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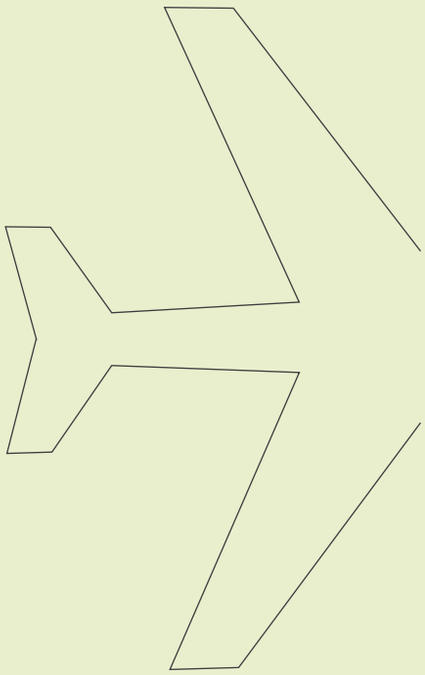

THE REGIONAL CONNECTIVITY SCHEME

UDAN: Progress and Prospects

PHASE-1 REPORT

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EXECUTIVE SUMMARY

- The present study analyzes the **effect of the Indian regional connectivity scheme (RCS)** on commercial air travel in the country.
- The RCS scheme is described in detail, including the **mechanisms in place to incentivize airline operators** to participate in the scheme.
- An **analysis of multiple air travel indicators for RCS flights** between September 2017 and September 2019 at the national, regional as well as at the airport levels is conducted. These indicators include **passenger and flight traffic, passenger load factor, fraction of non-RCS seats in RCS flights as well as the fare ratio of RCS and non-RCS seats**. The identified metrics enable us to measure the outcomes that the RCS wants to achieve through the policy document.
- **Passenger and flight traffic**: At the national level, a **steady month-on-month increase** in both the number of passengers and the number of flights is observed. RCS **passenger traffic increased** by a factor of 14.5 and RCS flight traffic increased by a factor of 13.4 between September 2017 and September 2019.
- **Passenger load factors**: Analysis of data revealed that passenger load factors on RCS flights were high and **more than half the RCS flights at the national level flew at more than 70% capacity.**
- **Fraction of non-RCS seats on RCS flights**: We observed that, on average, **around 30% of seats in an RCS flight were not subsidized** by the RCS. This increased to upwards of 70% on certain high performing routes.
- **Fare ratio of RCS and non-RCS seats**: From the analysis, we concluded that non-RCS seats were on average **three times as expensive** as RCS seats, indicating that passengers were willing to pay a higher amount on certain RCS routes.
- **Regional analysis** in RCS success revealed **imbalance between eastern, northeastern and central regions** of India when compared with other regions. However, a **promising growth trajectory** is observed for the multiple indicators studied.
- At the **airport level**, airports serving **tourist and pilgrimage destinations observed a higher increase in passenger traffic** than other airports.
- We do not offer a specific recommendation on the social or economic effects of the RCS. However, on collecting additional data, **a more detailed study on the socio-economic impact of the scheme could be conducted**.

1. The Indian School of Business (ISB), in collaboration with the Ministry of Civil Aviation (MoCA), the Airports Authority of India (AAI), and with inputs from their Implementation Consultant Deloitte Touche Tohmatsu India (Deloitte)[1], conducted a study of the Regional Connectivity Scheme (RCS) in India (also known as the '*Ude Desh ka Aam Naagrik*' - UDAN scheme). **This study aims to reflect on the background and structure of the RCS, analyze the effect of the scheme on commercial air travel infrastructure in the country, and see, from a data-driven perspective, whether the scheme is hitherto fulfilling its stated objectives.**

[1] The authors would like to acknowledge and thank the Ministry of Civil Aviation and their partners, the Airports Authority of India and Deloitte, for providing all the data upon which the present analysis is conducted and for their inputs in developing this report.

2. We **summarize the background of the RCS** as being a successor to prior efforts to enhance air connectivity in India and **elaborate on the three objectives of the RCS** stated in the 2016 RCS proposal, i.e., (1) Enhance connectivity to underserved and unserved airports, (2) Make air travel more affordable, and (3) Make operations and connectivity sustainable. Sustainability of operations after possible initial government intervention and support was the key guiding principle of the RCS. MoCA and various state governments were initially entrusted to help with objectives 1 and 2 and ensure funding to bridge the gap and make operations self-sustainable.

3. **The structure of the RCS scheme is described in detail, including the mechanisms in place to incentivize airline operators to participate in the scheme.** The auction method to select operators for RCS routes is described, and the concept of Viability Gap Funding (VGF) available to operators to fund part of the operations is summarized. In particular, the concept of RCS seats (subsidized through VGF) and non-RCS seats (at market prices) for a specific cabin are introduced and analyzed. As per the guidelines, an operator shall sell RCS seats (subsidized by VGF support) before selling any other passenger seats on an RCS flight (including Non-RCS seats at market prices).

4. We conduct an **in-depth analysis of four air travel indicators for RCS flights** between 2017 and 2019 at the national, regional, and airport levels. These indicators include passenger and flight traffic, passenger load factor, the fraction of non-RCS seats in RCS flights, and the fare ratio of RCS and non-RCS seats.

5. At the national level, a steady month-on-month increase in the number of passengers and the number of flights is observed. This suggests that **the number of passengers on RCS routes has increased**. A route level analysis of passenger load factors revealed that more than half of the RCS routes across the country have a greater than 70% passenger load factor.

6. In addition, the success of the scheme to generate sustainable air traffic is studied by comparing two metrics, viz. (1) the fraction of non-RCS seats in RCS flights and (2) the fare ratio of RCS and market-rate seats. Both these metrics indicate a **robust demand and willingness of customers to pay market rates for seats on RCS routes at the aggregate, national level.**

7. **Regional differences in RCS success reveals an imbalance between regions**. However, a promising growth trajectory is observed for the multiple indicators that were studied. In particular, we found statistically significant growth for the eastern, northeastern and central regions of India – regions that historically have had lower air connectivity as compared with the rest of the country.

8. We furthermore analyzed the effect of RCS on passenger traffic to a subset of underserved and unserved airports. While traffic increased to all airports after the introduction of the RCS, **regional differences were observed, with airports serving tourist and pilgrimage destinations marking a higher increase**.

INTRODUCTION

Along with the liberalization of the Indian economy in the early 1990s, civil aviation policies began to be relaxed. By 1994, Indian skies were opened to private players. Extensive air connectivity studies were conducted every seven-eight years. By 2011, a recommendation was made by the Ministry of Civil Aviation (MoCA) to improve connectivity to certain areas. These areas comprised of remote, un-served and under-served areas. This was to be done by developing regional airports, subsidizing routes for airlines and focusing on using smaller aircraft. The report's recommendations were formalized and enacted as part of the National Civil Aviation Policy 2016. Consequently, the '*Ude Desk ka Aam Naagrik*' - UDAN scheme was conceptualized as a regional airport development and Regional Connectivity Scheme (RCS).[2] The stated vision of UDAN was "letting the common citizen of the country fly" and to make air travel more affordable and widespread. At the same time, the main objectives of the RCS were threefold:

1. Enhance connectivity to underserved and unserved airports – Before the launch of RCS, hundreds of airports in the country were either used sparingly or were not used for commercial services at all. Many of these were in remote areas where accessibility by means other than air transport was difficult. Yet others would require facilities to be built from the ground up. As a result, ripples of economic benefits in the surrounding areas were envisioned, with commercial activity spurred.

