		yes	

Table E: Average Treatment Effect from the 2006 Intervention (Net effect), dropping Africa, Europe, and Mexico

Variable	did1	did2	FE1	HTAYLOR
Net effect	0.3283	0.3223	0.3857	0.3693
	0.0597	0.06	0.1337	0.0737
Policy time	0.9854	0.1546	-0.5217	0.2162
	0.518	0.0675	0.3103	0.0261
Dominican	1.4701	1.4715		
Republic	0.0425	0.0436		
Kerosene	-0.5107	-0.0907		-0.1274
	0.3218	0.0608		0.0228
Distance	14.3982	14.5462		65.6732
	0.5906	0.5983		15.6518
Distance 2	-0.966	-0.9765		-4.2533
	0.04	0.0404		0.9956
Exchange Rate	0.067	0.0668	-0.219	-0.1907
	0.0099	0.01	0.1996	0.0269
Cycle USA		0.2327		0.8175
		0.3407		0.1338
Time Dummy	yes		yes	
F	25.7849	821.7142	.	43.2724
N	6072	6072	6072	6072

The last scenario with changes in the control group excluded countries with HHI higher than 1200. Markets with HHI are considered very concentrated. This is an interpretation that poses that a treatment model should compare the "sick market" with "healthy markets." So, with this cutoff rule, we focused only on markets with some degree of competition.

The results are in line with our baseline estimation, that was 0.23. In the table below, we arrived at estimates of 0.2192 for Hausman-Taylor model and 0.39 for the OLS model.

Table F: Average Treatment Effect from the 2006 Intervention (Net effect), dropping Countries with HHI → 1200.

Variable	OLS1	OLS2	FE	HTAYLOR
Net effect	0.3956	0.3902	0.2209	0.2192
	0.0625	0.0625	0.1527	0.0843
Policy time	0.0374	0.0344	-0.3232	0.152
	0.4949	0.0722	0.2185	0.0228
Dominican	2.1962	2.2028		
Republic	0.0477	0.048		
Kerosene	-0.2272	0.0633		-0.0122
	0.315	0.0654		0.0197
Distance	-0.0613	-0.0981		53.4249
	0.5941	0.5924		71.5894
Distance 2	-0.0753	-0.0731		-3.353
	0.0359	0.0358		4.2933
Exchange Rate	0.1341	0.1342	0.1567	0.1586
	0.0109	0.0109	0.2052	0.0223
Cycle USA		-0.6652		0.0009
		0.3661		0.1141
Time Dummy	yes		yes	
F	52.5915	1686.395	.	35.3778
N	11194	11194	11194	11194

List of References

Aside of the material provided by the Dominican Republic government (IDAC and JAC), the document used the following sources:

Abadie, Alberto. The Economic Costs of Conflict: A Case Study of the Basque State," *American Economic Review*, 2003

Abadie, Alberto; Diamond, Alexis; Hainmueller, Jens. Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association*, 105 (490), 2010

Alvarado, Jennifer; Oddone, Nahuel; Gil, Lisette. Fortalecimiento de la cadena de valor de turismo en Pedernales, República Dominicana. CEPAL, 2017.

Athey, Susan; Imbems, Guido W. The State of Applied Econometrics: Causality and Policy Evaluation." *Journal of Economic Literature*, 31 (2), 2017, p. 9.

Blanke, Jennifer; Chiesa, Tea. Travel and Tourism Competitiveness Report, 2011. World Economic Forum, Geneva, Switzerland, 2011.

ICAO Civil Aviation Data Solutions (https://data.icao.int/icads/)

ICAO Data+ (https://data.icao.int/newdataplus/)

ICAO Aero Tariffs (https://data.icao.int/AeroTariffs/)

ICAO Long-Term Traffic Forecasts (https://data.icao.int/trafficforecast)

ICAO Aviation Satellite Account (https://www.icao.int/sustainability/Satellite/Pages/default.aspx)

ICAO Annual Report of the Council (years 2006 to 2018)

ICAO's Policies on Charges for Airports and Air Navigation Services (Doc 9082)

Airport Economics Manual (Doc 9562)

Manual on Air Navigation Services Economics (Doc 9161)

Instituto Dominicano de Aviación Civil. Dominican Republic State Air Navigation Plan. Draft Version, August 7, 2018.

JAC. Air Transport Statistics Report: Dominican Republic 2018, Dominican Republic, 2019.

OACI. Informe Final de Auditoría de la Vigilancia de la Seguridad Operacional del Sistema de Aviación Civil de República Dominicana. Programa Universal OACI de auditoría de la vigilancia de la seguridad operacional, 2009.

Acknowledgements

This report was coordinated and prepared with contributors from ICAO, the Inter-American Development Bank (IDB) and Dominican Republic. We wish to express our sincere gratitude for their support throughout the process and for their commitment to a successful publication.

Dominican Republic

Santiago Rosa Martinez, Director Adjunto Instituto Dominicano de la Aviación Civil (IDAC)
Betty Castaing , Directora Planificación y Desarrollo del IDAC
Aracenis Castillo de la Cruz, Cuerpo Especializado en Seguridad Aeroportuaria y de la Aviación Civil (CESAC)

International Civil Aviation Organization

North American, Central American and Caribbean Office, Mexico

Melvin Cintron, Regional Director
Julio Siu, Deputy Regional Director

Headquarters, Montréal

Boubacar Djibo, Director Air Transport Bureau
Toru Hasegawa, Deputy Director, Economic Development
Sainarayan A, Chief Aviation Data and Analysis
Antonin Combes, Aviation Data Analysis Officer
Mara Keller, Associate Aviation Officer – Economic Development
Behzad Taghipour, Consultant
Emma Neale, Intern

Inter-American Development Bank

Eduardo Café, Lead Consultant
Reinaldo Fioravanti, Lead Transport Specialist
Manuel Rodriguez Porcel, Transport Specialist
Victor Gomes, Economic Consultant