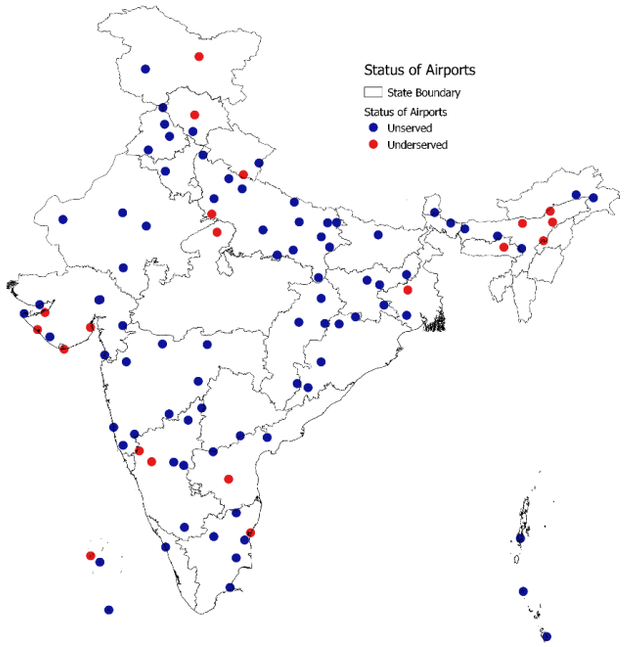

Exhibit 1: Unserved and Underserved Airports in India

2. Make air travel more affordable – For infrequent or first-time air passengers, especially those availing services under the RCS, affordability and capped airfares would remain a critical deciding factor. To protect flyers from high costs, the RCS envisioned "supporting airline

[2] (2016, June 15). National Civil Aviation Policy 2016. *Ministry of Civil Aviation, Government of India*. Retrieved from https://www.civilaviation.gov.in/sites/default/files/Final_NCAP_2016_15-06-2016-2_1.pdf.

operators through (1) concessions by Central Government, State Governments and airport operators to reduce the cost of airline operations on regional routes and other support measures, and (2) financial (viability gap funding or VGF) support to meet the gap, if any, between the cost of airline operations and expected revenues on such routes."[3]

3. Make operations and connectivity sustainable – Sustainability of operations after using the initial government intervention and support was the key guiding principle of the RCS. MoCA and the various state governments were initially entrusted to help objectives 1 and 2 and ensure the availability of VGF. However, the RCS would only be successful when market forces, demand, and competition could ensure self-sustaining, profitable operations.

It was envisioned that regional air connectivity would also develop underutilized aviation infrastructure, push job growth and boost inclusive national economic development across regions and states of India. Initial support from the government was expected to build infrastructure and establish passenger traffic. Market and competitive forces were then expected to take over and ensure the long-term sustainability of operations rather than depending on subsidies.

SCOPE OF THE RCS

The RCS was initially proposed to be a ten-year scheme with the scope of (1) utilizing existing airport capacity and developing new airports and (2) adding new routes between underserved and unserved airports in conjunction with airlines.

- Developing airport capacity – Before implementing the RCS, more than a hundred regional airports in India were unutilized or commercial services were not operational there. In many cases, these were owned by private or military owners. The RCS proposed modernizing these terminals as well as building new airports where no facilities existed. Partnerships were instituted between the central government, state governments and the airport owners to build new airports and upgrade existing facilities.

- New routes – Along with the development of new airport infrastructure, increasing connectivity to these airports was also a parallel objective. The routes were envisioned to be financially viable both for airline operators as well as for passengers. A bidding process was used to award routes between airport pairs. In addition, a viability gap funding (VGF) provision was implemented to ensure that routes remained financially viable while capping passenger airfares. The VGF was funded by a cess applied to trunk and popular flight routes. Several rounds of bidding for various routes were conducted between 2017 and 2019, and hundreds of routes were awarded by 2019.

SALIENT FEATURES OF THE RCS

- Auction mechanism and operator selection - For each route that came under the purview of the RCS, a bidding process was used to award the route to an airline operator. Over the years (starting 2016-17), three separate bidding rounds were conducted for multiple routes and were

[3] (2019, November) Regional Connectivity Scheme (RCS or the Scheme). *Ministry of Civil Aviation, Government of India*. Version 4.0. Retrieved from https://www.aai.aero/sites/default/files/rcs_udan/RCS-UDAN-4.0.pdf.

awarded accordingly. There were several processes and restrictions in place to ensure that the bidding process remained viable for both the government and the airlines:

a. The minimum and the maximum number of seats were specified for each route.
b. Initial routes were awarded only to one airline operator. This ensured that competitive forces did not risk viability for an operator.
c. Although a VGF provision was put in place and was available to incentivize operators, preference was given to zero-VGF bids that did not require any government subsidy.

- Financial viability and funding allocated to RCS - To ensure that the RCS becomes financially viable in the long term, concessions and financial support were proposed to the scheme participants. These ranged for a period of three to ten years by the central government, respective state governments, as well as by airport operators. Concessions offered by the central government were in the form of reduced service tax and excise liabilities and providing selected airline operators the ability to enter into domestic and international codeshare agreements. At the same time, state governments offered concessions in the form of improved airport infrastructure and personnel (e.g., security, airport connectivity, etc.) and reduced taxes on fuel. Airport operators would further subsidize the RCS by eliminating or reducing certain taxes and fees, such as aircraft landing and parking charges.

- Airfare caps and viability gap funding - To maintain affordability and because air travel would be a new concept for most travelers availing the RCS, caps on airfare were instituted for the scheme's participating airlines. The initial 2016 proposal was to cap airfares at INR 2,500 per hour of flight for aircraft seats allocated under the RCS scheme. On any given flight operated by an RCS awardee, 50% of the seats would have capped airfares, and the remainder would be priced at market rates.

  A per-route VGF bridge spanning three years would serve as an incentive for airlines to continue to operate on the route. The RCS would also review the pricing scheme and the VGF periodically to ensure that inflation, fuel prices, and other market factors were being taken into account. The VGF was proposed to be covered by various components. The primary source would be a per-ticket cess levied on the non-RCS trunk and popular routes to subsidize the capped airfares for the RCS. States would fund the remainder of the VGF for a route.

  At the same time, a VGF cap, in terms of time and quantum of support, was instituted above which an airline would not receive subsidies from the RCS. It was intended that market competition, increased passenger demand, and reduced costs would eventually yield a lucrative route without RCS subsidy and support. Indexation and revision of VGF support were carried out periodically to adjust for airline operators' typical cost of operations.

IMPLEMENTATION OF THE SCHEME

Implementation of the regional connectivity scheme has been divided into rounds. Each round focuses on developing infrastructure and connectivity in specific parts of the country. In UDAN 1, 128 routes connecting 70 airports, including 31 unserved, 12 underserved airports, and 27 well-served metro

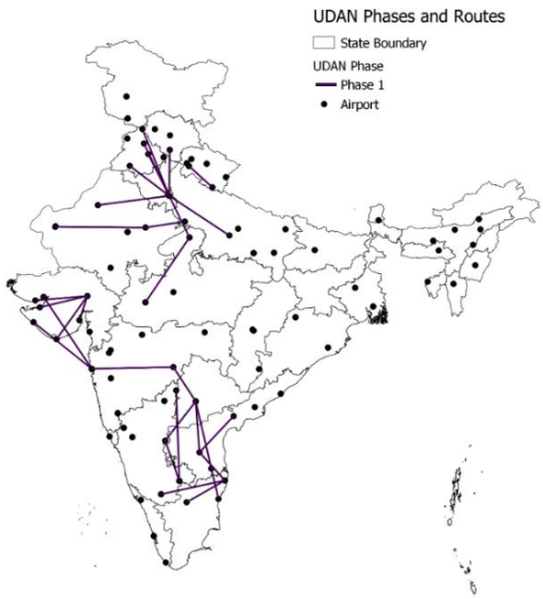

Exhibit 2: RCS Routes under UDAN 1

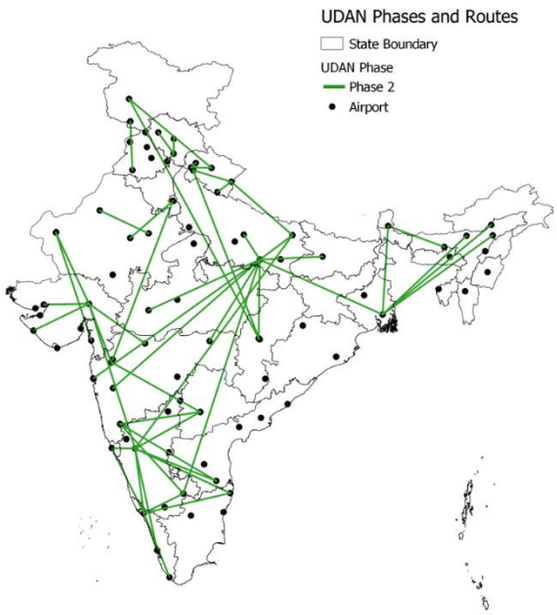

Exhibit 3: RCS Routes under UDAN 2

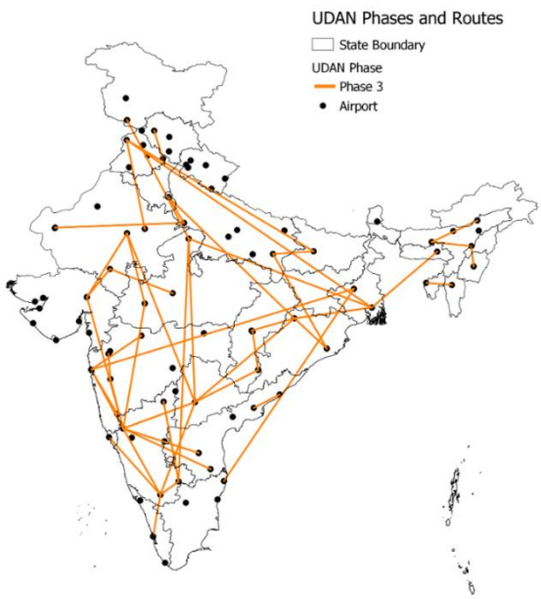

Exhibit 4: RCS Routes under UDAN 3

airports were awarded to five airline operators in early 2017.[4,5] On April 27, 2017, the Hon'ble Prime Minister flagged off the first UDAN flight under the scheme.[6]

[4] ENS Economic Bureau. (2017, March 31). UDAN takes off: Five airlines to fly 128 routes, connect 70 airports. *The Indian Express.* Retrieved from https://indianexpress.com/article/business/aviation/udan-takes-off-five-airlines-to-fly-128-routes-connect-70-airports-4593166/.

[5] Some other sources have reported slightly varying numbers for UDAN 1 as following: 132 routes connecting 71 airports, including 32 unserved, 12 underserved and 27 served airports were awarded to 5 airlines in early 2017.

UDAN 2 saw attention given to developing helicopter routes and non-terrestrial aerodromes. Emphasis was also placed on enhanced flight services to hills and remote areas. On January 24, 2018, the aviation ministry awarded 325 routes to 15 airlines and helicopter operators.[7] Out of these, 129 routes were in a newly created category of 'priority areas' including Jammu and Kashmir, Himachal, Uttarakhand, North East, Andaman and Nicobar Islands and Lakshadweep Islands.[8,9]

UDAN 3 saw the inclusion of tourism routes as proposed by the Ministry of Tourism and the addition of seaplanes for connecting water aerodromes. 235 routes were awarded by MoCA on January 25, 2019. Out of these, 189 were RCS routes, while 46 were tourism routes. A total of 89 airports covering 6 unserved airports, 17 underserved airports, 6 water aerodromes, and 50 served airports were to be connected.[10,11] In February 2019, MoCA announced an additional bidding round, UDAN 3.1, to include priority, canceled, or crucial routes that have not been covered under the scheme.[12] A total of 335 RCS routes were awarded under UDAN 3 (including 3.1), covering 33 airports (20 unserved, 3 underserved, and 10 water aerodromes).[13,14]

PRIOR STUDIES AND ANALYSES

Some papers have critically looked at the RCS and analyzed the initial indicators from high- and low-demand routes. Others have contrasted the Indian RCS with similar regional connectivity schemes around the world.[15] In the ensuing years since the roll-out of the RCS, several news articles and some structured analyses were conducted to assess the impact on metrics such as domestic traffic increase, passenger load factor change and airport performance. A key differentiating feature of the Indian RCS scheme is that while some seats on an RCS route are subsidized by the government (through the VGF and RCF), others are sold at market rates. A high number of market-rate seats on an RCS route would

[6] Press release. (2017, April 27). Hon'ble Prime Minister Flags off the first UDAN Flight under Regional Connectivity Scheme (RCS) on Shimla – Delhi sector. *Airports Authority of India*. Retrieved from https://www.aai.aero/sites/default/files/press_release_news/PressRelease-FlaggingoffthefirstUDANFlightunderRCS.pdf.
[7] (2018, January 25). AAI awards 325 routes to 15 operators; 56 new airports, helipads to be connected under UDAN 2. *Business Today.* Retrieved from https://www.businesstoday.in/industry/aviation/story/india-prime-minister-narendra-modi-to-get-25-new-airports-31-helipads-under-udan-2-airlines-98616-2018-01-25.
[8] Sinha, S. (2018, January 25). UDAN-2: 325 more routes; Indigo, Jet Airways join with chopper operators. *The Times of India*. Retrieved from https://timesofindia.indiatimes.com/business/india-business/udan-2-325-more-routes-awarded-indigo-jet-airways-join-with-chopper-operators/articleshow/62638862.cms.
[9] Some other sources have reported slightly varying numbers for UDAN 2 as following: in early 2018, 305 routes were awarded to 15 airlines connecting 66 airports. Out of these 305 routes, 106 routes were classified as priority RCS routes.
[10] IANS. (2019, January 25). Udan-III: 235 routes to connect airports, water aerodromes. *Business Standard*. Retrieved from https://www.business-standard.com/article/news-ians/udan-iii-235-routes-to-connect-airports-water-aerodromes-119012501329_1.html.
[11] PIB Delhi. (2019, January 25). Shri Suresh Prabhu announces UDAN 3.0 results. *Ministry of Civil Aviation*. Retrieved from https://pib.gov.in/PressReleasePage.aspx?PRID=1561472.
[12] (February 2019). Regional Connectivity Scheme (RCS) – UDAN 3.1 Notification. *Airlines Authority of India*. Retrieved from https://www.aai.aero/sites/default/files/rcs_udan/UDAN%203.1_Notification_final.pdf.
[13] PIB Delhi. (2019, December 3). Ministry of Civil Aviation Launches Round 4 of RCS-UDAN. *Ministry of Civil Aviation.* Retrieved from https://pib.gov.in/PressReleasePage.aspx?PRID=1594751.
[14] Some other sources have reported slightly varying numbers for UDAN 3 as following: the award of all proposals has been undertaken in FY 2019 and FY 2020 with 335 routes being awarded to 15 airlines connecting 76 airports. Out of these, 231 were RCS routes, 50 were Priority RCS routes and 46 were tourism routes.
[15] Fageda, X., Suárez, A., Serebrisky, T., & Fioravanti, R. (2017, October). Air connectivity in remote regions: A comprehensive review of existing transport policies worldwide. *Journal of Air Transport Management.* Elsevier, Vol. 66 (2018): 65-75. ISSN 0969-6997. Retrieved from https://doi.org/10.1016/j.jairtraman.2017.10.008.

suggest that the route is likely to remain sustainable even after the three-year government subsidy period runs out.

The RCS in India was preceded by a route-based remote connectivity policy based on traffic distribution rules - Route Dispersal Guidelines (RDGs). These guidelines were set up after aviation was opened to private players in 1994. It attempted to support air services in remote regions, which required airlines to distribute traffic across three categories of airports, including trunk routes and remote, potentially unprofitable routes. Routes were classified into three categories, viz. Category I, II and III. Category I included routes between large city pairs. Categories II and IIA included airports in the northeastern region, Jammu and Kashmir, Andaman and Nicobar Islands, and Lakshadweep Islands. Category III included the remaining airports and routes. The RDGs were set up to incentivize the airlines and service Categories II and IIA and Category III routes. Anyone who operated scheduled air transport services on one or more of the routes under Category l was required to provide such services in Categories ll, llA and lll as indicated below:[16]

- The operator will deploy at least 10% in Category-ll of the capacity deployed on the Category-l routes.
- The operator will deploy at least 10% in category-llA of the capacity deployed on Category-ll routes.
- The operator will deploy at least 35% in category-lll routes of the capacity deployed on Category-l routes.

Several incentives, concessions and benefits were offered to airlines operating under the RDGs. In a precursor to the seat-level subsidy covered by the RCS' VGF model, the government underwrote certain seats in the RDG scheme operating on non-category I routes. In effect, the government covered the costs of a certain number of seats on the aircraft if those did not sell at market rates.

Since the RCS launch, several studies have assessed its effectiveness and impact[17,18] and the general findings have been that:

- RCS has increased the number of routes and airports with commercial services.
- The aviation market in the country has expanded.
- Passenger load factors have increased by approximately 8% on average.
- A moderate improvement in the average airport performance of RCS-linked airports was seen.

However, it was concluded that until 2020, **the RCS had brought about unbalanced prosperity to air travel**. While the southern, western and northern regions of India have done exceptionally well in terms of airport additions, the east and northeast have lagged behind.

[16] (2016, August 12). Provision of Services of Different Categories of Routes Under Route Dispersal Guidelines (RDGs). *Ministry of Civil Aviation*. Order F. No.AV.1 801 I 1112016-DT. Retrieved from https://www.civilaviation.gov.in/en/infocus/provision-services-different-categories-routes-under-route-dispersal-guidelines-rdgs.

[17] Das, A., Bardhan, A., & Fageda, X. (2020, August). New regional aviation policy in India: Early indicators and lessons learnt. *Journal of Air Transport Management*. Elsevier Vol. 88(C) 2020. 101870, ISSN 0969-6997. Retrieved from https://doi.org/10.1016/j.jairtraman.2020.101870.

[18] Iyer, C. K., & Thomas, N. (2020, September). A Critical Review on Regional Connectivity Scheme of India. World Conference on Transport Research. *Trasportation Research Procedia*. Vol. 48 (2020), 47-59. ISSN 2352-1465. Retrieved from https://doi.org/10.1016/j.trpro.2020.08.005.

MEASUREMENT MODEL OF THE SCHEME

When the RCS was proposed in 2016, the direct and indirect economic impact of the scheme was one of its stated objectives. Direct support for infrastructure development and employment of personnel in and around airports was also proposed. It was envisioned that initial concessions and support from the central and state governments would spur passenger traffic, resulting in socio-economic growth in the regions. A structured analysis is conducted in the subsequent sections to examine the impact of such government support on passenger and flight traffic.

At the same time, financial support was also provided to airlines using viability gap funding (VGF) and the setting up of a regional connectivity fund (RCF). These funds aimed to encourage airline operators to continue operating on a route despite initial losses. The hope was that competition, market forces, and the initial government support (through VGF and RCF) will make passenger traffic profitable as measured by sustained passenger load factors. As specific routes were contracted under the UDAN scheme, and only a few seats in each flight are subsidized (with the remaining seats sold at market rates, also called non-UDAN seats), we contrast UDAN passenger load factors against non-UDAN seats and traffic.

PERFORMANCE METRICS

Using the data discussed above, we consider the following performance metrics to assess the impact of UDAN at a regional, airport, and route level. These metrics largely capture the UDAN objective of improving the connectivity to underserved and unserved regions, their affordability, and sustainability.

1. **Passenger and flight traffic**
2. **Passenger load factor (PLF)**
3. **Fraction of non-UDAN seats in UDAN flights**
4. **Fare Ratio of UDAN and non-UDAN seats**

1. Passenger and flight traffic: The aggregate and relative trends in the passenger and flight traffic connecting UDAN airports provide insights into the year-on-year performance of the UDAN scheme. The relative trends specifically help us comment on how the underserved regions and airports have evolved. As seen in exhibit 5, we observe a steady month-on-month increase in the number of passengers and the number of flights on an aggregate level.

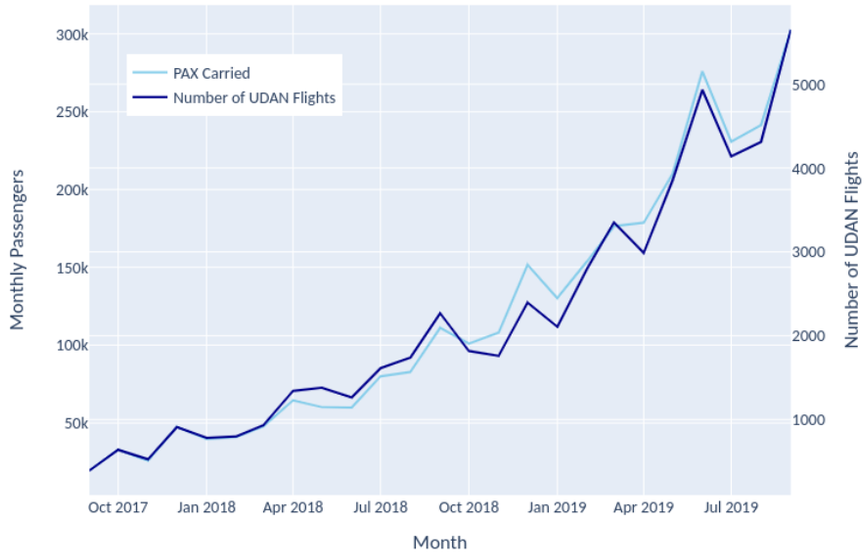

Exhibit 5: Monthly Passengers and UDAN Flights

The total number of UDAN flights increased from 390 in September 2017 to 5,240 in September 2019. There was a proportional increase in the number of UDAN passengers from 19400 in September 2017 to 277914 in September 2019.

2. Passenger load factor (PLF): The passenger load factor is the ratio of the total number of passengers in the flight to the aircraft capacity. At a route level, a higher PLF indicates a higher underlying demand for the route. It also shows the route is likely sustainable. PLF helps us comment on the relative performance of underserved and unserved regions vis-a-vis other regions at the regional level.

Exhibit 6 gives the PLF distribution across all routes. On average, the PLF is 0.66 (and a standard deviation of 0.20). Exhibit 7 gives the cumulative distribution. We observe more than half the flights have been flying at more than 70% capacity (PLF = 0.7).

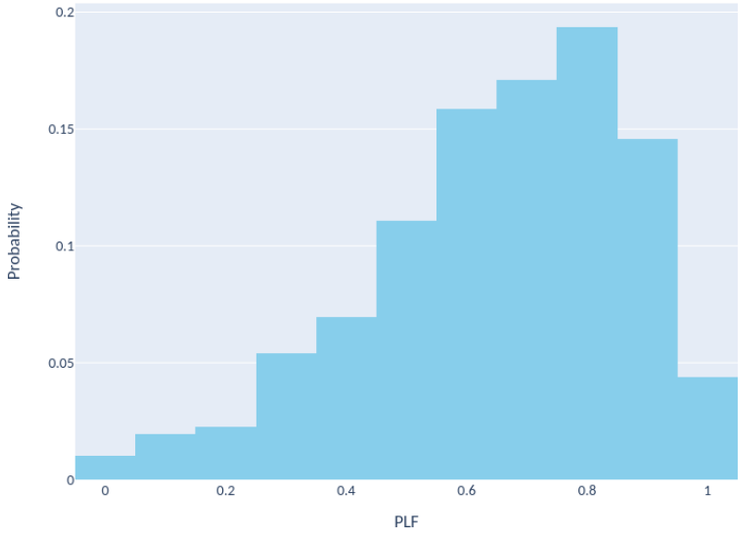

Exhibit 6: PLF Distribution

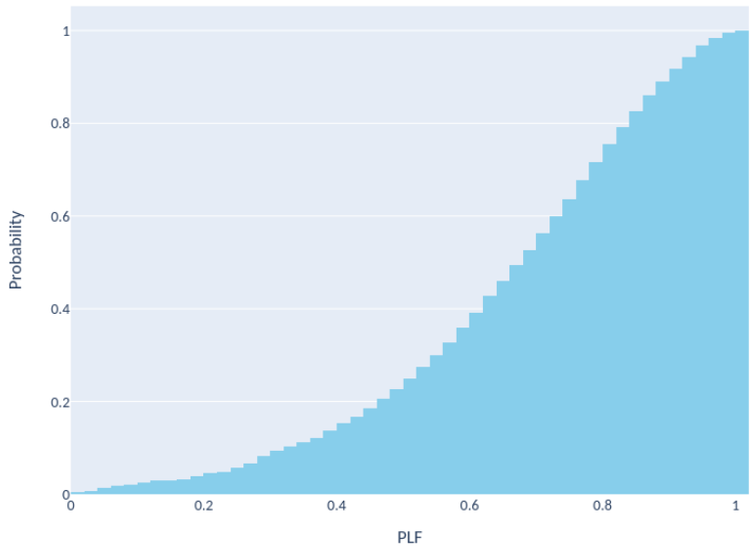

Exhibit 7: PLF Cumulative Distribution

3. Fraction of non-UDAN seats in UDAN flights: Fraction of non-UDAN seats in UDAN flights is the fraction of seats sold in a UDAN flight that are not subsidized. At the route level, this metric captures the demand over and beyond the subsidized seats. It helps assess the sustainability of the route. Like PLF, at a regional level, it helps compare the performance across regions. Exhibit 8 gives the distribution of the fraction of non-UDAN seats. The average value is 0.30 with significant variance (standard deviation of 0. 22). The peak around 0.7 corresponds to a subset of high-performing routes, including Jaipur-Jaisalmer, Mumbai-Porbandar, and Delhi-Kanpur. As we discuss later, the routes that connect with metros or major tourist towns perform well.

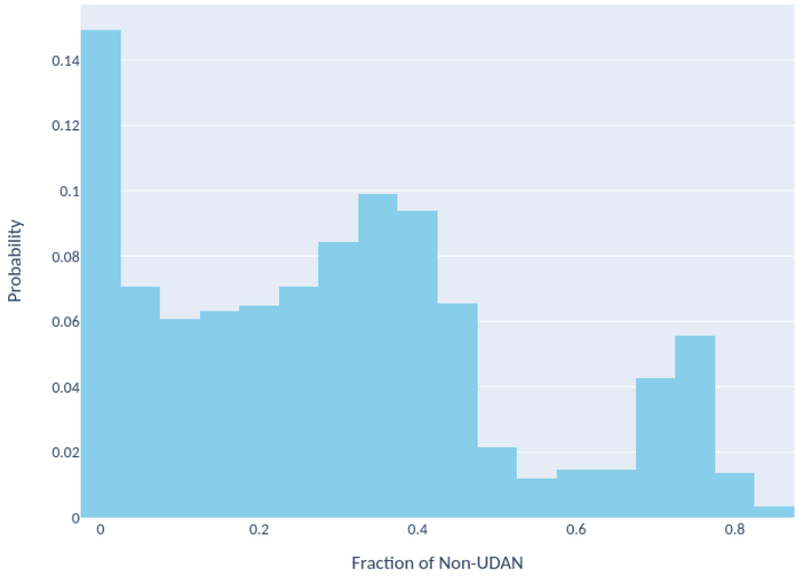

Exhibit 8: Non-UDAN Seats Distribution

4. Fare Ratio of UDAN and Non-UDAN Seats: A ratio of the maximum fare of non-UDAN seats to the maximum fare of UDAN seats on a given route and week. A higher value indicates that the demand for non-UDAN seats is robust and that passengers are willing to pay a higher amount. Exhibit 9 gives the fare ratio distribution. On average, the non-UDAN fares are higher than UDAN fares by a factor of 3.1.

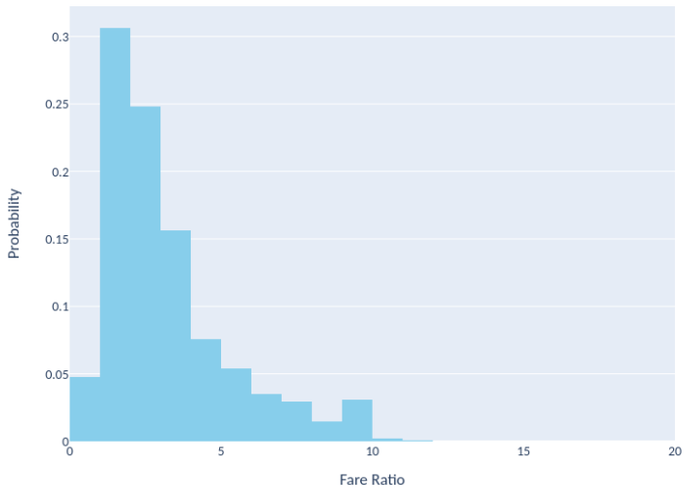

Exhibit 9: Distribution of Fare Ratio

CONNECTIVITY ANALYSIS AT A REGIONAL LEVEL

We first consider the regional differences with respect to the proportion of passenger and flight traffic flying into or out of a region. As shown in exhibit 10, the southern region has a higher proportion of passengers than the eastern, northeastern and central regions combined. In the subsequent discussion, we treat these three regions as underserved regions.

For the purposes of this analysis, we have classified the states and union territories into 6 contiguous regions. They are:

a. East – Bihar, Odisha, West Bengal
b. North East – Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura
c. Central – Madhya Pradesh, Uttar Pradesh, Chhattisgarh
d. West – Goa, Gujarat, Maharashtra, Daman & Diu
e. North – Chandigarh, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttarakhand
f. South – Andhra Pradesh, Karnataka, Kerala, Pondicherry, Tamil Nadu, Telangana

While the underserved regions contributed 6% of the overall passenger traffic in 2018, they have shown a statistically significant increase year on year, well-aligned with the RCS objective of improving connectivity to these regions. Specifically, we observe an increase of 6% in eastern, 5% in northeastern, and a 4% increase in central regions. It shows improving latent demand, which is being fulfilled by RCS flights.

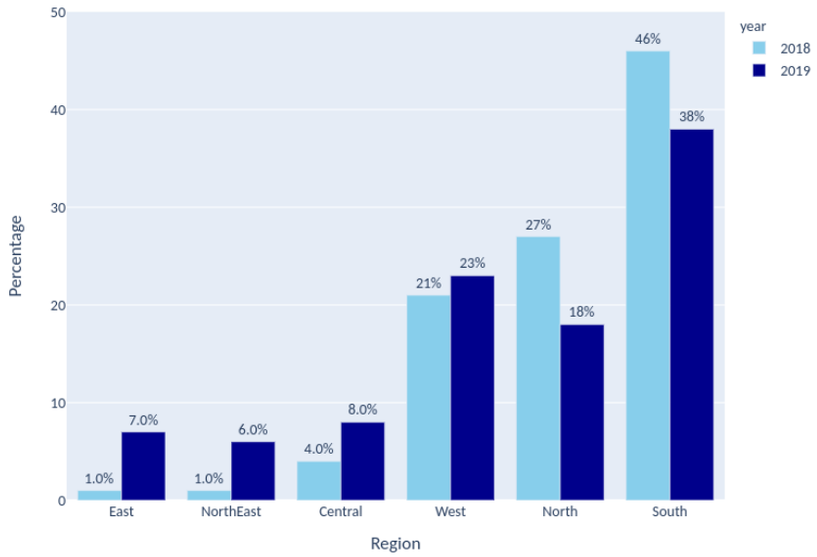

Exhibit 10: Percentage of Passengers by Region

We observe a similar trend for total UDAN flights. As shown in exhibit 11, while the total number of flights operating into or out of eastern, northeastern and central regions was lower compared to other regions, the statistically significant year-on-year increase shows a promising trend. It implies that the connectivity to these regions improved with a higher proportion of flights flying into or out.

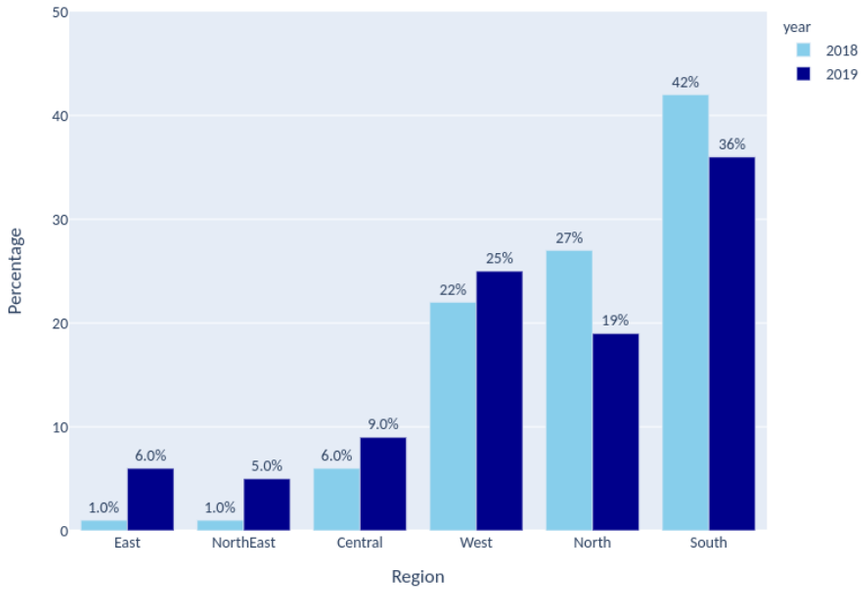

Exhibit 11: Percentage of UDAN flights by Region

With respect to percentage of passengers and UDAN flights flying into or out of each region, while **east, northeast and central regions underperformed** compared to other regions, they show a significant year on year increase from 2018 to 2019. This is a promising trend and **validates the UDAN objective of improving connectivity** to underserved and under connected regions.

Concerning PLF, which measures the underlying demand, we observe an increase in passenger load factor across all three regions. As shown in exhibit 12, for the northeast, we observed an increase from 0.4 in 2018 to 0.56 in 2019. Similarly, we observe an increase in eastern and central regions, which are statistically significant. It shows the flights connecting these regions are now operating at a higher capacity.

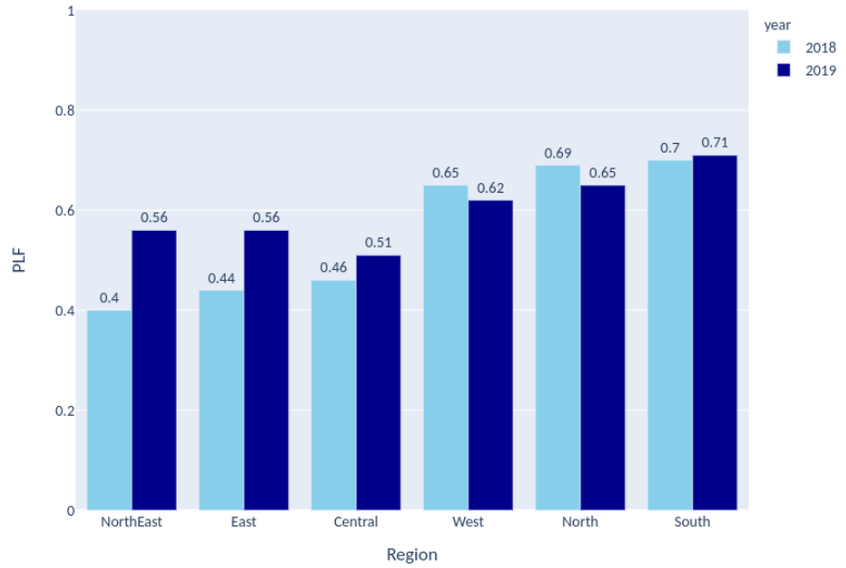

Exhibit 12: PLF by Region

The fraction of non-UDAN seats also shows a year-on-year increase for the underserved regions. As seen in exhibit 13, the fraction of non-UDAN seats in 2019 in the northeast is comparable with the better-connected regions of south, north, and west. A higher fraction of non-UDAN seats indicates the flights to these regions are sustainable, and there is a latent demand beyond the UDAN subsidized seats.

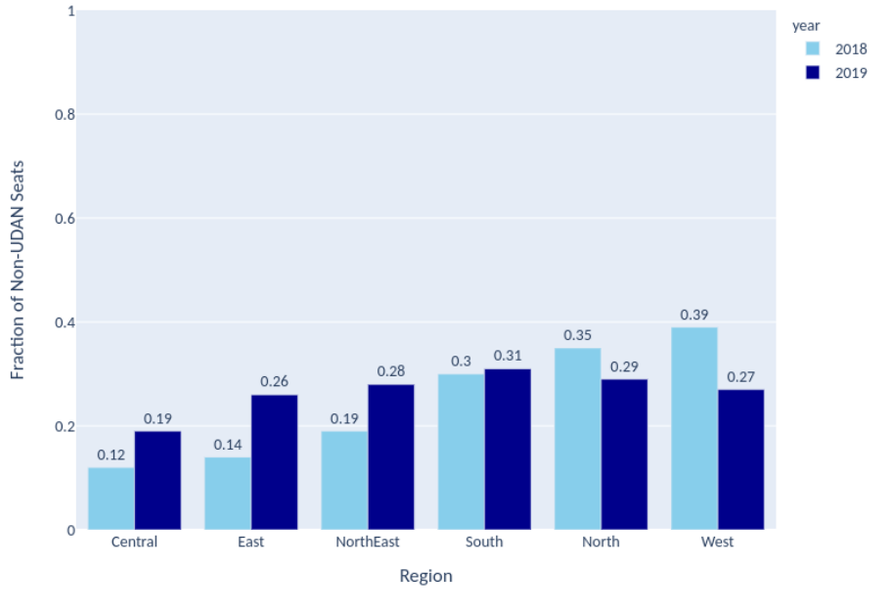

Exhibit 13: Fraction of Non-UDAN Seats by Region

With respect to **passenger load factor and fraction of non-UDAN seats**, we observe a **similar trend**. While **east, northeast, and central regions underperformed** in 2018 compared to other regions, they displayed a **significant year on year increase** from 2018 to 2019. The performance of northeast in 2019 especially was comparable to the better-connected regions like north and west. This **further validates the UDAN objective** of improving and establishing sustainable connectivity to underserved regions.

CONNECTIVITY ANALYSIS AT THE AIRPORT LEVEL

The RCS Scheme document classifies airports under the RCS Scheme broadly as 'underserved' and 'unserved.' We use this classification to guide our analysis of summary data at the airport level. The following describes the summary statistics for some of the airports.

Underserved airports - We examined the difference in average passenger traffic per month before and after the operationalization of the RCS Scheme for each of the airports classified as underserved airports. The following exhibit 14 shows the difference in average passenger traffic per month for select underserved airports. The first four airports, i.e., Hubli, Allahabad, Belgaum and Durgapur, have the highest difference (among all underserved airports) in average passenger traffic per month after and before the UDAN scheme was operationalized. The last four airports, i.e., Shillong, Jamnagar, Diu and Tezpur, have the lowest difference in average passenger traffic per month after and before the UDAN scheme was operationalized at the airports (for airports for which data was available).[19] We note that only Tezpur airport has a lower average passenger traffic after UDAN than before.

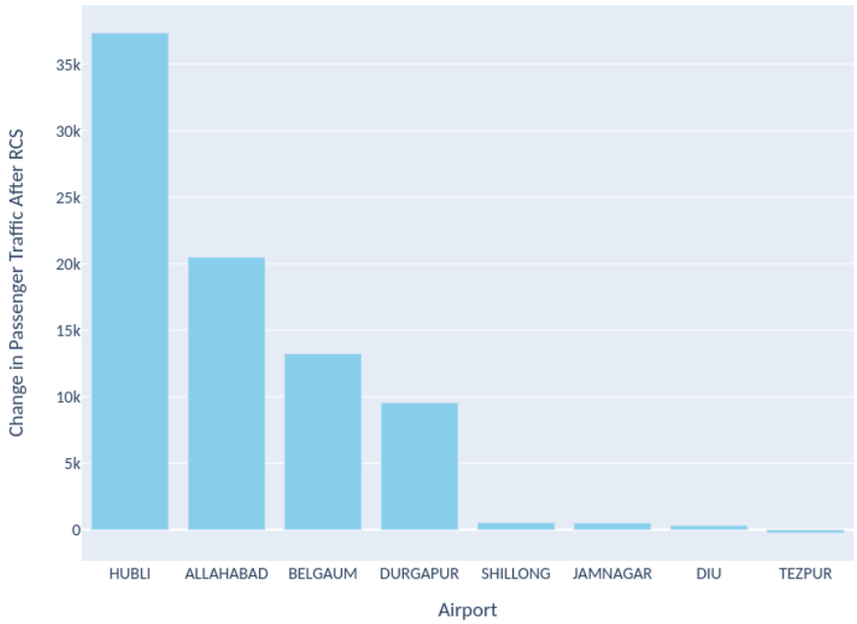

Exhibit 14: Difference between Average Passenger Traffic After and Before UDAN: Underserved Airports

[19] Jagdalpur airport was excluded from this analysis because the airport showed period of zero traffic after the UDAN scheme was operationalized.

Among the **underserved airports**,

- **Hubli** has shown the **highest increase in average passenger traffic** after UDAN was operationalized.
- **Tezpur** has shown a **decrease in average passenger traffic** after UDAN was operationalized.

The mean fraction of non-UDAN seats sold on flights to and from the above airports observed from the beginning of the scheme to October 2019 is as in the exhibit 15 below:

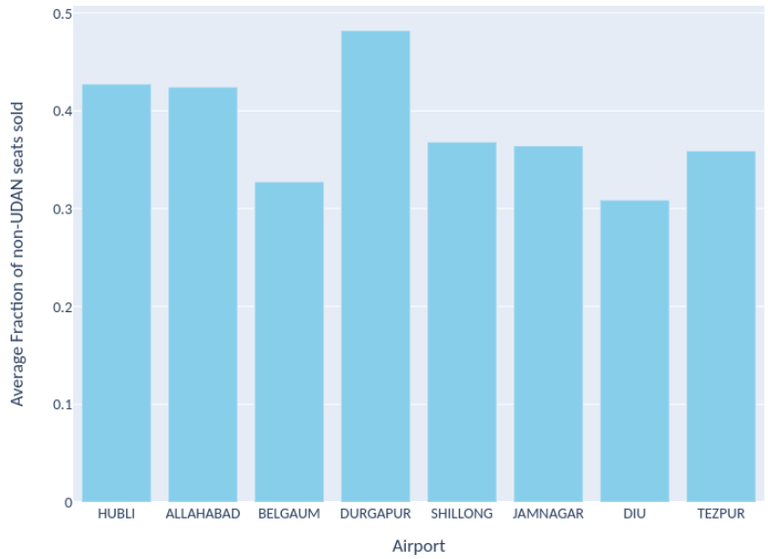

Exhibit 15: Mean Fraction of Non-UDAN Seats Sold: Underserved Airports

Among the **underserved airports**, there is **no clear trend** in the manner by which the **average fraction of non-UDAN seats sold** vary across airports (among the eight underserved airports considered).

The following exhibit 16 shows the difference between the recorded fraction of non-UDAN seats sold on flights to and from the above airports from the start of UDAN at the respective airports to the last recorded observation for the above airports:

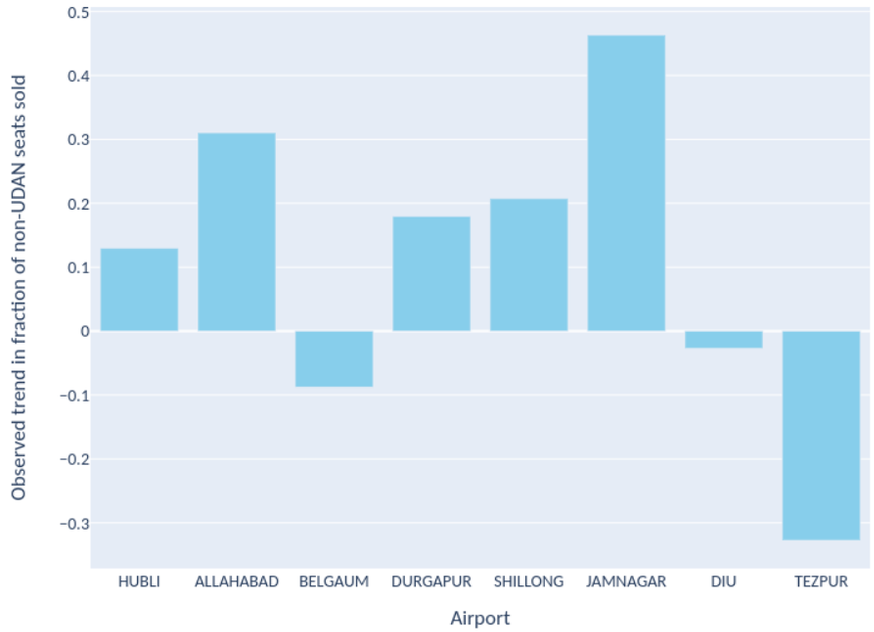

Exhibit 16: Fraction of Non-UDAN seats sold: Difference between the Most Recent Observation and the Earliest

Among the **underserved airports**, some airports have exhibited an **overall decreasing trend in the fraction of non-UDAN seats sold**. In particular, **Diu, Tezpur, and Belgaum** airports show a negative trend in the fraction of non-UDAN seats sold on flights to and from Diu, Tezpur and Belgaum airports respectively from the first recorded observation to the last recorded observation.

Unserved airports - We examined the difference in average passenger traffic per month before and after UDAN for each of the airports under the UDAN scheme classified as unserved airports. As shown in exhibit 17, the first four airports, i.e., Kanpur, Jaisalmer, Nanded and Kishangarh, show the highest average airport passenger traffic per month after UDAN was operationalized. The last four airports, i.e., Ludhiana, Pathankot, Bhatinda, and Shimla, show the lowest average airport passenger traffic per month after UDAN was operationalized (for airports for which data was available).[20]

[20] Pakyong, Jalgaon, Jharsuguda, Pithoragarh, Hindon, and Kalaburagi were excluded from this analysis either because of missing data or because of periods of zero traffic after the operationalization of the UDAN scheme.

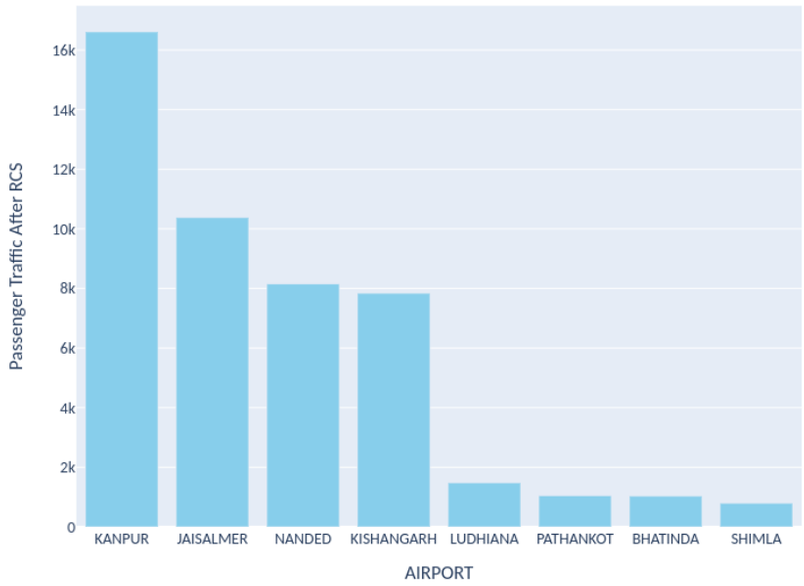

Exhibit 17: Airport Passenger Traffic After UDAN: Unserved Airports

Among the **unserved airports**,

- **Kanpur** has shown the **highest increase in average passenger traffic** among unserved airports after UDAN was operationalized.
- **Shimla** has shown the **smallest increase in average passenger traffic** among unserved airports after UDAN was operationalized.

The mean fraction of non-UDAN seats sold on flights to and from the above airports observed since the beginning to October 2019 is as in the exhibit 18 below:

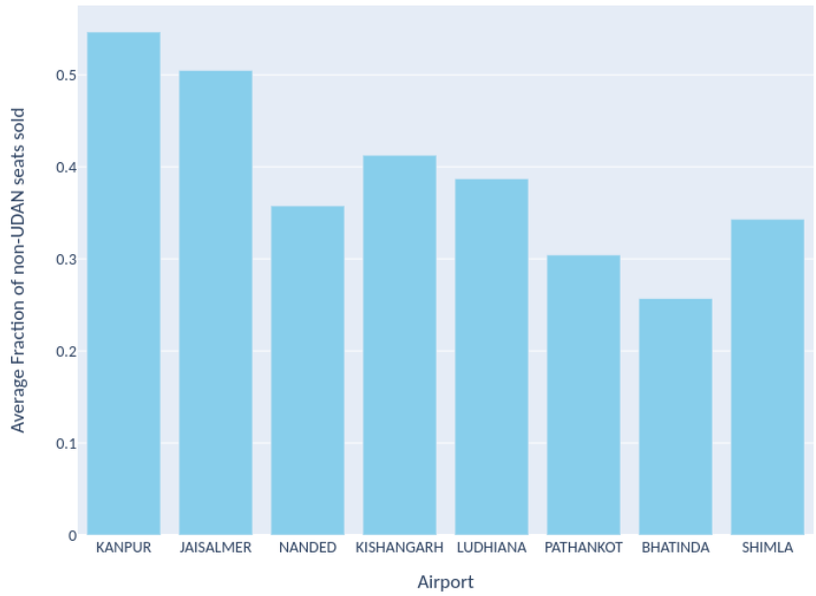

Exhibit 18: Mean Fraction of Non-UDAN Seats Sold

Among the **unserved airports**, there is **no clear trend** in the manner by which the **average fraction of non-UDAN seats sold** vary across airports (among the eight underserved airports considered).

The following exhibit 19 shows the difference between the recorded fraction of non-UDAN seats sold on flights to and from the above airports from the start of UDAN at the respective airports to the last recorded observation:

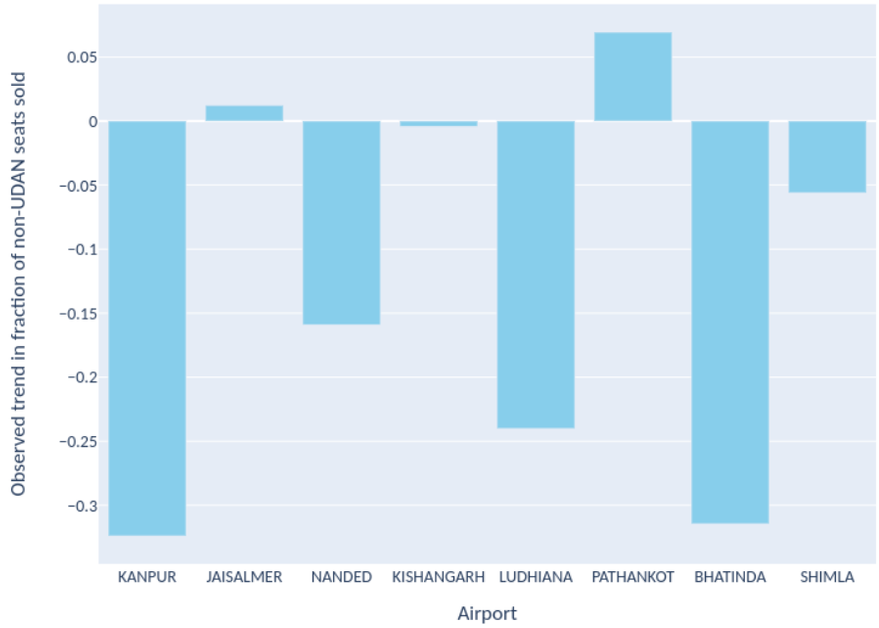

Exhibit 19: Fraction of Non-UDAN Seats Sold: Difference between the Most Recent Observation and the Earliest

Among the **unserved airports**, some airports have exhibited **an overall decreasing trend in the fraction of non-UDAN seats sold**. In particular, **Kanpur, Nanded, Kishangarh, Ludhiana, Bhatinda, and Shimla** show a decreasing overall trend in the fraction of non-UDAN seats sold to and from Kanpur, Nanded, Kishangarh, and Shimla from the first recorded observation to the last recorded observation.

NEXT STEPS

While we observe year-on-year increases across various metrics for the northeast, central and eastern regions, whether these trends sustain in 2020 and beyond, given the adverse impact of COVID on the airline industry, would help further establish long-term sustainability of flights in these regions. Beyond the regional level, state-specific differences can also be analyzed. Correlating these differences with the state's policies and their involvement in the UDAN scheme can help design policies that address issues specific to the states.

Furthermore, an important metric that the RCS Scheme is keeping track of is the non-UDAN passenger traffic. Some airports show an overall decreasing trend in the non-UDAN passenger traffic from the

UDAN scheme's operationalization date. Such factors are airport and route-specific, and studies can be conducted at the level of a specific airport to ascertain the causes. Some airports show an increasing overall trend in the non-UDAN passenger traffic from the UDAN scheme's operationalization data. The reasons for this may be specific to the airport and the routes. Analyzing the reasons may allow us to explore policy changes to the provision of the VGF. For instance, one can envision a re-classification of airports where airports (and the routes that connect them) can be re-categorized using non-UDAN passenger data from the past years with lower VGF support to routes that perform well on this metric.

Finally, additional data are required to measure the socio-economic impact of the scheme. While the analysis is beyond the scope of this phase-1 report, we recommend that future extensions analyze the scheme's impact on important socio-economic factors.

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